Final

Non-CERCLA
Decision Document
Lightning Strike/Burn Area (FT001)
Aircraft Mock-up Area/Fire Training Area/
Abandoned Drum Disposal Area (FT002)
Fire Department Foam Training Area (FT003)

Final

EARECKSON AIR STATION, ALASKA

Prepared By

United States Air Force
Pacific Air Forces
JBER, Alaska

September 2010

Final

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Acronyms

µg/L	micrograms per liter
AAC	Alaska Administrative Code
ADDA	Abandoned Drum Disposal Area
ADEC	Alaska Department of Environmental Conservation
AFFF	Aqueous film-forming foam
AK	Alaska Test Method
Army	U.S. Army
AS	Air Station
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
DRO	diesel range organic
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
ERP	Environmental Restoration Program
FS	Feasibility Study
FTA	Fire Training Area
GRO	gasoline range organic
HHERA	Human Health and Ecological Risk Assessment
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IC	Institutional Controls
IRP	Installation Restoration Program
JBER	Joint Base Elmendorf-Richardson
LUC	land use control
MA	Mock-up Area
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	Monitored Natural Attenuation
msl	mean sea level
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
Plan	Eareckson AS Base General Plan
RAATM	Risk Assessment Assumptions Technical Memorandum

RAO	remedial action objective
RBCL	risk-based cleanup level
RI	Remedial Investigation
RME	reasonable maximum exposure
RRO	residual range organics
SVOC	semi-volatile organic compound
SW	EPA Solid Waste Method
TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
TCE	trichloroethylene
TPH	Total Petroleum Hydrocarbons
USAF	U.S. Air Force
UST	underground storage tank
USGS	U.S. Geological Survey
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):	Lightning Strike/Burn Area (FT001) Aircraft Mock-Up Area/Fire Training Area/Abandoned Drum Disposal Area (FT002) Fire Department Foam Training Area (FT003)

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 three Environmental Restoration Program (ERP) sites listed above at Eareckson AS, Alaska. The USAF has selected these remedies and this Decision Document is issued by the USAF in accordance with, and satisfies the requirements of the: Defense Environmental Restoration Program, 10 United States Code 2701 et seq., and the Alaska Oil and Hazardous Substance Pollution Control Act, 18 Alaska Administrative Code (AAC) 75. The State of Alaska Department of Environmental Conservation (ADEC) has determined that proper implementation of the selected remedy will comply with state law. The U.S. Environmental Protection Agency (EPA) 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 sites at Eareckson AS.

Petroleum substances are present at concentrations above 18 AAC 75 Method Two cleanup levels and in the groundwater exceeding Table C levels established in Alaska Site Cleanup Rules (18 AAC 75.325 through 75.390. Institutional controls (ICs) at sites FT001, FT002, and FT003, along with Monitored Natural Attenuation (MNA) at FT002 and FT003, are being implemented as part of the remedial alternative for the three ERP sites under Alaska State regulations (including but not limited to Title 46 of the Alaska Statutes and the regulations promulgated there under).

1.3 Assessment of Sites

1.3.1 Assessment Under CERCLA

Based on the results of environmental investigations conducted at the three ERP sites addressed in this Decision Document, no Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances are considered contaminants of concern (COCs), or contaminants of ecological concern, and the USAF has determined that no action is necessary under CERCLA to protect public health or welfare or the environment at any of the sites. As lead agent under CERCLA, the USAF has issued a no action Record of Decision under separate cover for these sites – in part because petroleum is not considered a hazardous substance under the CERCLA petroleum exclusion (see 42 United States Code 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

At the Lightning Strike/Burn Area (FT001), human health or ecological risks from soil and groundwater are acceptable provided that the land use does not include subsurface activities. ICs to restrict excavations, installation of groundwater wells, and other subsurface activities are the selected remedy to protect human health and the environment at FT001.

The Aircraft Mock-up Area (MA), Fire Training Area (FTA), and Abandoned Drum Disposal Area (ADDA) together comprise FT002 and cannot support unrestricted use due to petroleum hydrocarbons remaining in place. ICs, with MNA of groundwater, is the selected remedy for FT002-MA. At FT002-FTA, the remedy is ICs to restrict subsurface activities. ICs, with MNA of surface water and sediments, is the selected remedy for FT002-ADDA.

At the Fire Department Foam Training Area (FT003) the risks to human health and the environment identified were due to metals (aluminum and chromium) that are believed to be naturally occurring. However, petroleum hydrocarbon levels in the subsurface soils and groundwater exceed ADEC cleanup levels. The selected remedy at FT003 includes ICs to restrict subsurface activities and MNA of groundwater. Additional sampling and analysis for metals in the site groundwater will also be conducted to substantiate that the metals are naturally occurring.

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 FT001, FT002, and FT003 at Eareckson AS were developed and evaluated through a Remedial Investigation/Feasibility Study (RI/FS) (USAF, 1995; 1996a, b, and c), other investigations (as described in Section 2), and Human Health and Ecological Risk Assessments (USAF, 2006). Based on the results of these investigations and studies, the USAF selected ICs as the preferred alternative for FT001, ICs in combination with MNA for FT002, and ICs for FT003. The selected remedies for these sites 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 disturb contaminants and affect the performance of the other components of the selected remedies and maintain current land uses, while protecting human health and the environment.

- **Lightning Strike/Burn Area (FT001).** FT001 is a bermed area approximately 100 feet in diameter located near the southwestern end of the island, approximately 500 feet south of South Road. FT001 was used to burn wood and other combustible debris for fire training activities from the early 1970s to the mid-1980s. The site was covered with 2 feet of clean fill in 1987. FT001 contains no structures and is currently undeveloped.

  The site has widespread concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels exceeding ADEC's most stringent cleanup levels. Therefore, ICs will be put into place to prevent disturbing contaminated soil and groundwater at the site without ADEC approval.

- **Aircraft Mock-Up Area/Fire Training Area/Abandoned Drum Disposal Area (FT002).** FT002 is located in the western end of the island, at the intersection of the north-south runway (abandoned Runway B) and the southwest-northeast runway (abandoned Runway C). It consists of three areas: MA, FTA, and ADDA. An inactive bioventing system is located at FT002-MA. The bioventing system consists of eight bioventing wells connected by piping to a small blower house.

  At **FT002-FTA** concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels still exceed ADEC's most stringent cleanup levels. Therefore, ICs will be put into place to prevent disturbing soil or groundwater at the site without ADEC approval.

  At **FT002-MA** groundwater is contaminated with petroleum hydrocarbons at concentrations that exceed ADEC groundwater cleanup levels. ICs will be put into place to prevent disturbance of the subsurface at the site and groundwater sampling will be conducted once every 2 years to monitor the natural attenuation of remaining contaminants. In addition, the groundwater will be re-sampled for metals to verify assumptions made during the remedial investigations, risk assessments, and in this decision document.

At **FT002-ADDA** fuel-related compounds remain in sediments and surface water at the site. Again, ICs will be instituted to protect against disturbance of contaminated media. The ecological risk assessment conducted in 2006 identified diesel range organics (DRO) and residual range organics (RRO) concentrations in sediments and RRO concentrations in surface water above the ecological hazard criterion for the rock sandpiper. Therefore, sediment and surface water sampling will be conducted once every 2 years to monitor the natural attenuation of contaminants. In addition, the surface water will be re-sampled for metals to verify assumptions made during the remedial investigations, risk assessments, and in this Decision Document.

- **Fire Department Foam Training Area (FT003).** FT003 is located in the west central area of the island, north of the western lakes complex and approximately 800 feet to the northwest of Lower Lake. Originally, this area consisted of a hangar building that was removed at some unknown time. A small concrete structure was built at the former hanger location and used for fire training activities. Items burned at the site include wood, paper, fuels (including JP-4 and diesel), and miscellaneous combustible materials. Prior to 1993, the concrete structure was removed and up to 4 feet of backfill was placed at this source area.

  Concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels at the site exceed ADEC's most stringent cleanup levels. Therefore, ICs will be put into place to prevent contaminated soil and groundwater at the site from being disturbed without ADEC approval and groundwater sampling will be conducted once every 2 years to monitor the natural attenuation of remaining contaminants. In addition, the surface water and groundwater will be re-sampled for metals to verify assumptions made during the remedial investigations, risk assessments, Record of Decision, and in this Decision Document.

The USAF will implement, monitor, maintain, and enforce the ICs identified below in accordance with State of Alaska 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-contaminated soils or groundwater 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 the sites to restrict excavation of soil and restrict groundwater use. The Plan will contain a map indicating site locations, with restrictions on any invasive activities that could potentially compromise the integrity of soil covers and expose potential contaminants. Dig permits issued by the Base Operating Contractor are required for any excavation or well installation at Eareckson AS. The objective of the ICs are to prevent access or use of soil and groundwater contaminated with petroleum hydrocarbons, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). Prior to approving a permit, the Plan will be reviewed to ensure that invasive activities are not taking place within the boundary of the sites where land use has been restricted.
- The remedy has been selected under state law and the USAF will obtain prior concurrence from ADEC to terminate the ICs, modify current land use, or allow anticipated actions that

might disrupt protectiveness of ICs. In the unlikely event that the property is to be transferred, the USAF will notify ADEC at least 30 days prior to any transfer taking place.

- The ICs will remain in effect until the petroleum hydrocarbon concentrations, VOCs, and SVOCs in soil are determined to be less than the ADEC 18 AAC 75.341 Method Two cleanup levels and groundwater meets the cleanup levels listed in 18 AAC 75.345, Table C.
- The Air Force will ensure, as appropriate, that any contractor, tenant, or other authorized occupant of land subject to land use controls (LUCs) is informed of the LUCs and is made subject to the requirements of such LUCs.

USAF will enforce the ICs by the following actions:

- Update USAF land records and the Plan to include site boundaries and the IC requirements. The ERP site boundaries shown on Figures 2-2, 2-3, and 2-4 are based on existing surveys and observations, including observation of disturbed soil, visible debris, and plant growth, and/or geophysics, and will be considered site boundaries for the ICs.
- Perform visual inspections in conjunction with MNA sampling to verify effectiveness of the ICs and report inspection results to ADEC. Inspection reports will be prepared no less than once every 5 years to evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. This will include:
  - Any activity that is inconsistent with the IC requirements, objectives, or controls, or any action that may interfere with effectiveness of the IC shall be addressed by USAF as soon as practicable after discovery, but in no case will the process be initiated later than 10 days after the USAF becomes aware of the breach.
  - USAF shall provide notice to ADEC as soon as practicable after discovery of any activity that is inconsistent with IC requirements, objectives, or controls, or any action that may interfere with the effectiveness of the IC.
- In the event that the ICs fail or are deficient and could imminently lead to actual risk to human health and the environment, USAF will address the situation promptly, including notification of ADEC.
- USAF will obtain ADEC approval prior to conducting any excavation or well installation activities with the contaminated areas.

In addition to ICs at FT002-MA, MNA will be conducted. MNA will consist of groundwater monitoring once every 2 years by collecting groundwater samples analyzed for the following:

- Gasoline range organics (GRO) by Alaska Test Method (AK)101
- DRO by AK102
- RRO by AK103
- Benzene, toluene, ethylbenzene and xylenes (BTEX) by EPA Solid Waste Method 846 (SW)8260B
- Polynuclear aromatic hydrocarbons (PAHs) by SW8270C

A monitoring report will be provided to ADEC following each monitoring event. Groundwater monitoring can be discontinued after contaminant concentrations fall below the levels listed in Table 2-6 (Section 2.9.2) for two consecutive monitoring events.

In addition to ICs at FT002-ADDA, MNA will be conducted. MNA will consist of monitoring surface water and sediments at sample locations FT002-ADA, FT002-ADB, and FT002-ADC. Surface water and sediment samples will be collected at each of the three sample locations every 2 years and analyzed for the following:

- DRO by AK102 (sediment only)
- RRO by AK103
- Total aromatic hydrocarbons (TAH) by SW8260B
- Total aqueous hydrocarbons (TAqH) by SW8260B and SW8270C

Surface water and sediment monitoring can be discontinued after contaminant concentrations fall below the levels listed in Table 2-6 (Section 2.9.2) for two consecutive monitoring events.

In addition to ICs at FT003, MNA will be conducted. MNA will consist of groundwater monitoring once every 2 years by collecting groundwater samples and analyzing for the following:

- DRO by AK102
- VOCs by SW8260B
- SVOCs by SW8270C

To verify the conclusion that the metals in the groundwater and surface water at FT002 and FT003 are at naturally occurring concentrations, additional groundwater and surface water sampling for metals will be performed. Groundwater will be sampled at FT002-MA, surface water at FT002-ADDA, and both groundwater and surface water at FT003. The sampling will be conducted within 5 years and the results reported to ADEC. The samples will be analyzed for the following metals by EPA Method 6020A (7471A for mercury):

- Aluminum
- Antimony
- Arsenic
- Barium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Silver

The results of the groundwater and surface water metals re-sampling will be compared to Table 1-1 to evaluate whether the concentrations are naturally occurring or exceed ADEC levels. If the results indicate that the concentrations do not appear to be naturally occurring, then the selected remedy may need to be reassessed.

Table 1-1
Groundwater and Surface Water Metals Cleanup and Background Levels

Metal	ADEC Groundwater Cleanup Level[1] (mg/L)	Groundwater Background Level[2] (mg/L)	ADEC Surface Water Cleanup Level[3] (mg/L)	Surface Water Background Level[4] (mg/L)
Aluminum	0.05	34.87	0.087 (total)	0.8970
Antimony	0.006	ND	0.006	ND
Barium	2.0	0.660	2	0.0070
Cadmium	0.005	0.0022	Exp{0.7409[ln(hardness)] – 4.719} * {1.101672-[ln(hardness)(0.041838)]}	ND
Chromium (total)	0.10	0.048	0.100 (total)	ND
Lead	0.015	0.0197	Exp{1.273[ln(hardness)] – 4.705} * {1.46203-[ln(hardness)(0.145712)]}	0.0057
Mercury	0.002	ND	0.77 (dissolved)	ND
Selenium	0.05	0.0027	5.0	0.0026
Silver	0.10	0.0012	Exp{1.72[ln(hardness)] – 6.59} * 0.85	ND

Key:
1 – From 18 AAC 75.345, Table C
2 – From the 1995 RI/FS report (USAF, 1995), Volume I, Table 3.3-6, 97.5 percentile
3 – From 18 AAC 70.020, most stringent value listed.
4 – From the 1995 RI/FS report (USAF, 1995), Volume I, Table 3.3-7, 97.5 percentile
AAC – Alaska Administrative Code
mg/Kg – milligrams per kilogram
mg/L – milligrams per liter
RI/FS – Remedial Investigation/Feasibility Study

1.5 Statutory Determinations

The selected remedies for the three ERP sites are protective of human health and the environment, comply with promulgated requirements, and are cost effective. The selected remedies represent the maximum extent to which permanent solutions can be used in a practicable manner at the three ERP sites. The remedies selected for ERP Sites FT001, FT002, and FT003 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 FT001, FT002, and FT003 for Eareckson AS, Alaska, which can be found at http://www.adminrec.com, and includes:

- List of COCs and their respective concentrations:
  - FT001: Petroleum hydrocarbons, benzene, ethylbenzene, antimony, arsenic, cadmium, and chromium concentrations in soil exceed ADEC Method Two cleanup levels. These COCs did not exceed ADEC Method Four risk-based cleanup levels (RBCLs).
  - FT002: Petroleum hydrocarbons and BTEX concentrations exceed ADEC's most stringent cleanup levels for soil and groundwater. RRO in surface water and DRO and RRO in sediments exceed ADEC Method Four RBCLs for ecological receptors.
  - FT003: Petroleum hydrocarbon concentrations exceed ADEC's most stringent cleanup levels in soil and groundwater. Naturally-occurring aluminum in surface water and aluminum and chromium in groundwater exceed ADEC Method Four RBCLs for human and ecological receptors.
- 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.

  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 groundwater used in the baseline risk assessment and Decision Document.

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

  See **Section 2.12** – Selected Remedy

1.7 Authorizing Signatures

This signature sheet documents the USAF and ADEC's approval of the remedy selected in this Decision Document for ERP Sites FT001, FT002, and FT003 at Eareckson AS, Alaska. ADEC has determined that proper implementation of the USAF's selected remedy will comply with State laws. This decision may be reviewed and modified in the future if information becomes available and/or confirmation sampling indicates the presence of contamination or exposure routes that might cause an unacceptable risk to human health or the environment.

ROBYN M. BURK, COLONEL, USAF Commander, 611th Air Support Group JBER, Alaska	DATE
JOHN HALVERSON, Environmental Program Manager Federal Facilities Section, Contaminated Sites Program Alaska Department of Environmental Conservation	Date

2.0 Decision Summary

The Decision Summary identifies the Selected Remedy for each of the three ERP sites addressed in this Decision Document, explains how each 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 Hazard ID Number:	Lighting Strike/Burn Area (**FT001**) – 59 Aircraft Mock-Up Area/Fire Training Area/Abandoned Drum Disposal Area (**FT002**) – 42 Fire Department Foam Training Area (**FT003**) – 2844
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 JBER, AK 99506-2200

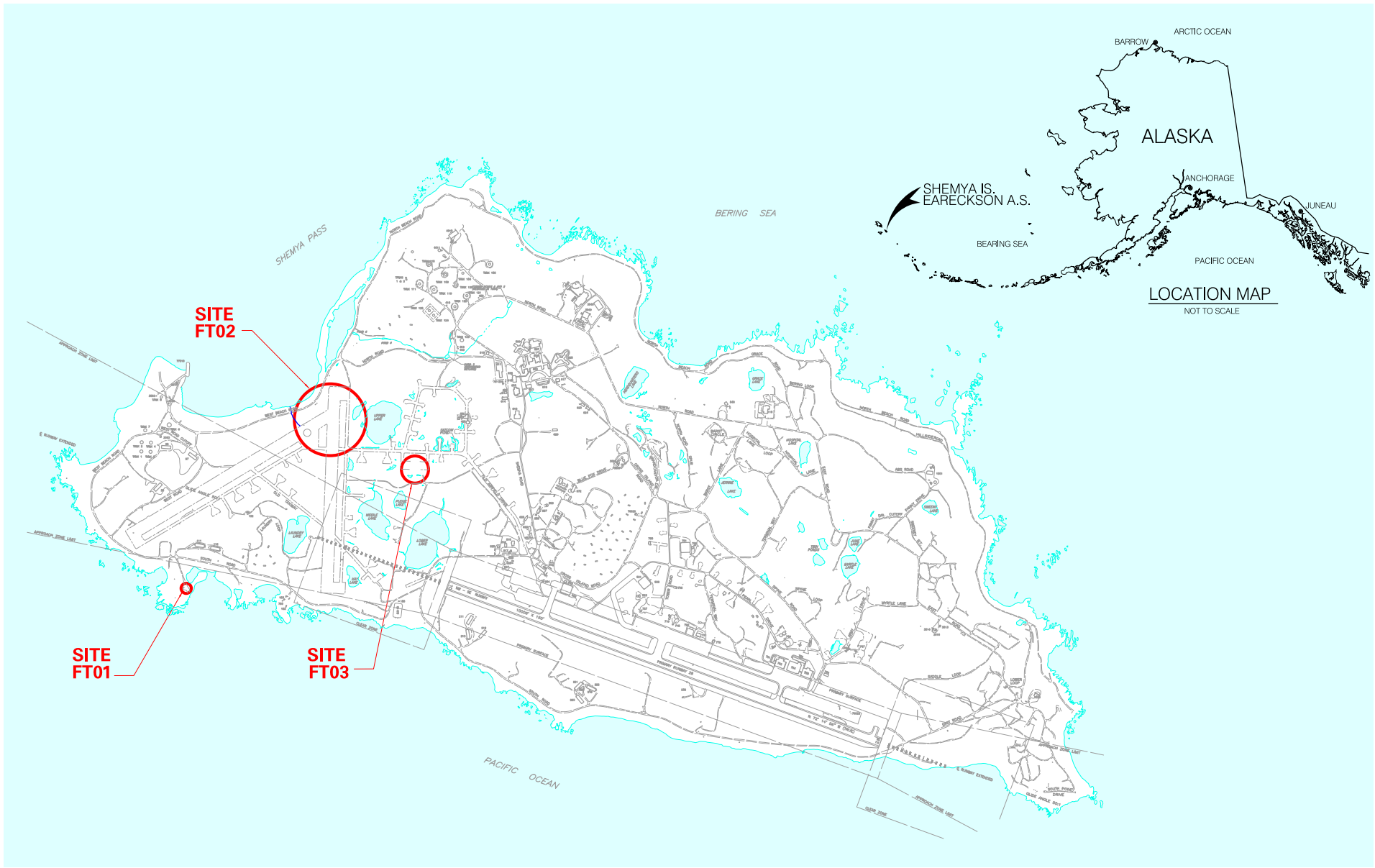
Eareckson AS occupies all of Shemya Island, located approximately 1,500 miles southwest of Anchorage, Alaska, at the westernmost tip of the Aleutian Islands (**Figure 2-1**). Shemya Island is part of the Near Islands group of the Aleutian Archipelago. The island is approximately 4.5 miles long and 2 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 three ERP sites addressed in this Decision Document are described briefly as follows:

- **Lightning Strike/Burn Area (FT001).** FT001 is a bermed area approximately 100 feet in diameter located near the southwestern end of the island, approximately 500 feet south of South Road (**Figure 2-2**). FT001 was used to burn wood and other combustible debris for fire training activities from the early 1970s to the mid-1980s. The site was covered with 2 feet of clean fill in 1987. FT001 contains no structures and is currently undeveloped.
- **Aircraft Mock-Up Area/Fire Training Area/Abandoned Drum Disposal Area (FT002).** FT002 is located in the western end of the island, at the intersection of the north-south runway (abandoned Runway B) and the southwest-northeast runway (abandoned Runway C). It consists of three areas: MA, FTA, and ADDA (**Figure 2-3**).

JOB No. 1851213.10010401 TIME: 29-SEP-2010 10:18 FILE: D:\CAD\Proj\afcee\shemya\DecesionDoc2007\FT01-FT02-FT03\NON-CERCLA\FINAL\FIG2-1.dgn



NORTH
SCALE IN FEET
0 3000

FIGURE 2-1

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
FT01, FT02, AND FT03 NON-CERCLA DECISION DOCUMENT

LOCATION AND VICINITY MAP

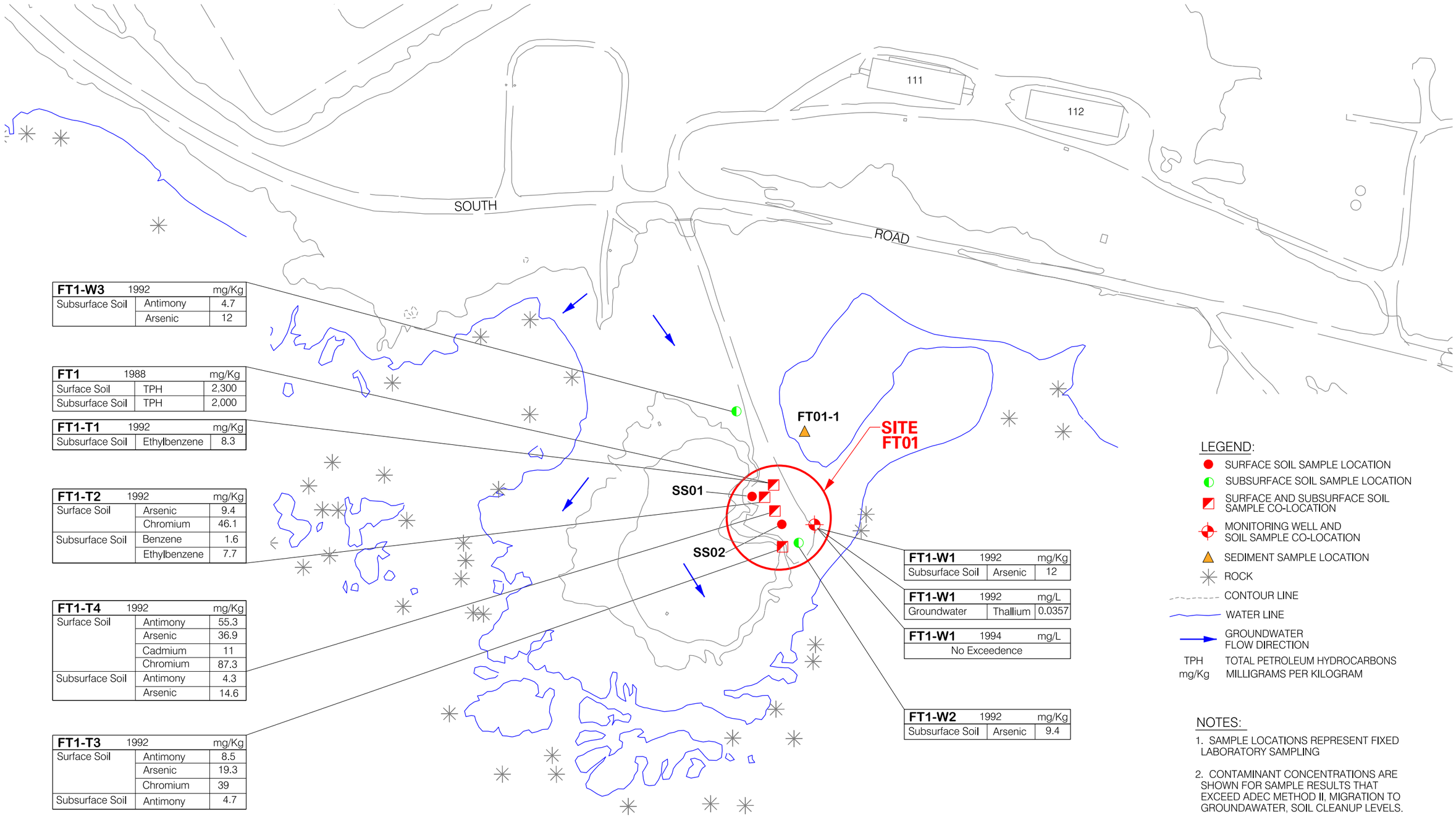


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FIGURE 2-2

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
FT01, FT02, AND FT03 NON-CERCLA DECISION DOCUMENT

FT01 SITE MAP WITH SAMPLE LOCATIONS

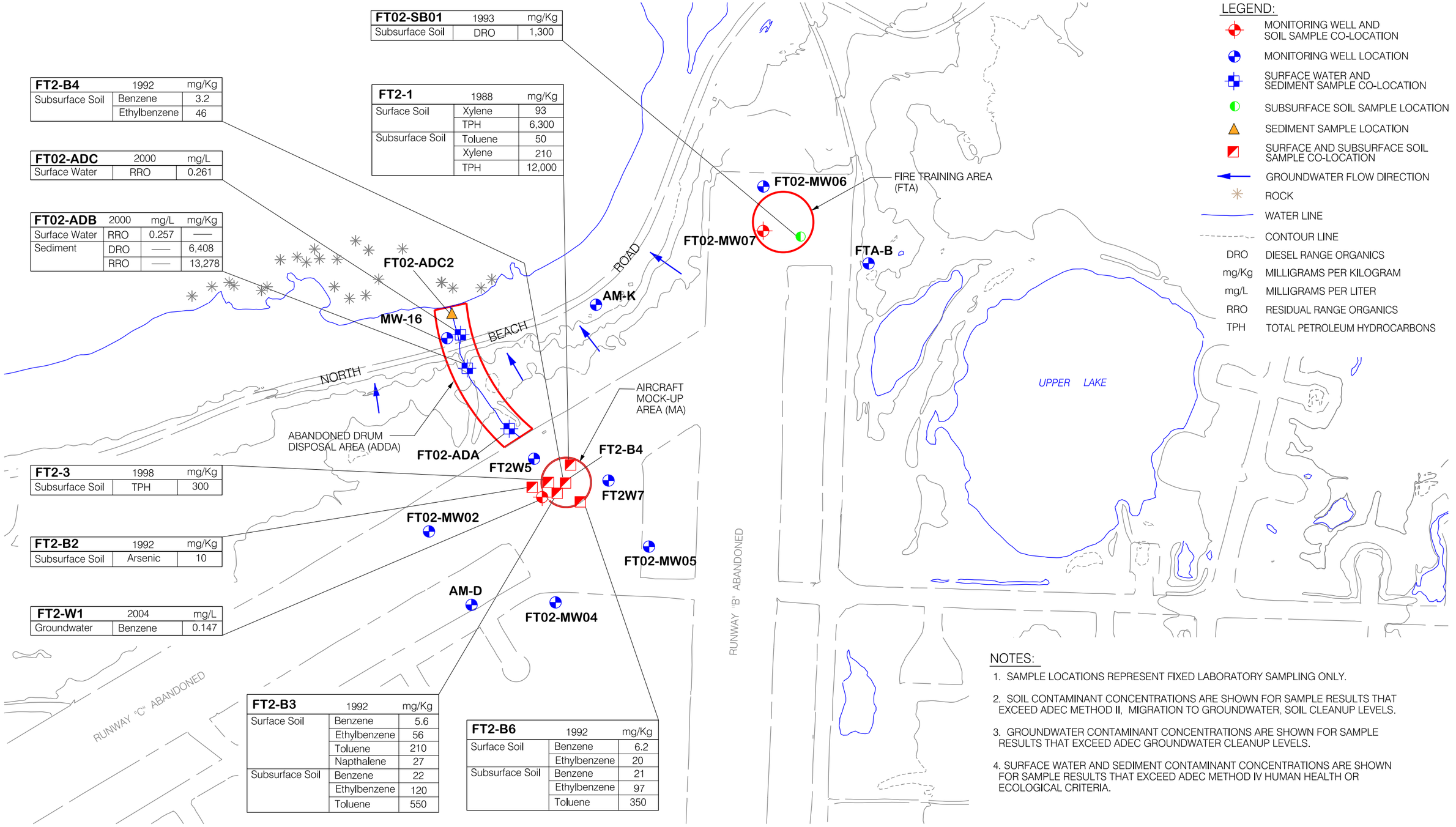

FIGURE 2-3

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
FT01, FT02, AND FT03 NON-CERCLA DECISION DOCUMENT

FT02 SITE MAP WITH SAMPLE LOCATIONS

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The MA was used for fire-fighting training from 1983 to 1988. Cylindrical tanks were configured to resemble an aircraft fuselage, which were located within two concentric earthen berms on asphalt. Petroleum products were used as accelerants during fire training at the site. From 1996 through 2000, a bioventing system was installed and operated to remediate petroleum contamination. The bioventing system consists of eight bioventing wells connected by piping to a small blower house.

The FTA was used for fire training activities from the early 1970s to the mid-1980s. Debris and approximately 1,100 cubic yards of petroleum contaminated soils were removed to a depth of 3 to 4 feet in the late 1980s.

The ADDA is a drainage on the north side of the abandoned runway that was used to dispose of drums. Approximately 30 buried drums and 35 to 40 cubic yards of visibly contaminated sediments were removed in 1996.

- **Fire Department Foam Training Area (FT003).** FT003 is located in the west central area of the island, north of the western lakes complex and approximately 400 feet to the northeast of Pudge Lake (**Figure 2-4**). Originally, this area consisted of a hangar building that was removed at some unknown time. A small concrete structure was built at the former hanger location and used for fire training activities. Items burned at the site included wood, paper, fuels (including JP-4 and diesel), and miscellaneous combustible materials. Prior to 1993, the concrete structure was removed and up to 4 feet of backfill was placed at this source area.

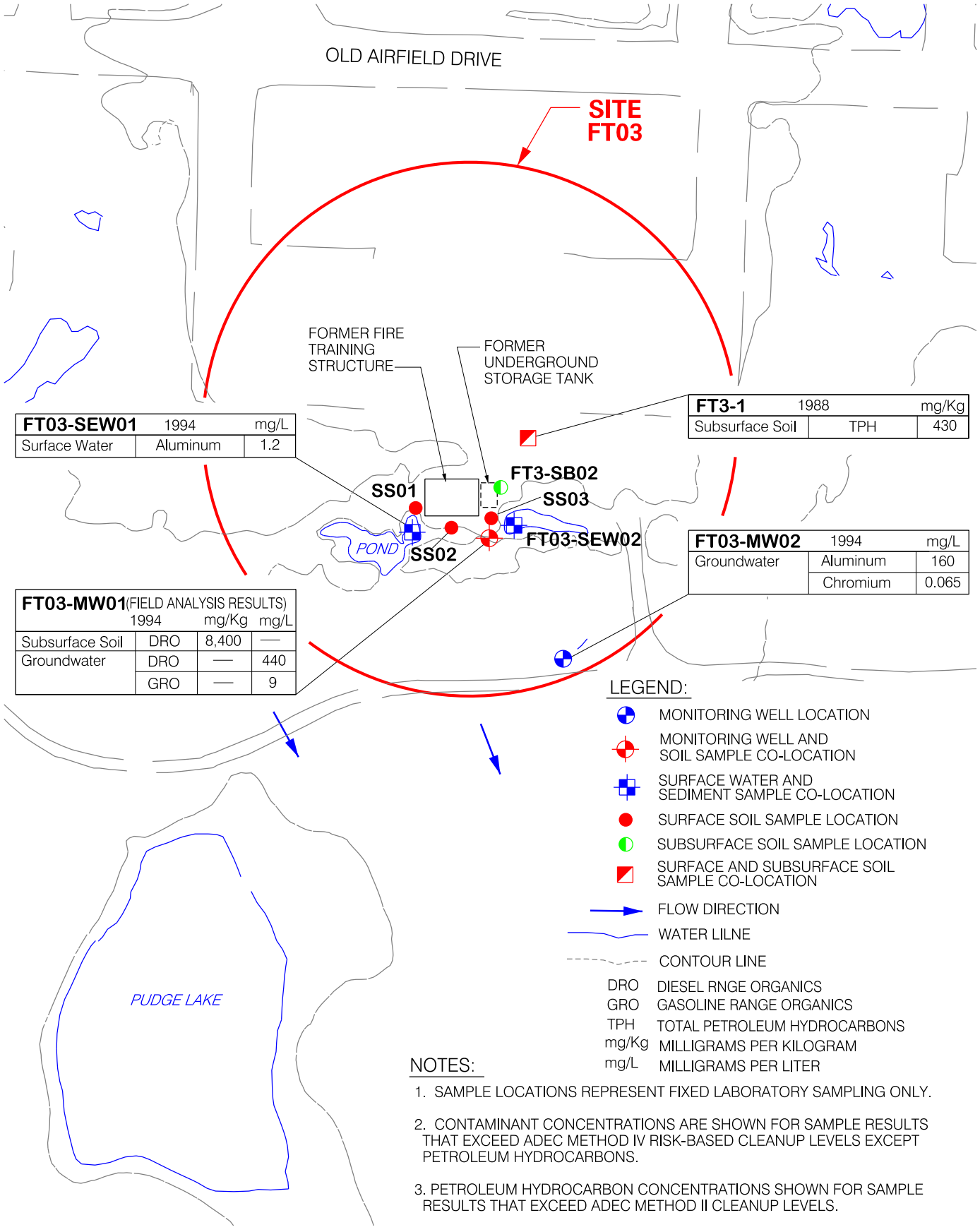
The USAF has conducted environmental restoration at the Eareckson AS ERP Sites FT001, FT002, and FT003 in accordance with CERCLA under the Defense Environmental Restoration Program, which was established by Section 211 of the Superfund Amendments and Reauthorization Act of 1986. ADEC provides regulatory 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 response actions undertaken at the three ERP sites addressed in this Decision Document. 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 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



NOTES:

1. SAMPLE LOCATIONS REPRESENT FIXED LABORATORY SAMPLING ONLY.
2. CONTAMINANT CONCENTRATIONS ARE SHOWN FOR SAMPLE RESULTS THAT EXCEED ADEC METHOD IV RISK-BASED CLEANUP LEVELS EXCEPT PETROLEUM HYDROCARBONS.
3. PETROLEUM HYDROCARBON CONCENTRATIONS SHOWN FOR SAMPLE RESULTS THAT EXCEED ADEC METHOD II CLEANUP LEVELS.

NORTH

SCALE IN FEET

0 150

FIGURE 2-4

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
FT01, FT02, AND FT03 NON-CERCLA DECISION DOCUMENT

FT03 SITE MAP WITH SAMPLE LOCATIONS

JOB No. 1851213.10010401 TIME: 29-SEP-2010 10:31 FILE: D:\CAD\Proj\afceelshemya\DecesionDoc2007\FT01-FT02-FT03\NON-CERCLA\FINAL\FIG2-4.DGN

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 have 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.

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.

Groundwater contamination on Shemya Island is primarily a result of fuel handling activities (i.e., storage tanks and pipelines) and the fire training pits. Contaminants detected in groundwater include petroleum hydrocarbons (GRO, DRO, and RRO), BTEX and other VOCs, which are components of fuel, and trichloroethylene (TCE), which is a solvent commonly used as a degreasing agent. Fuel constituents were found at FT001, FT002, and FT003, but not TCE.

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 FT001, FT002, and FT003 are summarized below.

Phase I, Records Search Report (JRB, 1984)

The Phase I report identified 28 source areas at Eareckson AS 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.

IRP Stage 1 Final Technical Report (USAF, 1990)

Limited investigations were conducted in 1988 at the three ERP sites. At FT001, two soil samples were collected from a test pit. Four hand borings were advanced at FT002 and a total of five soil samples were collected. One hand boring was advanced at FT003 and three soil

samples were collected. The study concluded that additional investigations were warranted at all three sites.

1992 Air IRP Field Investigation Report (USAF, 1993).

Geophysical electromagnetic conductivity surveys were performed at each of the three ERP sites to aid in locating buried metal, wastes, or utilities. In addition, at FT001 surface and subsurface soil samples were collected from trenches and borings and analyzed for total petroleum hydrocarbons (TPH), VOCs, SVOCs, polychlorinated biphenyls (PCBs), pesticides, metals, and dioxins. One monitoring well was installed and a groundwater sample was collected and analyzed for VOCs, SVOCs, PCBs, pesticides, and metals. At FT002-MA, surface soils were collected and analyzed for TPH and BTEX. Subsurface soil samples were collected from four borings and analyzed for VOCs, SVOCs, PCBs, pesticides, metals and, dioxins/furans. Three monitoring wells were installed and groundwater samples were collected and analyzed for VOCs, SVOCs, PCBs, pesticides, and metals. Samples were not collected from FT002-FTA, FT002-ADDA, or FT003 during this investigation.

The investigation concluded that widespread, low-level TPH contamination was present at FT001. SVOCs, metals, and dioxins were also detected. At FT002-MA, petroleum-related contamination was found in the soil and groundwater.

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

ERP Site FT001. During 1993 and 1994 RI/FS activities at FT001, one groundwater sample was collected for off-site dioxin analysis. No dioxins were detected in the groundwater. Two sediment samples were collected from the tidal area adjacent to FT001 for field screening. The sediments did not appear to contain elevated levels of organic constituent concentrations. Soil samples were also collected and the RI/FS concluded that petroleum hydrocarbon compounds and several SVOCs and dioxins were present in the soils within the bermed area. It also concluded that organic constituents did not appear to be migrating off-site.

ERP Site FT002. In 1993, surface and subsurface soil samples were collected from FT002-FTA. Two boreholes were advanced for soil sample collection and groundwater monitoring well installation. Six wellpoints were installed to further characterize groundwater quality. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, GRO, DRO, and metals. Groundwater samples were also analyzed for anions. There were no organics detected in the surface soils. In subsurface soils, BTEX constituents, GRO, DRO, and several metals were detected. BTEX constituents, carbon disulfide, benzoic acid, and GRO were detected in groundwater at low concentrations. No inorganics were detected in the groundwater above background concentrations.

At FT002-MA, eight monitoring wells and 15 wellpoints were installed for groundwater collection in 1993. Groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, GRO, DRO, metals, and anions. BTEX constituents, GRO, and DRO were detected in the samples collected in 1993.

Surface water and sediment samples were collected from three locations at FT002-ADDA in 1993 and analyzed for VOCs, SVOCs, pesticides, PCBs, GRO, DRO, metals, and anions. In 1994, additional surface water and sediment samples were collected and analyzed for BTEX, perchloroethylene, TCE, GRO, and DRO. BTEX, GRO, and DRO were detected in the surface water samples. A number of SVOCs and metals were also detected. Similar analytes were detected in the sediment samples.

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

In 1995, a groundwater sample was collected from FT002-MA and analyzed for VOCs. BTEX compounds and carbon disulfide were detected. Three surface water samples were collected from FT002-ADDA and analyzed for VOCs, SVOCs, and metals. Of these, BTEX and several SVOC compounds where detected.

At FT003, one surface water sample was analyzed for metals and organic lead. No analytes were detected. Two sediment samples were analyzed for SVOCs, metals, and organic lead. Several metals were detected.

Technical Memorandum, FT002 Bioventing Remedial Action Report (USAF, 1999b)

In August 1996, a remedial action was performed at FT002-ADDA to remove the abandoned drums and underlying, visibly contaminated soil/sediments. Twenty-nine 55-gallon drums were removed from the head of the drainage. Many of the drums were marked as containing 30-weight and 90-weight oil; however, removed drums were rusted and only contained water and sediments from the drainage. Approximately 40 cubic yards of sediment visibly contaminated by petroleum hydrocarbons were excavated after the drums were removed. The top 1 to 2 feet of sediment were removed from the first 50 feet of the ditch.

Four sediment confirmation samples were collected after the removal action and analyzed for VOCs, GRO, and DRO. The results were mostly below ADEC soil cleanup levels, except for DRO at one location and benzene at another. The report also documents the results of sediment and surface water samples collected between August 1993 and August 1998 from three locations along the ditch. Petroleum hydrocarbon concentrations generally declined over the period at the upgradient location. At the other two locations, petroleum hydrocarbons concentrations generally increased initially and then began to decline.

In August and November 1996, another remedial action was performed at FT002-MA that involved the construction of a bioventing system. A total of eight biovent wells and 10 well points were installed at the MA. The biovent wells were connected to a blower by aboveground piping. Soil, groundwater, and soil gas samples were collected during the project. The 1996 soil samples were analyzed for VOCs, GRO, and DRO and the results indicated that contamination was present above ADEC soil cleanup levels.

Soil gas and groundwater samples were also collected in April 1997, September 1997, March 1998, and September 1998 (groundwater only). Soil gas samples were analyzed for total gaseous

non-methane organics and BTEX, and the results showed declining concentrations from 1996 to 1998. Groundwater results over the period also showed generally declining concentrations.

Basewide Monitoring Program Reports (USAF 1999a, 2000, 2001b, 2005).

ERP Site FT001. Monitoring at FT001 generally consisted of inspecting the soil cap over the site for signs of deterioration. The cap was reported to be in good condition during all four monitoring events conducted. During the supplemental investigations conducted in 2004, three surface soil samples were collected and analyzed for dioxins. A number of dioxin congeners were detected; however, the subsequent risk assessment found the concentrations to be acceptable.

ERP Site FT002. Annual monitoring events at FT002 consisted of collecting groundwater, surface water, and sediment samples in 1998, 1999, and 2000. Groundwater samples were collected from two monitoring wells downgradient of FT002-MA, and surface water and sediment samples were collocated from three locations at FT002-ADDA. The samples were analyzed for VOCs, SVOCs, PAHs, GRO, DRO, RRO, and metals. In addition, one groundwater sample was collected at FT002-MA and analyzed for BTEX in 2004.

Groundwater sampling at FT002-MA indicated that contaminant concentrations in groundwater at the site decreased while the bioventing system was operating. Only one contaminant (benzene) was detected at a level exceeding its cleanup level in 2000. The supplemental sampling conducted in 2004 showed an increase in BTEX concentrations; however, benzene was still the only constituent to exceed its cleanup level.

The surface water sample results for FT002-ADDA indicated that, although some VOC concentrations had increased slightly since 1999, they remained relatively low at all three sampling locations (Figure 2-3). BTEX constituents were found at low concentrations and, with the exception of xylenes, were not detected in the downstream samples. The sediment sample results indicated that, although some metals concentrations in the downstream samples had increased since 1999, VOC concentrations were still low, and no VOCs were detected at the furthest downstream location. DRO concentrations showed a trend of increasing concentrations at the middle sample location; however, DRO concentrations furthest downstream were still very low.

ERP Site FT003. Three surface soil samples were collected at FT003 and analyzed for PCBs in 2004. The soil samples did not contain detectable levels of PCBs. During this investigation, an empty underground storage tank was discovered at FT003. Approximately 10 soil samples were collected from four sampling locations. Results from samples submitted for laboratory analysis were compared to ADEC Method Two Cleanup levels. Although a number of analytes were detected, only DRO exceeded cleanup levels. DRO concentrations ranged from a minimum estimated detected concentration of 54.3 milligrams per kilogram (mg/Kg) to a maximum concentration of 5,800 mg/Kg. Detailed information is available in the *Underground Storage Tank Removals at Building 625 and ERP Site FT003* (USAF, 2009).

2.3 Community Participation

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

Prior to conducting investigations at FT001, FT002, and FT003, the USAF initiated a community relations program for Eareckson AS. The final version of the Community Relations Plan was prepared in August 1994 (USAF, 1994a). Public meetings were held in Anchorage in 1994 (regarding environmental cleanup at Eareckson AS) and 2005 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 FT001, FT002, and FT003 is presented in **Table 2-1.** The public comment period requirements are presented in **Table 2-2**.

Table 2-1
Public Notification of Document Availability for Sites FT001, FT002, and FT003

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.	Notice of availability of the Proposed Plan for Four Sites, including Sites FT001, FT002, and FT003, was published in the World section of the *Anchorage Daily News* in August 2005.
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 notice of availability included all of these components.

Key:
RI/FS – Remedial Investigation/Feasibility Study

Table 2-2
Public Comment Period Requirements Under CERCLA for Sites FT001, FT002, and FT003

Requirement:	Satisfied by:
Lead agency should make document available to public for review on same date as newspaper notification.	The document was 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.	All data collected and all CERCLA primary documents produced for these sites are available at: http://www.adminrec.com.
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.	The USAF provided a public comment period for the RI/FS and the Proposed Plan from August 12, 2005, to September 12, 2005.
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 three 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)).	A public meeting was held for FT001, FT002, and FT003 on August 24, 2005, at the Loussac Library in Anchorage, Alaska.

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

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

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. Three 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, 1995; USAF, 1996 a and b).

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 FT001

Surface materials present at FT001 include gravels and grasses covering the majority of the area, with smaller portions of gravels and sands in areas affected by the ocean. Sea cliffs are present on the western edge of the source area, with the topography sloping gently to the northeast and east to the Pacific Ocean.

Subsurface lithology at FT001 is characterized by heavily disturbed areas that have turned the primarily gravel and burned debris subsurface layers into somewhat compacted, discontinuous layers of sand and gravel with black, tar-like substances varying from approximately 1 to 4 feet below ground surface (bgs). The gravel directly under the burn area contains some sand and/or silt and exhibits scattered cobbles and boulders (varying in depth from 2 to 15 feet bgs). Cobbles and boulders in the vicinity of FT001 vary widely and are mostly present in the center portion of the source area.

Bedrock was encountered at approximately 4 to 9 feet bgs and is a hard, compact, light-green mudstone. Bedrock at FT001 generally slopes to the south, with the southern edge of bedrock at FT001 sloping toward the east.

2.5.2.2 Site FT002

The subsurface conditions at FT002 are characterized by fine- to medium-grained, well-sorted sand to depths of at least 32 feet bgs. In 1988, subsurface soils at FT002 were described as sands underlain by discontinuous layers of peat and dense sandy soils to bedrock. Peat layers are thought to be representative of native materials present before runway construction that were never removed. Based on the review of pre-occupation topography, the FT002 area was up to 40 feet lower than its present elevation. During construction of the runways, adjacent low lying areas were filled in to bring elevations up to grade. A borehole completed near North Beach Road north of Abandoned Runway B in 1993 showed gravels to approximately 8 feet bgs, which overlay a weathered mudstone bedrock.

Near the MA, monitoring wells drilled in the area of Runway C exhibited sandy fill material to depths ranging from 14 to 20 feet bgs. In some boreholes, peat material was present below the fill. The peat layer in Borehole FT002-MW02 was approximately 4 feet thick and covered mudstone bedrock, which was identified at 16.5 feet bgs. Before runway construction, two small lakes were present in the area of FT002. It is probable that silt or other fine-grained sediments, typical of lacustrine depositional environments, are present in the area of these former lakes. The presence of lacustrine deposits in this area may result in perching layers within the local stratigraphy.

Bedrock in the vicinity of FT002 has been well defined using available geologic data as a medium dark gray, fine-grained siltstone and mudstone with some areas exhibiting shallow

fractures and other areas exhibiting consolidated bedrock. As previously stated, the area surrounding FT002 has been greatly altered for runway construction, but bedrock has probably not been significantly disturbed. The bedrock surface varies from approximately 55 feet above msl around the intersection of Abandoned Runways B and C to below 30 feet above msl near the southeast portion of the site. The bedrock slopes gradually to the west and sharply to the north.

Along the northwestern edge of Abandoned Runway C (near the ADDA), bedrock appears to be present at somewhat greater depths. Given the beach-front location of this area, bedrock has been eroded into a relatively steep face at and near the northern extent of Abandoned Runway C. This erosional face of the bedrock is evident along North Beach Road where bedrock is exposed to heights of at least 20 feet above the surrounding ground surface. Based on borehole data and surface topography of the area, bedrock appears to be topographically higher in the area of the ADDA drainage, where visible exposure is present. Northeast and southwest of the outcrop, bedrock elevation decreases and is thus not evident in visible exposures. Naturally occurring beach sand mantles the bedrock in these areas.

2.5.2.3 Site FT003

The primary surficial material at FT003 consists of approximately 3 to 12 feet of a highly organic peat material of moderate to high plasticity occasionally mixed with silt and mudstone fragments. Underlying the peat layer is 0 to 10 feet of sandy silt with argillite/mudstone fragments overlying extremely hard, fractured siltstone bedrock. Peat directly overlies siltstone at FT003-MW02. The siltstone encountered in FT003-MW01 and FT003-MW02 had a very distinctive red/pink color and was much different in appearance than any other siltstone encountered on the island. The siltstone bedrock was encountered at depths ranging from 9 to 12 feet bgs and was often saturated.

Both a north-south trending structural fault and a north-south trending fracture zone may exist in the vicinity of FT003. The fault mapped by the U.S. Geological Survey (USGS) trends directly through the FT003 source area; while the fracture zone, mapped based on drilling observations and bedrock topography, is located approximately 150 feet east of FT003.

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. In most areas on Shemya Island, the soil-bedrock interface occurs at a depth of 10 to 20 feet bgs. Recharge to the shallow aquifer system is provided by precipitation and surface water runoff, via 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, they still may act as a transport medium for hazardous substance migration. Therefore, the depth to groundwater in the surficial aquifer can vary from just below the ground surface to just above the soil-bedrock interface.

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 FT001

Groundwater elevations at FT001 range from approximately 10 feet above msl at the northern end of the source area to sea level near the coastline. Groundwater at FT001 is sporadic and does not occur at all locations on the peninsula. At two soil borehole locations, groundwater was not encountered at 20 feet bgs (approximately 7 feet below msl). Groundwater was encountered at only one location near FT001 – Monitoring Well FT1W1. Groundwater levels in FT1W1 were observed to fluctuate from 0.96 feet above msl to 2.62 feet above msl in 1994, and is expected to exhibit a relatively small gradient due to its proximity to the sea and the source area's isolated location relative to the main groundwater influences from the island.

Based on topography at FT001 and observations at other source areas with similar proximity to the ocean, groundwater flow direction in the area would be predominantly east-southeast and is influenced by tidal activity. It appears likely that ocean water mixes with groundwater at FT001, based on field observations during the 1992 well installation.

2.5.3.2 Site FT002

Because of the presence of fill material, discontinuous peat layers, and weathered bedrock in the FT002 area, the hydrogeology of the area is complex. In the FT002 area, groundwater elevations range from approximately 61 feet above msl at Monitoring Well FT002-MW04, to approximately 3 feet above msl at Monitoring Well-16 (located along the coast). The water level measurements indicate that a mounding or ponding of groundwater occurs in the area of Abandoned Runway C and to the south between Abandoned Runways B and C. Consequently, groundwater flow from this area is multidirectional. On the northern side of Abandoned Runway C, groundwater becomes deeper and has a steep gradient.

The peat material encountered during drilling in the FT002 area exhibited relatively low hydraulic conductivities. If peat material is bermed in the subsurface along the margins of the runway, it may be prohibiting lateral flow of groundwater. Thus, a "bathtub" effect could be present in areas underlying the runways.

Where significant thickness of peat material is not present, groundwater contained in the fill material is in direct hydraulic communication with bedrock. The lack of surface vegetation and

the relatively high porosity of runway fill material enhance the recharge of groundwater in this area. This condition may be contributing to the groundwater ponding observed during site investigations. One feature that has not been positively identified, but would greatly influence the groundwater distribution and flow, is the potential drainage system of piping that might exist under the abandoned runways. As a result of the geophysical survey data collected in 1992, a portion of the drainage system might have been identified. Similar drainage systems have been designed and used for runoff control at other USAF runways.

2.5.3.3 Site FT003

Two monitoring wells (FT003-MW01 and FT003-MW02) were installed at FT003 in 1994. In December 1994, groundwater was measured in the two wells at approximately 13.8 and 18.3 feet bgs, respectively. The top of the groundwater was present within the siltstone lithology in both wells and appeared to be unconfined. Based on water levels in these two wells, and on the potentiometric surface map developed for the entire island, groundwater would be expected to flow to the south-southeast toward Lower Lake.

In 1993, four wellpoints were installed in the areas south, southeast, and southwest of FT003 as part of the basewide investigations. Peat water was encountered in these well points at depths ranging from approximately 1 to 5 feet bgs.

2.5.4 Surface Water Hydrology

Precipitation is the primary factor controlling the amount and availability of surface water on Shemya Island. The island receives approximately 30 inches of precipitation annually in the form of rain, 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 FT001

The overall topography near FT001 resembles the original pre-occupation topography, except in areas used for the burn pit and roadways. No seeps were evident near FT001. Surface water drains directly into the ocean; however, no defined drainage channels exist because of the flat terrain.

2.5.4.2 Site FT002

The only surface-water body at the FT002 area is surface water in the drainage where the ADDA is located and the seawater of Alcan Cove. Field observations and subsurface lithology suggest that the source of water in this drainage is groundwater from the fill material under Abandoned Runway C. Water in the drainage flows overland through a steeply incised channel for

approximately 100 feet, at which point it flows over and down a bedrock cliff. At the base of the cliff, surface water continues to flow overland and infiltrates into the ground.

Discharge rates from the ADDA vary considerably with precipitation. Rates were determined several times during the 1993 investigation, and typically were about 10 gallons per minute. During a heavy precipitation event (2 inches of precipitation in one day), the flow was measured at 160 gallons per minute. The elevated flow on this day suggests that, at FT002, precipitation infiltrates into the ground surface rapidly. Precipitation also appears to quickly contribute to groundwater flow beneath the runway and increase the discharge to the ADDA.

At several locations between the runways and the taxiways, ponding occurs after heavy precipitation and or snowmelt.

2.5.4.3 Site FT003

Two small ponds are present less than 50 feet from the original fire training structure location, one to the southeast and the other to the southwest. Flora and fauna identified in the ponds are species indicative of year-round standing water or saturated soil conditions. These ponds may be recharged, in part, by water from the peat layer.

The general direction of surface water flow in the area is to the south, toward Pudge Lake and Lower Lake. However, the presence of elevated rolling tundra at the southern edge of FT003 serves as a barrier for surface water runoff. Most water infiltrates and moves within the soil profile, except during intense rainfall periods when overland flow may occur. No surface-water migration pathway was evident at FT003. Several seeps emerge from along the slope south of FT003.

2.5.5 Ecology

Shemya's interior natural, undisturbed terrain can be classified as wetlands according to the U.S. Army Corp of Engineers 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.

2.5.5.1 Site FT001

FT001 is heavily disturbed, with the majority of the source area void of any kind of vegetation. Halophytic Herb Wet Meadow is the dominant vegetative type in the immediate area of FT001. This is dominated by sandwort (*Honckenya* spp.) and seabeach senecio (*Senecio* spp.). Adjacent to FT001 in the marine environment is a man-made, rocky shore. Glaucous-winged gulls were observed on the shoreline adjacent to FT001. Species observed using the off-island environment adjacent to FT001 within Skoot Cove include common eider, red-faced cormorants, mallard ducks, harlequin ducks, and marine mammals. Mallard ducks, Aleutian green-winged teal, and pintail ducks were observed using the tidal pond to the north of FT001. Passerines were observed using the terrestrial environment within FT001.

2.5.5.2 Site FT002

No vegetation currently exists in the FTA because the area is located on Abandoned Runway B, which is mostly asphalt. On the bluff to the north of the FTA, beach grass *(Elymus* spp.) is dominant and intermixed with Nootka lupine *(Lupinus* spp.) and mixed herbs. In areas of less disturbance, remnants of Crowberry Dwarf Shrub Tundra *(Empetrum* spp.) were observed among the beach grass.

The MA is located within the center of Abandoned Runway C and is composed of compacted soil and asphalt. To the north of the MA, vegetative communities dominating the area are beach grass and mixed herbs that are dominated by cow parsnip *(Heracleum* spp.). To the south-southwest of the MA, the area is dominated by rush *(Juncus* spp.) and interspersed with Nootka lupine. Directly to the south, vegetative communities are formed by beach grass, Nootka lupine, cow parsnip, and wild celery (*Vallesnira* spp.). During an ecological survey, Lapland longspurs were observed foraging among the beach grass located to the north and south of the MA. Passerines are the only species expected to use the MA or surrounding habitats.

Vegetative community types represented at the ADDA include beach grass and Large Umbel Vegetative Community (*Heracleum* spp. and *Angelica* spp.). The beach grass community exists where the drums have been abandoned; in the area slightly upgradient, adjacent to, and below the waterfall; and downgradient from the road shoulder toward the Alcan Cove shoreline for a distance of approximately 25 feet. The Large Umbel community is located just upgradient from the waterfall toward the disposal area and is intermixed with beach grass.

During an ecological survey, Lapland longspurs were observed foraging among the beach grass adjacent to the drainage. Shorebird tracks and probing areas were observed on the sandy shoreline adjacent to Alcan Cove. Evidence of shorebirds was not observed in the ADDA drainage, but was observed at the drainage discharge point on the shoreline of Alcan Cove. Arctic fox tracks were observed on the sandy shoreline adjacent to Alcan Cove. Based on the findings of the ecological survey, it is highly unlikely that shorebirds or waterfowl use the upper portion of the ADDA drainage. Shorebirds are not likely to use the drainage because the banks of the drainage are very steep and there are no exposed sediments. Waterfowl are not likely to use the drainage because the drainage is small in width and is very shallow in depth. Passerines are the only birds expected to potentially use the drainage.

2.5.5.3 Site FT003

There are large areas lacking vegetation within the boundaries of the Fire Training Area because the immediate vicinity and north side of the area is composed of an asphalt or concrete hardstand. The areas to the south of FT003 are dominated by sedges (*Carex* spp.) and remnants of crowberry dwarf shrub tundra (*Empetrum* spp.). Mixed Herbs were also observed within these areas. Disturbed areas (i.e., bermed areas) surrounding FT003 were dominated by grasses (*Elymus* spp.) intermixed with species representing the Large Umbel Vegetative Community.

Two small ponds (approximately 100 square feet each) were observed to the southeast and southwest of the fire training area. Aquatic vegetation in the ponds is dominated by creeping buttercup (*Ranunculus* spp.). The presence of this species indicates that the ponds are not ephemeral.

Passerine birds were observed foraging among the sedges and grasses that comprise the majority of the area immediately south of FT003. Aleutian Canada geese feed on the crowberry tundra located approximately one quarter mile to the south of the Fire Training Area. Because of the small size of the ponds, it is not likely that waterfowl use them. Arctic fox were observed in the vicinity of FT003.

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, 1993)
- 1995 IRP Field Program Technical Memorandum (USAF, 1996d)
- 1995-1996 RI/FS Report, Volumes I – IV (USAF, 1995; 1996a, b, and c)
- 1999 Technical Memorandum, FT002 Bioventing Remedial Action Report (USAF, 1999b)
- 1998, 1999, 2000, and 2004 Eareckson AS Comprehensive Basewide Monitoring Reports (USAF, 1999a, 2000, 2001b, 2005)

- 2006 Human Health and Ecological Risk Assessments for FT001, FT002, FT003, and SS07 (USAF, 2006)

A summary of each of the 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 to date at ERP Sites FT001, FT002, and FT003.

2.6.1.1 FT001

The site was used for fire training from the early 1970s to the mid-1980s. In 1985, debris and tar barrels were removed from the area. Between then and 1987, the area was graded and crushed rock was placed over the disturbed area. A 1988 investigation reported stained and darkened soil in an area approximately 100 feet in diameter. The site has been subsequently studied and sampled, but no additional remedial actions have been performed.

2.6.1.2 FT002

The FT002-FTA site was used for fire training from the early 1970s to the mid-1980s. In 1985, the site was excavated to a depth of approximately 3 to 4 feet. Approximately 1,100 cubic yards of soil was excavated and disposed of elsewhere on the island.

The FT002-MA site was also used for fire training, utilizing a mocked-up aircraft to make fire fighting more realistic. The aircraft mock-up was located inside two concentric berms. In 1992, the berms, the asphalt surface, and the aircraft mock-up were removed. Following several investigations, a bioventing system was installed in 1996. The system consists of eight wells connected to an air blower. Air was injected into the subsurface to provide additional oxygen to aid in bioremediation of contaminants. The system operated from 1996 until 2000.

At FT002-ADDA, drums had been abandoned in a drainage. In 1996, 29 55-gallon drums were removed from the drainage. Approximately 40 cubic yards of sediment that was visibly contaminated was excavated following the drum removal. The sediment was transported to another area on the island for treatment. In addition, sorbent booms were placed in the drainage to control any remaining sheen.

2.6.1.3 FT003

A small concrete structure at FT003 was used as a foam fire training area. Prior to 1993, the concrete structure was removed and up to 4 feet of backfill was placed on top of the concrete pad. Several investigations were conducted at the site, but no other remedial actions took place.

In 2004, another investigation was conducted to collect soil samples for PCB analysis. During the investigation, an underground storage tank (UST) was discovered at FT003.

In 2008 the approximately 2000-gallon UST was removed from the ground and decommissioned. Approximately 10 cubic yards of diesel contaminated soil was removed from the site and confirmation soil sampling of the excavation found DRO concentrations ranging from 427 to 929 mg/Kg. Four test pits were advanced to help characterize the contamination; one within the tank excavation and three in apparent downgradient locations between 10 and 20 feet away from the excavation. DRO results from the test pits ranged from 54.3 to 5,800 mg/Kg. The highest DRO concentration was from the test pit located within the tank excavation and the sample was collected from a depth of 9 feet. Groundwater was not sampled as part of the UST activities.

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 for unrestricted used at the three 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 three ERP sites addressed in this Decision Document. ERP Sites FT001, FT002, and FT003 and their historical sampling locations are shown on Figures 2-2, 2-3, and 2-4, 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, 2008). 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.

Groundwater. ADEC groundwater cleanup levels are listed in 18 AAC 75.345. Specific values are listed in 18 AAC 75.345, Table C for groundwater that is, or may be, used as a drinking

water source. Alternatively, groundwater cleanup levels can be derived from a site-specific risk assessment, subject to ADEC approval.

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.

Background concentrations of metals in several environmental media on Shemya Island were derived in the 1995 RI/FS report (USAF 1995). Background samples were collected in 1988, 1992, and 1994. In addition, data from the 1993 basewide sampling event was used in determining background concentrations. Samples were collected from surface soil, subsurface soil, freshwater sediments, marine sediments, fresh surface water, marine water, and fresh groundwater.

Statistical properties of the data sets were examined to identify multiple independent distributions that might be attributable to differences between background distributions and elevated concentrations as a result of releases from contaminant sources. Once the apparent background distribution was identified, summary statistics were developed for the data. These statistics were then used to estimate appropriate statistical ranges of the background distribution including the 0.025 to 0.975 interquantile ranges that encompass the central 95 percent of the apparent background distributions. The derived 0.975 quantile indicates that 97.5 percent of the naturally occurring metal concentrations are expected to be below that concentration. The 0.975 quantiles for detected metals in the environmental media sampled at FT001, FT002, and FT003 are listed on the sample results summary tables in Appendix A.

In the 1980s, the USGS conducted a study of element concentrations in Alaska soils consisting of collecting samples from 266 locations throughout Alaska, including the Aleutians Islands, and analyzing samples for 43 chemical elements (USGS, 1987). This study gives provides insight into the range of element concentrations naturally found in Alaskan soils. Results of this study are cited in the following individual metal discussions to provide additional data in evaluating natural levels of metals detected at FT001, FT002, and FT003.

Several metals were detected at concentrations that are above the background concentration ranges derived in the 1995 RI/FS report. Theses metals are discussed below.

Aluminum is the most common metal in the earth's crust and third most common element in the earth's crust. Its abundance is over 8 percent (80,000 mg/Kg). Concentrations found by the USGS in Alaskan soils ranged from 12,000 to 100,000 mg/Kg. Aluminum is identified as a risk driver in groundwater and surface water at FT003. Water samples were run on a total basis (not filtered) and given aluminum's abundance, it is likely that the aluminum concentration quantified in the water samples included aluminum found in sediments inadvertently collected with the water.

Antimony concentrations were reported in soils and sediments above the derived background concentrations for Shemya Island (this element was not analyzed for in the USGS study). Antimony is mainly used as a flame retardant in textiles and plastics. It is also used to alloy lead (to make it harder) and is found in bullets and lead-acid batteries. However, these materials are not known to have been disposed of at FT001, FT002, and FT003. However, if this were the case, one would expect to find much higher arsenic concentrations in the soil (100s to 1,000s of mg/Kg) than the reported concentrations (mostly below 30 mg/Kg). Since the reported antimony does not appear to be from either anthropological or natural sources, the most likely explanation is an error in the analysis. Samples from the sites were analyzed for metals using EPA Method SW6010, which uses inductively coupled plasma-atomic emission spectrometry. This method has known issues with spectral interferences between certain elements. Aluminum and chromium are known to contribute to the antimony quantifications and, if not properly corrected, will result in erroneous results for antimony.

Arsenic concentrations reported at FT001, FT002, and FT003 are above the derived background levels for Shemya Island. Arsenic is found in herbicides and pesticides, alloyed with lead (it makes lead harder, similar to antimony) and wood-preservatives. The most common use of arsenic in the U.S. over the last 40 years has been in lumber treated with chromate copper arsenate (CCA). Again, herbicides, pesticides, and lead are not known to have been disposed of at the sites. It is conceivable that treated lumber was burned at the sites as part of fire fighting activities. However, if this were the case, one would expect to find much higher arsenic concentrations in the soil. Therefore, it does not appear that the arsenic is from anthropological sources. The USGS study documented arsenic concentrations in soils across Alaska ranging from less than 10 to 750 mg/Kg, indicating that natural concentrations vary widely. In addition, similar to antimony, aluminum and chromium can interfere with arsenic quantification in EPA Method SW6010.

Chromium concentrations in some of the soil samples also exceeded the derived background concentration for Shemya Island. In this case, the derived value appears to be too low, particularly for surface soil (14.98 mg/Kg). The USGS study found chromium concentrations in Alaskan soils ranging from 5 to 390 mg/Kg with an average value of 64 mg/Kg.

Background concentrations for *thallium* were not derived in the 1995 RI/FS. Thallium was also not analyzed for during the USGS study. Other studies from the contiguous U.S. suggest that the expected natural concentrations of thallium in Shemya Island soils are less than 1 mg/Kg. Reported concentrations in soil samples from FT002 and FT002 are much higher than 1 mg/Kg (up to 119 mg/Kg) and appear to be erroneous. The relatively high levels of thallium reported would only be expected around industrial sources such as smelters, coal plants, and cement plants, none of which operated on Shemya Island. The most plausible explanation for the high reported thallium concentrations at the sites is an error in the analysis. As discussed above, there is known interference between certain elements when analyzed by EPA Method 6010. Aluminum is a known interferent of thallium.

2.6.2.3 Site FT001

Fire fighting training activities conducted at FT001 lead to a series of investigations to determine if those activities had adversely impacted the site. Waste oil, diesel, and JP-4 were used to start and sustain fires, which were then put out by the fire department using aqueous film-forming foam (AFFF). After the fire was extinguished, some of the flammable fluids remained and were allowed to infiltrate into the soil. Environmental investigations at FT001 included collecting soil, marine sediment, and groundwater samples for laboratory analysis. Samples were analyzed for petroleum hydrocarbons, VOCs, SVOCs, PAHs, dioxins/furans, and metals.

Surface and/or subsurface soil samples were collected for laboratory analysis at FT001 in 1988, 1992, and 2004 from nine different locations. Subsurface soil samples ranged in depth from 4 to 19.5 feet bgs. One groundwater monitoring well was installed and sampled in 1992. The groundwater level in this well is approximately 13 feet bgs. Two marine sediment samples were collected in 1994 for field analyses. Sample locations are shown on Figure 2-2, and a summary of samples collected and analyses performed is presented in **Table 2-3**. Sample results are summarized in Tables A-1 through A-4 in Appendix A.

In 2004, a supplemental site investigation was conducted and included sampling surface soils at FT001 for dioxins.

Results of the investigation efforts in the early 1990's indicated that surface and subsurface soil at the site has widespread, but generally low-level, concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels (see Tables A-1 through A-4 in Appendix A). Petroleum hydrocarbons were analyzed by an older method, and the results are not directly comparable to current ADEC cleanup levels, but the concentrations indicate that petroleum hydrocarbons measured in the soil in the early 1990s exceeded current cleanup levels. These contaminants naturally degrade over time and it is possible that concentrations of these compounds have decreased since the investigations were performed.

Table 2-3
Summary of Samples Collected and Analyses Performed at FT001, Eareckson Air Station

Media	Year	Laboratory[1]	Number Samples	BTEX (SW8020)	TPH (E418.1)	TCE/PCE (SW8010)	VOCs	SVOCs/ PAHs	Pest/ PCBs	Metals	GRO	DRO	Dioxins/ Furans
Surface Soil	1988	Off-site	1		✓		A	B		C	D		F
	1992	On-site	27	✓	✓	✓							
		Off-site	4				G	H	I	J			F
	2004	Off-site	3										K
Subsurface Soil	1988	Off-site	1		✓		A	B		C	D		
	1992	On-site	14	✓	✓	✓							
		Off-site	7				G	H	I	J			
Marine Sediment	1994	On-site	2	✓		✓					D	D	
Groundwater	1992	On-site	1	✓	✓	✓							
		Off-site	1				G	H	I	J			
	1993	On-site	1	✓		✓					D	D	
	1994	On-site	1	✓		✓					D	D	F

Key:

✓ – analysis performed
1 – On-site laboratories consisted of portable gas chromatographs and an infrared spectrophotometer located on Shemya Island. Off-site laboratories were NVLAP accredited laboratories.
A – SW8240
B – SW8270
BTEX – benzene, toluene, ethylbenzene, and xylenes
C – Lead by SW7421
D – SW8015M
DRO – diesel range organics
E – EPA Method
EPA – United States Environmental Protection Agency
F – SW8280
G – E624
GRO – gasoline range organics
H – E625
I – E608
J – Target Analyte List Metals (SW6010/7000)
K – SW8290
PAHs – polynuclear aromatic hydrocarbons
PCBs –polychlorinated biphenyls
PCE – perchloroethylene
Pest – pesticides
SVOCs – semi-volatile organic compounds
SW – EPA Solid Waste Method
TCE – trichloroethylene
TPH – total petroleum hydrocarbons
VOCs – volatile organic compounds

Metals were detected in soil, groundwater and marine sediment, but are believed to be naturally occurring or do not create an unacceptable risk. In addition, dioxins were found in surface soil at the site but at concentrations below applicable cleanup levels. Potential risks posed by these contaminants were evaluated in a risk assessment conducted in 2006. The risk assessment concluded that contaminants at FT001 do not pose unacceptable risks to human health or the environment. A summary of the risk assessment results for FT001 is presented in Section 2.8.1.

2.6.2.4 Site FT002

Environmental studies were conducted at FT002 in 1988, 1992, 1993, 1995 through 2000, and 2004 to characterize the nature and extent of contamination resulting from fire training activities and improper drum disposal. The studies included collecting soil, groundwater, surface water, and sediment samples for laboratory analysis. Environmental samples were analyzed for metals, VOCs, SVOCs, PAHs, pesticides/PCBs, dioxins/furans, and petroleum hydrocarbons. Sample locations are shown on Figure 2-3, and a summary of samples collected and analyses performed is presented in **Table 2-4**. Sample results are summarized in Tables A-5 through A-9 in Appendix A.

Surface soil (1988 and 1992) and subsurface soil (1988, 1992, 1993, and 1996) samples were collected at FT002 for laboratory analysis from nine different locations. Subsurface soil samples ranged in depth from 4 to 22 feet bgs. Metals, VOCs, several SVOCs and PAHs, and petroleum hydrocarbons were detected in the soil at FT002 (Tables A-5 and A-6 in Appendix A).

Surface water and sediment samples were collected from FT002-ADDA in 2000 from three monitoring locations. At the most upgradient sample location in the drainage, the TAH concentration was 17.7 micrograms per liter (µg/L) and TAqH was 19.6 µg/L. A slight sheen on the surface of the water was noted for the upgradient sample location but not at the two downgradient sample locations.

Fresh surface water samples were collected for laboratory analysis from three locations and sediment samples were collected from four locations at FT002 in 1993 and 1995 (surface water only) through 2000. Metals, VOCs, several SVOCs, several PAHs, and petroleum hydrocarbons were detected in the samples (Tables A-7 and A-8 in Appendix A).

Fresh groundwater samples were collected for laboratory analysis from 12 locations at FT002 in 1992, 1993, 1995, 1996, 1998, 1999, 2000, and 2004. Metals, VOCs, several SVOCs, several PAHs, and petroleum hydrocarbons were detected in the samples (Table A-9 in Appendix A).

One groundwater sample was collected for laboratory analysis from Monitoring Well MW-16 in 1993 to evaluate possible risks to marine receptors, since groundwater at FT002 is potentially in communication with marine surface water. Metals, two VOCs, and petroleum hydrocarbons were detected in the sample but at concentrations below current ADEC groundwater cleanup levels.

Table 2-4
Summary of Samples Collected and Analyses Performed at FT002, Eareckson Air Station

Media	Year	Laboratory[1]	Number Samples	BTEX (SW8020)	TPH (E418.1)	TCE/PCE (SW8010)	VOCs	SVOCs/ PAHs	Pest/ PCBs	Metals	GRO	DRO	RRO (AK103)	Dioxins/ Furans
Surface Soil	1988	Off-site	3		✓		A	B		C	D			
	1992	On-site	69	✓	✓	✓								
		Off-site	4				F	G	H	I				J
	1993	On-site	4	✓		✓					D	D		
Subsurface Soil	1988	Off-site	2		✓		A	B		C	D			
	1992	On-site	11	✓	✓	✓								
		Off-site	5				F	G	H	I				J
	1993	Off-site	3				A	B	K	I	D	D		
	1996	Off-site	21				L				M	N		
Surface Water	1993	On-site	10	✓		✓					D	D		
		Off-site	3				L	B	K	I	D	D		
	1994	On-site	3	✓		✓					D	D		
	1995	Off-site	3				L	B		I				
	1996	Off-site	3				L				M	N		
	1997	Off-site	6				L				M	N		
	1998	Off-site	3				L	O		I	M	N		
	1999	Off-site	3				L	O		I	M	N		
	2000	Off-site	3				L	O		I	M	N		
Sediment	1993	On-site	4	✓		✓					D	D		
		Off-site	3				L	B		I	D	D		
	1994	On-site	3	✓		✓					D	D		
	1996	Off-site	8				L				M	N		
	1997	Off-site	6				L				M	N		
	1998	Off-site	3				L	O		I		N	✓	
	1999	Off-site	3				L	O		I		N	✓	
	2000	Off-site	3				L	O		I		N	✓	

Table 2-4 (Cont.)
Summary of Samples Collected and Analyses Performed at FT002, Eareckson Air Station

Media	Year	Laboratory[1]	Number Samples	BTEX (SW8020)	TPH (E418.1)	TCE/PCE (SW8010)	VOCs	SVOCs/ PAHs	Pest/ PCBs	Metals	GRO	DRO	RRO (AK103)	Dioxins/ Furans
Groundwater	1992	On-site	3	✓		✓								
		Off-site	3				F	G	H	I				
	1993	On-site	12	✓		✓					D	D		
		Off-site	6				L	B	K	I	D	D		
	1994	On-site	6	✓		✓					D	D		
	1995	Off-site	1				L							
	1996	Off-site	3				L				M	N		
	1997	Off-site	6				L				M	N		
	1999	Off-site	2				L	O			M	N		
	2000	Off-site	2				L	O			M	N	✓	
	2004	Off-site	1	L										

Key:

✓ – analysis performed
1 – On-site laboratories consisted of portable gas chromatographs and an infrared spectrophotometer located on Shemya Island. Off-site laboratories were NVLAP accredited laboratories.
A– SW8240
AK – Alaska Test Method
B – SW8270
BTEX – benzene, toluene, ethylbenzene, and xylenes
C – Lead by SW7421
D – SW8015M
DRO – diesel range organics
E – EPA Method
EPA – United States Environmental Protection Agency
F – E624
G – E625
GRO – gasoline range organics
H – E608
I – Target Analyte List Metals (SW6010/7000)
J – SW8280
K – SW8080
L – SW8260
M – AK101
N – AK102
O – PAHs by SW8270C SIM
PAHs – polynuclear aromatic hydrocarbons
PCBs –polychlorinated biphenyls
PCE – perchloroethylene
Pest – pesticides
RRO – residual range organics
SVOCs – semi-volatile organic compounds
SW – EPA Solid Waste Method
TCE – trichloroethylene
TPH – Total Petroleum Hydrocarbons
VOCs – volatile organic compounds

Groundwater at FT002-MA is contaminated with benzene at concentrations that were still above ADEC groundwater cleanup level in 2004. Groundwater at FT002 is not used as a drinking water source and contaminants did not exceed site-specific risk-based human health or ecological criteria.

At FT002-FTA, concentrations of DRO in one subsurface soil sample (analyzed by SW8100 in 1993) exceeded the ADEC Method Two cleanup level.. No contaminants in either the soil or groundwater at FT002-FTA exceeded ADEC Method Four risk-based human health or ecological criteria.

Contamination remaining at FT002-ADDA is also petroleum related. Fuel-contaminated sediments were removed from the site in 1996; however, fuel-related compounds remain in sediments and surface water at the site. During the last sampling event at the site in 2000, TAH and TAqH in surface water were above the ADEC water quality criteria. Except for DRO and RRO, no contaminants in surface water or sediments exceed ADEC Method Four site-specific ecological criteria. DRO and RRO concentrations in sediments, and RRO concentrations in surface water, are above the ecological hazard criterion for the rock sandpiper.

Potential risks posed by these contaminants at FT002 were evaluated in a risk assessment conducted in 2006 and are discussed in Section 2.8.2.

2.6.2.5 Site FT003

Environmental studies were conducted at FT003 in 1988, 1993, 1994, 1995, and 2004 to characterize the nature and extent of contamination caused by fire training activities. In addition, a geophysical survey was conducted at the site in 1992. The studies included collecting soil, groundwater, surface water, and sediment samples for laboratory analysis. Environmental samples were analyzed for metals, VOCs, SVOCs, PAHs, pesticides/PCBs, dioxins/furans, and petroleum hydrocarbons. Sample locations are shown on Figure 2-4 and a summary of samples collected and analyses performed is presented in **Table 2-5**. Sample results are summarized in Tables A-10 through A-12 in Appendix A.

During a supplemental field investigation conducted in 2004 at ERP Site FT003, the backhoe struck an unidentified UST and associated piping located 6 feet due east of the former fire training structure foundation and approximately 20 feet north of Monitoring Well FT003-MW01. In 2008, the UST was removed from the site. Soil samples collected from the bottom of the UST excavation and from test pits advanced around the excavation contained DRO at concentrations up to 5,800 mg/Kg, which exceeded the ADEC Method Two Cleanup level (USAF, 2009). GRO, RRO, BTEX, VOCs, and PAHs were either not detected or were found at concentrations below applicable ADEC cleanup levels. Groundwater was not sampled during this investigation.

Table 2-5
Summary of Samples Collected and Analyses Performed at FT003, Eareckson Air Station

Media	Year	Laboratory[1]	Number Samples	BTEX (SW8020)	TPH (E418.1)	TCE/PCE (SW8010)	VOCs	SVOCs/ PAHs	Pest/ PCBs	Metals	GRO	DRO	Dioxins/ Furans
Surface Soil	1988	Off-site	1		✓		A	B		C			
	1994	On-site	11	✓		✓					D	D	
	2004	Off-site	3						F				
Subsurface Soil	1988	Off-site	1		✓		A	B		C			
	1994	On-site	11	✓		✓					D	D	
		Off-site	2				A	B		G			H
Surface Water	1993	On-site	2	✓		✓					D	D	
	1994	On-site	2	✓		✓					D	D	
		Off-site	2				I	B		G			
	1995	Off-site	1							G			
Sediment	1993	On-site	2	✓		✓					D	D	
	1994	On-site	2	✓		✓					D	D	
		Off-site	2				A	B		G			
	1995	Off-site	2							G			
Groundwater	1993	On-site	1	✓		✓					D	D	
		Off-site	1				I	B	J	G	D	D	
	1994	On-site	3	✓		✓					D	D	
		Off-site	2				I	B		G			

Key:
✓ – analysis performed
1 – On-site laboratories consisted of portable gas chromatographs and an infrared spectrophotometer located on Shemya Island. Off-site laboratories were NVLAP accredited laboratories.
A – SW8240
B – SW8270
BTEX – benzene, toluene, ethylbenzene, and xylenes
C – Lead by SW7421
D – SW8015M
DRO – diesel range organics
E – EPA Method
EPA – U.S. Environmental Protection Agency
F – PCBs only by SW8082
G – Target Analyte List Metals (SW6010/7000)
GRO – gasoline range organics
H – SW8280
I – SW8260
J – SW8080
PAHs – polynuclear aromatic hydrocarbons
PCBs – polychlorinated biphenyls
PCE – perchloroethylene
Pest – pesticides
SVOCs – semi-volatile organic compounds
SW – EPA Solid Waste Method
TCE – trichloroethylene
TPH – total petroleum hydrocarbons
VOCs – volatile organic compound

Surface and subsurface soil samples were collected at FT003 for laboratory analysis in 1988, 1994, and 2004 (surface soil only) from six different locations. Subsurface soil samples ranged in depth from 5 to 11 feet bgs. Only petroleum hydrocarbons were identified as possible concerns for human health, and petroleum hydrocarbons, zinc, and di-n-butyl phthalate were identified as concerns for ecological receptors.

Fresh surface water and sediment samples were collected for laboratory analysis from two ponds near FT003 in 1994 and 1995. Metals, two VOCs, one SVOC, and one PAH were detected.

Groundwater samples were collected for laboratory analysis from two locations at FT003 in 1993 and 1994. Metals, one SVOC, and two PAHs were detected.

Potential risks posed by these contaminants at FT003 were evaluated in a risk assessment conducted in 2006 and are discussed in Section 2.8.3.

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 FT001

The source of contaminants at FT001 is the burn area where fuel, combustion byproducts, and AFFF were released to surface and subsurface soils. Although the source area has been capped with 2 feet of soil, eliminating contaminant exposure from surface and subsurface soils as long as the cap remains intact, human and ecological pathways to soil are conservatively assumed to be complete and were evaluated. There is the potential for contaminants in the soil to migrate to groundwater. However, human exposure pathways for groundwater are considered incomplete because groundwater is marine influenced and of inadequate quality for potable uses. Groundwater might be in communication with marine surface water, and marine ecological exposure to contaminants by this pathway was evaluated. Fresh surface water is not present at the site.

2.6.3.2 FT002

At FT002-FTA, the sources of contaminants were fuel and combustion byproducts released to surface and subsurface soils during fire training activities. Most of the contaminated soils were removed during the 1985 removal action. Human and ecological exposures to surface and subsurface soils are considered complete and were evaluated. Human exposure to groundwater was also considered a complete pathway during the risk assessment although this is not likely,

because groundwater at FT002-FTA is not a drinking water source. Other exposure pathways are incomplete at FT002-FTA.

At FT002-MA, the source of contaminants was also fuel and combustion byproducts released to surface and subsurface soils during fire training activities. Contamination has also migrated into the groundwater at this area. A bioventing system was operated at the site from 1996 to 2000 and significantly reduced contaminant concentrations in the groundwater, and presumably also in the soil. Both human and ecological exposure pathways to contaminants in surface and subsurface soils are assumed to be complete and were evaluated in the risk assessment. Human exposure to groundwater was also evaluated, although, as stated above, it is not a likely pathway. Groundwater at FT002 is assumed to be in communication with marine surface waters and ecological exposure to contaminants in groundwater was evaluated via this pathway. Human and ecological exposure pathways from freshwater habitats and marine sediments are considered incomplete at FT002-MA.

At FT002-ADDA, the source of contaminants was drums buried at the head of the drainage. The drums and visibly-contaminated sediments were removed from the site in 1996. Exposure pathways considered complete at FT002-ADDA are ecological receptors potentially exposed to contaminants in freshwater and marine habitats. Human exposure pathways are considered incomplete at FT002-ADDA.

2.6.3.3 FT003

The source of contaminants at FT003 was fuel, combustion byproducts, and AFFF released to surface and subsurface soils during fire training activities. The training structure and debris were removed and up to 4 feet of backfill was placed over the site. Human and ecological exposure pathways to surface and subsurface soils are assumed to be complete and were evaluated. Human exposure to groundwater was also assumed to be complete, although unlikely, and was evaluated during the risk assessment. Groundwater at FT003 is thought to be in communication with fresh surface water and ecological exposure pathways for groundwater are considered to be complete. Two ponds are located at FT003 and, therefore, ecological exposure to freshwater habitats was evaluated. Human exposure pathways to fresh surface water and fresh sediments are considered incomplete. There are no marine habitats at FT003.

2.7 Current and Potential Future Land and Resource Uses

Current and potential future land and resource uses are generally the same for the three ERP sites, 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.

FT001 current land use is restricted open space. FT002 and FT003 current land use is industrial outdoor storage areas. There are no current plans for any future development at FT001, FT002, and FT003; therefore, the reasonably anticipated future land use is the same as the current land use.

2.7.2 Ground and Surface Water Uses

The groundwater resources beneath and in the vicinity of FT001, FT002, and FT003 are described in Section 2.5.3. Groundwater at FT001 is marine influenced and not considered potable. Groundwater at FT002 and FT003 is not used as a drinking water source and there are no plans to utilize the groundwater in these areas.

The surface water resources in the vicinity of FT001, FT002, and FT003 are described in Section 2.5.4. There is no viable surface water at FT001. Stormwater typically infiltrates into the ground and any runoff that does occur is sheet flow into the surrounding marine water. Surface water at FT002 and FT003 is limited and used for aquatic life and wildlife propagation. 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

A human health and ecological risk assessment (HHERA) was conducted for FT001, FT002, and FT003 in 2006 utilizing updated site data (USAF, 2006). The HHERA included both screening-level (i.e., Tier I) and baseline (i.e., Tier II) risk assessments. These risk assessments were conducted to evaluate potential human health and environmental risks associated with chemicals identified at the sites. Tier I and Tier II HHERAs were previously prepared for FT001, FT002, and FT003, as documented in the RI/FS (USAF, 1996a and b) and Basewide Monitoring Report (USAF, 1999a). The updated risk assessments were performed in response the additional data collected in 1998, 1999, and 2004, and to provide consistency with Alaska regulation in effect at that time and risk assessment methods described in ADEC's *Risk Assessment Procedures Manual* (ADEC, 2000).

Since the HHERA was completed in 2006, Alaska regulations on cleanup levels have been updated to reflect new findings in toxicology. The ADEC Method Two soil cleanup levels for many contaminants have changed and new contaminants have been added to the tables. In addition, ADEC has issued new guidance on performing risk assessments (ADEC, 2010) since the HHERA was completed. The effects of these changes on the risk management decisions presented in this decision document have been assessed and have been determined to not significantly affect the results of the HHERA and, therefore, the findings presented in this Decision Document.

2.8.1 Site FT001 HHERA

2.8.1.1 FT001 – Tier I Screening

FT001 – COPCs.

Surface soil (1988, 1992, and 2004) and subsurface soil (1988 and 1992) samples were collected at FT001 from nine different locations (Figure 2-2). Subsurface soil samples ranged in depth from 4 to 19.5 feet bgs. The COPCs identified for surface soil (via direct ingestion and inhalation exposure pathways) included metals (aluminum, antimony, arsenic, chromium, lead, thallium, and vanadium), one dioxin (2,3,7,8-TCDD TEQ), and one PAH (benzo(a)pyrene). Tier I screening levels are not available for DRO measured by EPA Method 8100M, and this analyte was carried through the Tier I screen as a surface soil COPC. Chemicals detected in surface soil at concentrations exceeding ADEC Method Two cleanup levels included metals (aluminum, antimony, arsenic, cadmium, chromium, lead, and nickel) and one dioxin (2,3,7,8-TCDD TEQ). Again, an ADEC Method Two cleanup level is not available for DRO measured by EPA Method 8100M, and this analyte was identified as a COPC for surface soil.

The COPCs identified for subsurface soil (via direct ingestion and inhalation exposure pathways) at FT001 included metals (aluminum, antimony, arsenic, beryllium, lead, thallium, and vanadium) and VOCs (benzene, toluene, and total xylenes). Chemicals detected in subsurface soil at concentrations exceeding ADEC Method Two cleanup levels included metals (aluminum, antimony, arsenic, chromium, lead, selenium, and thallium) and VOCs (2-butanone and BTEX). DRO measured by EPA Method 8100M was carried through the Tier I screen as a subsurface soil COPC.

FT001 – COPECs.

Surface soil COPECs at FT001 included metals (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, thallium, vanadium, and zinc), one VOC (total xylenes), SVOCs (bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, and dibenzofuran), and one dioxin (2,3,7,8-TCDD TEQ). Tier I ecological screening levels for soil are not currently available for 2-methylnaphthalene and DRO measured by EPA Method 8100M, and these analytes were carried through the Tier I screen as surface soil COPECs.

Chemicals identified as COPECs for subsurface soil included metals (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, selenium, thallium, vanadium, and zinc), VOCs (toluene, and total xylenes), and a SVOC (di-n-butyl phthalate). DRO measured by EPA Method 8100M was carried through the Tier I screen as a subsurface soil COPEC.

Chemicals identified as COPECs for marine sediment included metals (aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, magnesium, manganese, molybdenum, nickel,

selenium, vanadium, and zinc). Maximum concentrations of these metals exceeded Tier I ecological screening criteria.

Chemicals detected in groundwater were screened for ecological receptors, assuming groundwater is in communication with marine surface water. Maximum concentrations of eight metals (aluminum, beryllium, cadmium, copper, manganese, silver, thallium, and zinc) exceeded Tier I ecological screening criteria for marine surface water.

2.8.1.2 FT001 – Tier I Risk Assessment

FT001 – Tier I Human Risk.

Tier I cumulative cancer risk and noncancer Hazard Index (HI) estimates for surface soil at FT001 were calculated as 9×10^{-5} and 8.7, respectively. The primary contributors to the cumulative human health cancer risk and HI estimates for surface soil were arsenic, thallium, benzo(a)pyrene, and one dioxin (2,3,7,8-TCDD TEQ). Cumulative cancer risk and noncancer HI estimates for subsurface soil were calculated as 3×10^{-5} and 18, respectively. The primary contributors to the cumulative human health cancer risk and HI estimates for subsurface soil were arsenic and thallium. It should be noted that Tier I cancer risk and noncancer HI estimates were based on assumed residential scenarios; however, there are no current or anticipated future residential exposures to contaminated media at FT001. All soil COPCs contributing to a cancer risk of 1×10^{-5} or noncancer HI of 1.0 were further evaluated.

FT001 – Tier I Ecological Risk.

The Tier I cumulative ecological HI for surface soil at FT001 was estimated as 44. Approximately 99 percent of the total ecological HI was attributable to maximum concentrations of metals, butyl benzyl phthalate, and dioxins measured in surface soil. The Tier I ecological HI for subsurface soil was estimated as 81. The total ecological HI was primarily attributable to the maximum detected concentrations of thallium, total xylenes, ethylbenzene, and selenium in subsurface soil. All soil COPECs contributing to an ecological HI of 1.0 were further evaluated.

The Tier I cumulative ecological HI for marine sediment at FT001 was estimated as 11. The total ecological HI was primarily attributable to maximum detected concentrations of arsenic, copper, and nickel in marine sediment. All marine sediment COPECs contributing to an ecological HI of 1.0 were further evaluated.

The Tier I HHERA for FT001 assumed that contaminants detected in groundwater might potentially migrate to marine surface water, where marine ecological receptors are potentially exposed to dissolved contaminants. The Tier I ecological HI for groundwater was estimated as 370. Aluminum was responsible for 88 percent of the ecological HI estimate, with lesser contributions from copper, manganese, silver, and zinc. The Tier I ecological screening evaluation for groundwater assumed no attenuation or dilution of groundwater contaminant

concentrations in marine surface water. All groundwater COPECs contributing to an ecological HI of 1.0 were further evaluated.

FT001 – Petroleum Hydrocarbons.

Consistent with ADEC Guidance (ADEC, 2002), petroleum hydrocarbons were not included in the cumulative screening estimates described above for FT001. Biased sampling for TPH by EPA Method 8100M identified DRO in FT001 surface and subsurface soils at concentrations of 2,300 and 2,000 mg/Kg, respectively. Although not directly comparable, the ADEC Method Two cleanup level for the Migration-to-Groundwater Pathway is 250 mg/Kg. These results suggest that concentrations of DRO in surface and subsurface soil at FT001 might potentially impact groundwater. However, DRO releases at the site occurred 20 to 30 years ago, and the petroleum hydrocarbons are aged. Field screening results for DRO in FT001 groundwater were non-detect. Therefore, it appears that DRO in surface and subsurface soils at FT001 are not currently impacting groundwater.

2.8.1.3 FT001 – Tier I Refinement

During initial Tier I screening at FT001, maximum concentrations of inorganic analytes were conservatively compared to mean background levels established for specific media at Shemya Island. A Tier I refinement step was included in the HHERA to refine the COPCs and COPECs identified during Tier I screening, based on more reasonable estimates of background conditions at Shemya Island. For the Tier I refinement step, the 97.5 percentile background concentration was selected as an upper bound estimate of background. Inorganic constituents with a maximum concentration exceeding the 97.5 percentile background concentration, and associated with a cumulative human health risk or criteria exceedence for the ADEC Method Two cleanup level (Migration-to-Groundwater Pathway), were retained as COPCs for evaluation in the Tier II HHERA. Similarly, inorganic constituents with maximum concentrations exceeding the 97.5 percentile background concentration, and contributing to an ecological HI in excess of 1.0, were retained as COPECs for evaluation in the Tier II HHERA.

Based on the Tier I refinement phase, metals that were eliminated from further evaluation as COPCs or COPECs in the Tier II HHERA included:

- Aluminum, nickel, and vanadium in surface soil.
- Aluminum, beryllium, chromium, and selenium in subsurface soil.
- Antimony, arsenic, cadmium, cobalt, magnesium, manganese, nickel, selenium, vanadium, and zinc in marine sediment.
- Aluminum, beryllium, copper, and manganese for groundwater (assumed to be in communication with marine surface water).

2.8.1.4 FT001 – Tier II Risk Assessment

FT001 – Tier II Human Risk.

Receptors evaluated in the Tier II human health risk assessment (HHRA) for FT001 included a site worker, transit walker, and future excavation worker. A site worker was evaluated to examine potential exposure to station personnel obtaining access to the area. Although it is not anticipated that a transit walker would use FT001 under the current restricted status of this site, this receptor was included to evaluate a potential future land use scenario.

FT001 – Surface and Subsurface Soils. An excavation worker was evaluated to examine potential risks if future remedial actions at FT001 included soil excavation. Cancer risk and noncancer hazard estimates were calculated for each receptor based on both 'reasonable maximum exposure' (RME) and 'average' assumptions. Further information regarding the exposure scenarios and assumptions evaluated in the Tier II HHRA for FT001 may be found in the 1994 RI/FS Report (USAF, 1996b) and in the *Risk Assessment Assumptions Technical Memorandum* (RAATM) (USAF, 2001a).

All cancer risk estimates were below the ADEC acceptable risk criterion of 1×10^{-5} for surface and subsurface soils at FT001. In surface soils, all noncancer HI estimates were equal to, or below, the ADEC acceptable HI criterion of 1.0.

In subsurface soils, the RME noncancer HI estimates for the FT001 site worker and excavation worker, and average noncancer HI estimate for the site worker, slightly exceeded the ADEC acceptable HI criterion of 1.0. Exceedence of the HI criterion was attributable to the presence of thallium in subsurface soil. The maximum concentration of thallium detected in subsurface soil (110 mg/Kg) was higher than the RME Method Four RBCL calculated for thallium (58 mg/Kg), and equal to the average Method Four RBCL calculated for this chemical (110 mg/Kg). However, thallium in soil was analyzed using EPA Method 6010, which is based on inductively coupled plasma. This method is subject to interference from other metals, including aluminum. Consequently, thallium concentrations in soil are over-reported using EPA Method 6010. It should also be noted that there is no known source of thallium contamination at FT001. Based on the above, noncancer HI estimates for FT001 subsurface soil are overestimated and are not considered to present an unacceptable risk to human health.

FT001 – Marine Sediment and Groundwater. As described in the RAATM, human exposure pathways for marine sediment are considered to be incomplete. Human exposure pathways for groundwater are also considered to be incomplete, because groundwater at FT001 is marine-influenced and is of inadequate quality for potable uses. Therefore, potential human exposures and health risks were not evaluated for these media.

FT001 – Tier II Ecological Risk.

In surface and subsurface soils and marine sediments, ecological hazard quotients (HQ) estimates at FT001 were below the ADEC hazard criterion of 1.0. Tier II ecological hazard

estimates for marine sediment support the results of field screening and P450 Reporter Gene System analysis, which suggest that contaminants present at FT001 are not impacting the offshore environment.

Groundwater at FT001 was evaluated in the Tier II Ecological Risk Assessment (ERA) for marine ecological receptors, assuming groundwater is in communication with marine surface water. The exposure models for marine receptors include exposure to COPECs present in groundwater (assumed as marine surface water) and sediment, as well as to chemicals present in dietary items as a result of uptake from these media. Ecological HI estimates for the rock sandpiper and sea otter exceed the ADEC HQ criterion of 1.0, due to the presence of thallium in groundwater at a concentration of 0.0357 milligrams per liter (mg/L). However, thallium concentrations in groundwater were analyzed using EPA Method E200.7, which likely over-reported thallium concentrations as a result of interference from other metals. In addition, ecological HI estimates for marine receptors were calculated assuming no attenuation or dilution by marine surface water in the ocean. As a result, thallium concentrations, and the associated hazard estimates, for marine surface water at FT001 are overestimated and are not considered to pose an unacceptable ecological risk.

2.8.2 Site FT002 HHERA

2.8.2.1 FT002 – Tier I Screening

FT002 – COPCs.

Surface Soil. Surface soil samples were collected for laboratory analysis at FT002 in 1988 and 1992 from nine different locations (Figure 2-3). The COPCs identified for surface soil (via direct ingestion and inhalation exposure pathways) included metals (aluminum, arsenic, magnesium, thallium, and vanadium) and VOCs (1,1,2,2-tetrachloroethane and BTEX). Tier I screening levels are not available for TPH measured by EPA Method E418.1; therefore, TPHs were carried through the Tier I screen as a surface soil COPC.

Chemicals detected in FT002 surface soil at concentrations exceeding ADEC Method Two cleanup levels included metals (aluminum, arsenic, cadmium, chromium, magnesium, manganese, nickel, selenium, and thallium), VOCs (1,1,2,2-tetrachloroethane, 2-butanone, BTEX, methylene chloride, and tetrachloroethene), one SVOC (dibenzofuran), and PAHs (2-methylnaphthalene and naphthalene). Again, an ADEC Method Two cleanup level is not available for TPHs measured by EPA Method E418.1 and TPHs were identified as a COPC for surface soil.

Subsurface Soil. Subsurface soil samples were collected for laboratory analysis at FT002 in 1988, 1992, 1993, and 1996 (Figure 2-3). Subsurface soil samples ranged in depth from 4 to 22 feet bgs. The COPCs identified for subsurface soil (via direct ingestion and inhalation exposure pathways) included metals (antimony, arsenic, beryllium, magnesium, thallium, and vanadium), VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-methyl-2-pentanone, BTEX, and m,p-

xylenes), and one PAH (phenanthrene). DRO measured by EPA Method E418.1 was carried through the Tier I screen as a subsurface soil COPC.

Chemicals detected in FT002 subsurface soil at concentrations exceeding ADEC Method Two cleanup levels included metals (antimony, arsenic, cadmium, chromium, lead, magnesium, manganese, and thallium), VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-methyl-2-pentanone, acetone, BTEX, methylene chloride, and m,p-xylenes), one SVOC (n-nitrosodiphenylamine), and PAHs (2-methylnaphthalene, and naphthalene). TPH, DRO, and GRO measured by EPA Method E418.1 were carried through the Tier I screen as subsurface soil COPCs.

Groundwater. Fresh groundwater samples were collected for laboratory analysis from 14 locations at FT002 in 1992, 1993, 1995, 1996, 1997, 1999, and 2000 (Figure 2-3). The COPCs identified for groundwater included: metals (aluminum, antimony, arsenic, beryllium, cadmium, chromium, lead, magnesium, manganese, and vanadium), VOCs (1,1-dichloroethene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, isopropylbenzene, methylene chloride, m,p-xylene, n-propylbenzene, and toluene), SVOCs (4-methylphenol and bis(2-ethylhexyl)phthalate), one PAH (naphthalene), and petroleum hydrocarbons (GRO, DRO, and RRO). Tier I screening criteria do not exist for GRO analyzed by SW8015M or DRO measured by SW8100M. Therefore, these analytes were carried through the Tier I screen as groundwater COPCs.

FT002 – COPECs.

Surface Soil. The COPECs identified for surface soil at FT002 included metals (aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, magnesium, manganese, selenium, thallium, vanadium, and zinc), VOCs (1,1,2,2-tetrachlororethane, BTEX, methylene chloride, and tetrachloroethene), SVOCs (bis(2-ethylhexyl)phthalate and dibenzofuran) and PAHs (2-methylnaphthalene, fluorene, naphthalene, and phenanthrene). Tier I ecological screening levels for soil are not currently available for TPHs measured by EPA Method E418.1; therefore, this analyte was also carried through the Tier I screen as a surface soil COPEC.

Subsurface Soil. Chemicals identified as COPECs for subsurface soil at FT002 included metals (antimony, arsenic, barium, cadmium, chromium, cobalt, magnesium, manganese, thallium, vanadium, and zinc), VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-methyl-2-pentanone, acetone, BTEX, methylene chloride, m,p-xylene, and o-xylene), SVOCs (bis(2-ethylhexyl)phthalate, dibenzofuran, and n-nitrosodiphenylamine) and PAHs (2-methylnaphthalene, acenaphthene, fluorene, naphthalene, and phenanthrene). TPH, GRO, DRO, and RRO measured by EPA Method E418.1 were carried through the Tier I screen as subsurface soil COPECs.

Surface Water. Fresh surface water samples were collected for laboratory analysis from six locations at FT002 in 1993 and 1995 through 2000. Contaminated sediments associated with FT002-ADDA were excavated in 1996; therefore, surface water samples collected from the

ADDA drainage in 1993 and 1995 are not representative of current conditions and were not included in the Tier I screening assessment. As described in the RAATM (USAF, 2001a), surface water does not have a complete exposure pathway for human receptors. Therefore, no COPC screening was done for this medium.

Sampling locations FT002-ADA and FT002-ADB are representative of potential exposure media for fresh surface water receptors, while location FT002-ADC was sampled to evaluate contaminant concentrations discharging to the marine environment and potential exposures to marine receptors (Figure 2-3). Chemicals identified as COPECs for non-marine receptors include metals (aluminum, antimony, barium, cadmium, manganese, silver, and vanadium), VOCs (1-chlorohexane, 1,1-dichloropropene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,3-dichloropropane, benzene, sec-butylbenzene, m,p-xylene, n-proylbenzene, o-xylene, toluene, and total xylenes), one SVOC (2-methylphenol), and petroleum hydrocarbons (DRO, GRO, and RRO). Chemicals identified as COPECs for marine receptors included metals (aluminum, antimony, barium, manganese, and vanadium) and petroleum hydrocarbons (DRO and RRO).

Sediment. Sediment samples were collected for laboratory analysis at FT002 in 1993 and 1996 through 2000 from four different locations (Figure 2-3). Contaminated sediments associated with location FT002-ADDA were excavated in 1996; therefore, sediment samples collected from this location in 1993 are not representative of current conditions and were not included in the Tier I screening assessment. As described in the RAATM, sediment does not have a complete exposure pathway for human receptors. Therefore, no COPC screening was done for this medium.

As described above, sampling locations FT002-ADA and FT002-ADB are representative of potential exposure media for fresh sediment receptors, while location FT002-ADC was sampled to evaluate contaminant concentrations discharging to the marine environment and potential exposures to marine receptors (Figure 2-3). Chemicals identified as sediment COPECs for non-marine receptors included metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, and zinc), VOCs (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-isopropyltoluene, acetone, BTEX, methylene chloride, m,p-xylenes, n-butylbenzene, n-propylbenzene, and o-xylene), SVOCs (4-methylphenol and bis(2-ethylhexyl)phthalate), and PAHs (fluoranthene, naphthalene, and pyrene). GRO, DRO, and RRO were carried through the Tier I screen as sediment COPECs.

Chemicals identified as sediment COPECs for marine receptors at FT002 included metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, magnesium, manganese, selenium, thallium, vanadium, and zinc) and VOCs (methylene chloride, m,p-xylenes, o-xylene, toluene, and total xylenes). Tier I ecological screening levels for sediment are not currently available for total GRO analyzed by SW8015 and AK101, DRO analyzed by SW8100 and AK102, or RRO analyzed by AK103. Therefore, these analytes were carried through the Tier I screen as sediment COPECs.

Groundwater. A groundwater sample was collected from Monitoring Well MW-16, located at FT002-ADC, in 1993 (Figure 2-3). As described in the RAATM, groundwater collected for ecological marine receptors does not have a complete exposure pathway for human receptors. Therefore, no COPC screening was done for this medium. Chemicals identified as COPECs for marine receptors in groundwater included metals (aluminum, arsenic, magnesium, molybdenum, and vanadium), VOCs (acetone and benzidine), and petroleum hydrocarbons (GRO and DRO).

2.8.2.2 FT002 – Tier I Risk Assessment

FT002 – Tier I Human Risk.

Tier I cumulative cancer risk and noncancer HI estimates for surface soil at FT002 were calculated as 4×10^{-5} and 10, respectively. The primary contributors to the cumulative human health cancer risk and HI estimates for surface soil were arsenic, thallium, and 1,1,2,2-tetrachloroethane. Only arsenic and thallium exceeded cancer risk and noncancer hazard criteria of 1×10^{-5} and 1.0, respectively, on a chemical-specific basis.

Tier I cumulative cancer risk and noncancer HI estimates for subsurface soil at FT002 were calculated as 5×10^{-5} and 9.8, respectively. The primary contributors to the cumulative human health cancer risk and HI estimates for subsurface soil were arsenic, thallium, and benzene. It should be noted that Tier I cancer risk and noncancer HI estimates were based on assumed residential scenarios; however, there are no current or anticipated future residential exposures to contaminated media at FT002. All COPCs contributing to a cancer risk of 1×10^{-5} or noncancer HI of 1.0 were further evaluated.

Tier I cumulative cancer risk and noncancer HI estimates for fresh groundwater at FT002 were calculated as 8×10^{-4} and 24, respectively. The only COPC with a chemical-specific cancer risk estimate in excess of 1×10^{-5} was benzene. The primary contributors to the cumulative noncancer HI estimate for groundwater were antimony and naphthalene. Other COPCs with HQ estimates of 1.0 or greater include aluminum, manganese, vanadium, and bis(2-ethylhexyl) phthalate.

FT002 – Tier I Ecological Risk.

Surface Soil. The maximum Tier I ecological HQ for surface soil at FT002 was estimated as 100, and was attributable to total xylenes. Other COPECs associated with ecological HQ estimates in excess of 1.0 included selenium, thallium, methylene chloride, toluene, dibenzofuran, and naphthalene.

Subsurface Soil. The maximum Tier I ecological HQ for subsurface soil at FT002 was estimated as 96. Total xylenes were associated with the highest ecological HQ estimate for subsurface soil. Other COPECs associated with ecological HQ estimates in excess of 1.0 included thallium, acetone, methylene chloride, toluene, dibenzofuran, and naphthalene.

Groundwater. The Tier I HHERA assumed that contaminants detected in groundwater samples collected from Monitoring Well MW-16 might potentially be in communication with marine surface water, where ecological receptors are potentially exposed to dissolved contaminants. The maximum Tier I ecological HQ for groundwater (for marine receptors) was estimated as 24, and was associated with aluminum. The Tier I ecological screening evaluation for groundwater assumed no attenuation or dilution of groundwater concentrations in the marine surface water. Furthermore, the maximum concentration of aluminum detected in groundwater (for marine receptors) is below the 97.5 percentile background concentration for aluminum. Groundwater (for marine receptors) COPECs for which ecological benchmarks are unavailable included magnesium, molybdenum, vanadium, acetone, benzidine, GRO, and DRO. All COPECs identified for groundwater (for marine receptors) were further evaluated.

Surface Water. The maximum Tier I ecological HQ estimate for fresh surface water samples collected from FT002-ADA and FT002-ADB was 5.1, and was attributable to aluminum. The maximum aluminum concentration detected in fresh surface water is below the 97.5 percentile background concentration for aluminum. The only other COPEC associated with an HQ estimate in excess of 1.0 was cadmium. All COPECs identified for fresh surface water were further evaluated.

Surface water samples collected from FT002-ADC were evaluated for potential impacts to marine receptors. The maximum Tier I ecological HQ estimate for surface water samples collected from FT002-ADC was 3.2, and was attributable to aluminum. The maximum aluminum concentration detected in fresh surface water is below the 97.5 percentile background concentration for aluminum. Surface water COPECs for which marine benchmarks are unavailable included barium, vanadium, DRO, and RRO. All COPECs identified for surface water were further evaluated.

Sediment. The maximum Tier I ecological HQ estimate for fresh sediment samples collected from FT002-ADA and FT002-ADB was 13, and was attributable to arsenic. Other COPECs associated with HQ estimates for fresh sediment in excess of 1.0 included antimony, cadmium, copper, lead, manganese, nickel, silver, bis(2-ethylhexyl)phthalate, and naphthalene. All COPECs identified for fresh sediment were further evaluated.

Sediment samples collected from FT002-ADC were evaluated for potential impacts to marine receptors. The maximum Tier I ecological HQ estimate for sediment samples collected from FT002-ADC was 4.1, and was attributable to arsenic. Other COPECs associated with HQ estimates for marine receptors in excess of 1.0 included antimony, copper, and manganese. All COPECs identified for surface water were further evaluated.

FT002 – Tier I Petroleum Hydrocarbons.

Biased sampling for TPHs by EPA Method E418.1 identified TPHs in FT002 surface and subsurface soils at concentrations of 7,500 and 12,000 mg/Kg, respectively. However, Method E418.1 is a nonspecific analytical method and results may include natural plant waxes and lipids.

The maximum concentration of GRO by AK101 in subsurface soil at FT002-MA (108.1 mg/Kg) is below the ADEC Method Two cleanup level for the Migration-to-Groundwater Pathway (300 mg/Kg). The maximum concentration of DRO by AK102 in subsurface soil at FT002-MA (763.5 mg/Kg) exceeds the ADEC Method Two cleanup level for the Migration-to-Groundwater Pathway (250 mg/Kg). The maximum concentration of RRO by AK103 in subsurface soil at FT002-MA (323 mg/Kg) is below the ADEC Method Two cleanup level for the Ingestion Pathway (10,000 mg/Kg). These results suggest that concentrations of DRO in subsurface soil at FT002-MA might potentially impact groundwater. Potential human health risks associated with DRO in subsurface soil were further evaluated.

Although the most recent sampling data (from 2000) indicates that the GRO, DRO, and RRO concentrations in groundwater at FT002 are now below ADEC groundwater cleanup levels, prior sampling data for GRO and DRO (RRO was not analyzed) indicated that the concentrations were well above their respective ADEC groundwater cleanup levels. Therefore, potential human health risks associated with GRO and DRO in groundwater were further evaluated.

Low concentrations of GRO and DRO were detected in groundwater samples collected from Monitoring Well MW-16 (for marine receptors). Potential ecological risks associated with these contaminants were further evaluated.

Petroleum hydrocarbons (GRO, DRO, and RRO) were detected in fresh surface water and sediment samples collected from FT002-ADA and FT002-ADB. Low concentrations of DRO and RRO were detected in surface water samples collected from FT002-ADC, and low concentrations of GRO, DRO, and RRO were detected in sediment samples collected from FT002-ADC. Potential ecological risks associated with petroleum hydrocarbons were further evaluated.

2.8.2.3 FT002 – Tier I Refinement

Based on the Tier I refinement phase, aluminum, barium, cadmium, chromium, cobalt, magnesium, manganese, nickel, selenium, vanadium, and zinc in surface soil were eliminated from further evaluation at COPCs or COPECs at FT002 in the Tier II HHERA, because maximum concentrations of these metals were below 97.5 percentile background concentrations. Arsenic and thallium were retained as COPCs for surface soil; and arsenic, cadmium, chromium, copper, selenium, and thallium were retained as COPECs for surface soil.

Based on the Tier I refinement phase, cadmium, chromium, lead, magnesium, manganese, and vanadium in subsurface soil were eliminated as COPCs. Barium, chromium, cobalt, magnesium, manganese, vanadium, and zinc were eliminated as subsurface soil COPECs. Antimony, arsenic, beryllium, and thallium were retained as COPCs for subsurface soil; and antimony, arsenic, cadmium, and thallium were retained as COPECs for subsurface soil.

COPCs in fresh groundwater eliminated from further consideration in the Tier II HHRA based on the Tier I refinement included chromium, lead, magnesium, and manganese. Aluminum, antimony, arsenic, beryllium, cadmium, and vanadium were retained as COPCs for groundwater. No COPECs were identified for fresh groundwater, because ecological receptors are not exposed to this medium at FT002.

No human health COPCs were identified for fresh surface water associated with FT002-ADA or FT002-ADB. Aluminum and manganese were eliminated as COPECs for fresh surface water associated with FT002-ADA and FT002-ADB; antimony, barium, cadmium, silver, and vanadium were retained as COPECs for this medium. No COPCs were identified for fresh surface water associated with FT002-ADC. Aluminum was eliminated from further consideration, and antimony, barium, manganese and vanadium were identified as COPECs for fresh surface water associated with FT002-ADC.

No human health COPCs were identified for fresh sediment associated with FT002-ADA or FT002-ADB. Aluminum, magnesium, nickel, and zinc were eliminated as COPECs for fresh sediment associated with FT002-ADA and FT002-ADB; the remaining 16 metals identified as Tier I COPECs for fresh sediment at these locations were retained as COPECs for evaluation in the Tier II ERA. Aluminum, beryllium, cadmium, chromium, magnesium and zinc were eliminated as COPECs for sediment associated with marine receptors at FT002-ADC; antimony, arsenic, barium, cobalt, copper, manganese, selenium, thallium, and vanadium were retained as COPECs for this medium.

2.8.2.4 FT002 – Tier II Risk Assessment

FT002 – Tier II Human Risk.

The Tier II cancer risk estimates for surface and subsurface soil are below ADEC's acceptable risk criterion of 1×10^{-5}. With the exception of the RME noncancer HI estimate for the excavation worker, all noncancer HI estimates are below the ADEC acceptable HI criterion of 1.0. Exceedence of the HI criterion by the RME excavation worker was attributable to the presence of thallium in surface and subsurface soil. The maximum concentration of thallium detected in site soils (67.8 mg/Kg) was only slightly higher than the RME Method Four RBCL calculated for thallium (61.3 mg/Kg), and less than the average Method Four RBCL calculated for this chemical (144 mg/Kg). However, thallium in soil was analyzed using EPA Method 6010, which is based on inductively coupled plasma. This method is subject to interference from other metals, including aluminum. Consequently, thallium concentrations in soil are over-reported using EPA Method 6010. It should also be noted that there is no known anthropogenic source of thallium contamination at FT002. Consequently, noncancer HI estimates for FT002 surface soil are also overestimated.

For exposure to groundwater, the RME site worker cancer risk estimate exceeded the ADEC acceptable risk criterion of 1×10^{-5}, but average cancer risk estimates were below the ADEC acceptable risk criterion. Exceedence of the cancer risk criterion was attributable to the presence

of arsenic and cadmium in fresh groundwater. The maximum concentration of arsenic detected in groundwater (0.019 mg/L) was over four-fold higher than the RME Method Four RBCL calculated for arsenic (0.0044 mg/L), but just slightly higher than the 97.5 percentile background concentration (0.0176 mg/L). The maximum concentration of cadmium detected in groundwater (0.0029 mg/L) was approximately three-fold higher than the RME Method Four RBCL calculated for cadmium (0.0010 mg/L), but was only slightly higher than the 97.5 percentile background concentration (0.0022 mg/L).

All noncancer HI estimates for groundwater at FT002 exceeded the ADEC acceptable risk criterion of 1.0. Excess noncancer hazards were primarily attributable to antimony and arsenic in groundwater. The maximum concentration of antimony detected in groundwater (0.026 mg/L) was approximately 1.2 times higher than the RME Method Four RBCL calculated for antimony, but less than the average Method Four RBCL (0.038 mg/L) calculated for this analyte. The maximum concentration of arsenic detected in groundwater (0.019 mg/L) was over four-fold higher than the RME Method Four RBCL calculated for arsenic (0.0044 mg/L), but just slightly higher than the 97.5 percentile background concentration (0.0176 mg/L). It should be noted, however, that it is extremely unlikely that groundwater at FT002 would be used for potable purposes.

Cumulative human health risk estimates across media were calculated and cumulative carcinogenic risk and noncarcinogenic HI estimates were below ADEC's acceptable cancer risk criterion of 1×10^{-5} and HI of 1.0.

FT002 – Tier II Ecological Risk.

No COPECs were identified for surface soil because ecological HQ estimates for this medium were below 1.0. The HQ estimate for the snow bunting exposed to subsurface soil exceeded the ADEC HQ criterion of 1.0. Exceedence of the HQ criterion by the snow bunting was attributable to the presence of DRO in subsurface soil. The maximum concentration of DRO in subsurface soil (1,300 mg/Kg) is approximately 1.3 times higher than the Method Four RBCL calculated for DRO in subsurface soil (965 mg/Kg). FT002-FTA (sampling location FT002-SB01) was the only location where DRO levels in soil exceeded the ecological hazard criterion.

The only receptor of concern associated with the freshwater habitat at FT002 is the rock sandpiper, and the HQ estimate for the rock sandpiper exposed to freshwater sediment and surface water exceeds the ADEC HQ criterion of 1.0. Exceedence of the HQ criterion by the rock sandpiper was observed for DRO and RRO in freshwater sediment and surface water. Concentrations of RRO in fresh surface water samples collected from FT002-ADA and FT002-ADB exceed the Method Four RBCL for RRO in surface water. The maximum concentration of DRO in freshwater sediment (6,408 mg/Kg) is higher than the Method Four RBCL for this analyte in sediment (1,016 mg/Kg). The maximum concentration of RRO in freshwater sediment (13,278 mg/Kg) is also higher than the Method Four RBCL for this analyte in fresh sediment (1,016 mg/Kg).

Receptors of concern associated with the marine habitat are the mallard, rock sandpiper, glaucous-winged gull, sea otter, and red-faced cormorant. Ecological HQ estimates for these species exposed to surface water and sediment at FT002-ADC were below the ADEC ecological HQ criterion of 1.0. Groundwater at FT002 was also evaluated for marine ecological receptors, assuming groundwater is in communication with marine surface water. All ecological HQ estimates associated with marine habitat exposure are less than the ADEC HQ criterion of 1.0. Based on the above, contaminants present in media associated with FT002 are not anticipated to pose a hazard to the marine environment.

Cumulative ecological hazard estimates across all media were calculated and, with the exception of the snow bunting and rock sandpiper, cumulative ecological hazard estimates were below the ADEC acceptable HI criterion of 1.0. Cumulative HIs in excess of 1.0 were estimated for the snow bunting due to DRO and rock sandpiper due to RRO.

FT002 – Tier II Petroleum Hydrocarbons.

Petroleum-related constituents (benzene, ethylbenzene, and naphthalene) were detected in FT002 groundwater at concentrations exceeding Tier I cancer risk or noncancer hazard criteria in the HHERA. GRO and DRO were detected in groundwater beneath FT002 at maximum concentrations exceeding ADEC Groundwater Cleanup Levels. However, neither of the petroleum-related constituents exceeded cancer risk or noncancer hazard criteria during the Tier II HHERA for FT002. Therefore, Method Four RBCLs for groundwater were not previously derived for these constituents.

The exposure point concentration for benzene in groundwater that was evaluated in the Tier II HHRA (0.0005 mg/L) was measured in a groundwater sample collected from Monitoring Well FT2-W1 on June 2, 1999. The groundwater exposure point concentration for GRO was derived from the results of sampling conducted at FT2-W1 in August 2000. These concentrations were considered most representative of current site conditions at the time the HHERA was performed. However, a more recent (2004) groundwater sample was collected from Monitoring Well FT2-W1 to evaluate potential changes in groundwater concentrations of COCs following deactivation of the groundwater treatment system in 2001. The benzene concentration in this sample was observed to have increased significantly during this time frame. A benzene concentration of 0.110 mg/L was detected in the 2004 sampling event, compared to the value of 0.0005 mg/L that was evaluated in the Tier II HHERA. It is reasonable to assume that concentrations of other petroleum-related constituents in FT002 groundwater might also have increased as a result of deactivation of the water treatment system.

Based on the above, Method Four RBCLs were calculated for the following petroleum-related indicator chemicals: BTEX, naphthalene, GRO, DRO, and RRO. Method Four RBCLs for these chemicals are based on the same methods that were used to calculate Method Four RBCLs for other groundwater constituents exceeding Tier II HHERA cancer risk or noncancer hazard criteria in FT002 groundwater. These Method Four RBCLs will be used to evaluate the potential

public health significance of any petroleum contamination detected in groundwater during future monitoring activities conducted at FT002.

2.8.3 Site FT003 HHERA

2.8.3.1 FT003 – Tier I Screening

FT003 – COPCs.

Soil. Surface and subsurface soil samples were collected for laboratory analysis at FT003 in 1988, 1994, and 2004 from six different locations (Figure 2-4). Subsurface soil samples ranged in depth from 5 to 11 feet bgs. No COPCs were identified for surface soil via the direct ingestion and inhalation exposure pathways. However, Tier I screening levels are not available for TPH measured by EPA Method E418.1 and this analyte was carried through the Tier I screen as a surface soil COPC. Methylene chloride was detected in surface soil at a concentration exceeding one-tenth the ADEC Method Two Soil Migration-to-Groundwater Cleanup Level and this analyte was identified as a COPC for surface soil.

The COPCs identified for subsurface soil (via direct ingestion and inhalation exposure pathways) included metals (arsenic, chromium, lead, and vanadium) and one VOC (methylene chloride). TPH was also carried through the Tier I screening as a subsurface soil COPC.

No surface soil COPECs were identified, although TPH was carried through the Tier I ecological screen as a surface soil COPEC. Chemicals identified as COPECs for subsurface soil included metals (barium, chromium, cobalt, manganese, vanadium, and zinc) and one SVOC (di-n-butyl phthalate). TPH was also carried through the Tier I screen as a subsurface soil COPEC

Groundwater. Fresh groundwater samples were collected from two locations at FT003 in 1993 and 1994 (Figure 2-4). The COPCs identified for groundwater included metals (aluminum, barium, chromium, lead, manganese, nickel, and vanadium) and one SVOC (bis(2-ethylhexyl)phthalate). Because groundwater at FT003 is thought to be in communication with fresh surface water at the site, ecological exposure pathways for groundwater are considered to be complete. Groundwater COPECs included metals (aluminum, barium, chromium, cobalt, lead, manganese, nickel, vanadium, and zinc) and PAHs (2-methylnaphthalene and phenanthrene).

Surface Water. Fresh surface water samples were collected from two ponds near FT003 in 1994 and 1995 (Figure 2-4). Surface water does not have a complete exposure pathway for human receptors at FT003; therefore, no COPC screening was done for this medium. Chemicals identified as COPECs for surface water included metals (aluminum, cadmium, and lead) and one VOC (bromomethane).

Sediment. Sediment samples were collected in 1994 and 1995 from two ponds near FT003 (Figure 2-4). Sediment does not have a complete exposure pathway for human receptors at

FT003; therefore, no COPC screening was done for this medium. Chemicals identified as COPECs for sediment included metals (aluminum, arsenic, barium, cadmium, chromium, copper, lead, nickel, vanadium, and zinc), VOCs (2-butanone and acetone), one SVOC (di-n-butyl phthalate), and one PAH (fluoranthene).

2.8.3.2 FT003 – Tier I Risk Assessment

FT003 – Tier I Human Risk.

Cumulative cancer risk and noncancer HI estimates for surface soil were not calculated because the only COPC for surface soil identified in the Tier I Screening was TPH, which was excluded from the calculation of Tier I cumulative cancer risk and hazard estimates, consistent with ADEC's *Cumulative Risk Guidance* (ADEC, 2002). Tier I cumulative cancer risk and noncancer hazard estimates for human exposures to soil were below the cancer risk criterion of 1×10^{-5}, or noncancer HI of 1.0. Therefore, this media was not further evaluated in the Tier II HHERA for FT003, in regard to human health concerns. Methylene chloride detected in surface soil was below the ADEC Method Two Soil Migration-to-Groundwater Cleanup Level, while the maximum concentration of methylene chloride detected in subsurface soil slightly exceeded this criterion. Methylene chloride is a common laboratory contaminant and is not considered to be associated with the site.

Tier I cumulative cancer risk and noncancer hazard estimates for human exposure to groundwater at FT003 were calculated as 5×10^{-7} and 16, respectively. The primary contributors to these estimates for groundwater were aluminum, chromium, lead, manganese, nickel, and bis(2-ethylhexyl)phthalate.

FT003 Tier I Ecological Risk.

The Tier I cumulative ecological HI for surface soil was not estimated because the only COPEC for surface soil identified in the Tier I Screening was TPH. The Tier I ecological HI for subsurface soil was estimated as 4.8. The total ecological HI was primarily attributable to the maximum detected concentrations of zinc and di-n-butyl phthalate in subsurface soil.

The Tier I ecological HI for surface water was estimated as 18. Aluminum was responsible for 75 percent of the ecological HI estimate, with lead contributing 22 percent. The Tier I ecological HI for freshwater sediment was estimated as 98. Fluoranthene contributed 49 percent of the ecological HI estimate, with lesser contributions from arsenic, cadmium, copper, lead, nickel, zinc, and di-n-butyl phthalate. All COPECs contributing to an ecological HI greater than 1.0 were further evaluated in the Tier I refinement.

FT003 – Tier I Petroleum Hydrocarbons.

Consistent with ADEC Guidance (ADEC, 2002), petroleum hydrocarbons were not included in the cumulative screening estimates described above. Biased sampling for TPH by EPA Method E418.1 identified TPH in FT003 surface and subsurface soils at concentrations of 170 and 430

mg/Kg, respectively. Although not directly comparable, the ADEC Method Two cleanup level for DRO (Migration-to-Groundwater pathway) is 250 mg/Kg. These results suggest that concentrations of petroleum hydrocarbons in subsurface soil at FT003 may potentially impact groundwater. Field screening results for DRO in FT003 groundwater showed a maximum detection of 440 mg/L from a sample in 1994.

2.8.3.3 FT003 – Tier I Refinement

A Tier I refinement step was included in the FT003 HHERA to refine the COPCs and COPECs identified during Tier I screening, based on more reasonable estimates of background conditions at Shemya Island. Based on the Tier I refinement, arsenic, barium, chromium, cobalt, lead, manganese, and vanadium in subsurface soil were eliminated from further evaluation as COPCs and COPECs in the Tier II HHERA, because maximum concentrations of these metals were below 97.5 percentile background concentrations. Similarly, barium, lead, manganese, and vanadium in fresh groundwater were eliminated from further consideration as COPCs. Tier I refinement also resulted in the elimination of barium, cobalt, lead, manganese, vanadium, and zinc in groundwater from further consideration as COPECs. No inorganic COPECs were eliminated from fresh surface water. Nickel in freshwater sediment was eliminated from further evaluation as a COPEC.

2.8.3.4 FT003 – Tier II Risk Assessment

FT003 – Tier II Human Risk.

All cancer risk estimates for site workers and transit walkers were below the ADEC acceptable risk criterion of 1×10^{-5}. Noncancer HI estimates did exceed the ADEC acceptable risk criterion of 1.0. Excess noncancer hazards were attributable to aluminum in groundwater. However, there are no known anthropogenic sources for aluminum at the site, and the concentrations detected are believed to be naturally occurring.

Cumulative human health risk estimates across media were calculated. Cumulative carcinogenic risk and noncarcinogenic HI estimates were below ADEC's acceptable cancer risk criterion of 1×10^{-5} and HI of 1.0 at FT003.

FT003 – Tier II Ecological Risk.

The avian species used in the terrestrial exposure assessment for the inland area at FT003 included a passerine species (represented by the snow bunting) and a raptor (represented by the peregrine falcon). Passerines were observed foraging among the sedges and grasses that comprise the majority of the area immediately south of FT003 (USAF, 1996a). Raptors, represented by the peregrine falcon, were selected as a receptor of concern because they are regularly seen on Shemya Island and because raptor food sources are expected to frequent FT003 (USAF, 1996a).

There is no marine environment within FT003. Therefore, potential receptors associated with the marine environment (i.e., glaucous-winged gulls, red-faced cormorants, and marine mammals) were not evaluated in the Tier II ERA for FT003.

The only surface and subsurface soil COPECs identified for inclusion in the Tier II ERA were TPH and zinc. Neither the HI estimate for the snow bunting nor the peregrine falcon exposed to surface soil exceeded the ADEC HI criterion of 1.0. Therefore, surface and subsurface soil associated with FT003 is not anticipated to pose a hazard to ecological receptors of concern.

Freshwater habitat adequate for use by avian species is present at the site. Two small ponds (approximately 100 square feet each in size) were observed to the south of FT003. Waterfowl use the Western Lakes Complex south of FT003 (Figure 2-1) as a resting area during spring and fall migrations (USAF, 1996a). Receptors of concern associated with the freshwater habitat are the mallard, emperor goose, and rock sandpiper. Exposure scenarios include exposure to COPECs derived from freshwater sediment and fresh surface water. Only the HI estimate for the rock sandpiper exposed to freshwater sediment and fresh surface water exceeded the ADEC HI criterion of 1.0.

Exceedence of the HI criterion by the rock sandpiper was attributable to the presence of aluminum in fresh surface water and aluminum, lead, zinc, and di-n-butyl phthalate in freshwater sediment. However, there are no known anthropogenic sources for aluminum at the site and the concentrations detected are believed to be naturally occurring. The maximum detected concentration of lead, zinc, and di-n-butyl phthalate in freshwater sediment (560, 2,200, and 29.5 mg/Kg, respectively) are all lower than the Method Four RBCL calculated for these analytes (991, 3,560, and 30 mg/Kg, respectively). Because all freshwater sediment concentrations are lower than their respective Method Four RBCLs, sediment is not anticipated to pose a hazard to ecological receptors of concern.

Groundwater at FT003 was evaluated in the Tier II ERA for freshwater ecological receptors, assuming groundwater is in communication with fresh surface water. Exposure scenarios include exposure to COPECs derived from freshwater sediment and groundwater. Ecological HI estimates for the mallard and rock sandpiper exceeded the ADEC HI criterion of 1.0, due to the presence of aluminum and chromium in groundwater at FT003. As described above, metals concentrations in groundwater are considered to be naturally occurring.

Cumulative ecological hazard estimates for FT003 across all media were calculated and, for all receptors, cumulative ecological hazard estimates were below the ADEC acceptable HI criterion of 1.0.

FT003 – Tier II Petroleum Hydrocarbons.

Biased sampling for TPH by EPA Method E418.1 identified TPH in FT003 surface and subsurface soils at concentrations of 170 and 430 mg/Kg, respectively. Although not directly comparable, the ADEC Method Two Table B Soil Cleanup Level for the Ingestion Pathway for DRO is 10,250 mg/Kg. All Tier I cumulative cancer risk and noncancer hazard estimates for

human exposures to soil were below the cancer risk criterion of 1 x 10^{-5} or noncancer HI of 1.0. Based on the above, it is not anticipated that levels of petroleum hydrocarbons detected in surface and subsurface soils at FT003 pose a significant risk to site workers or transit walkers potentially accessing the site.

2.8.4 Basis for Action

The response actions selected in this Decision Document are necessary to protect public health or the environment from releases of petroleum hydrocarbons at ERP Sites FT001, FT002, and FT003.

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 Section 2.10.

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 FT001

The RAOs presented in the Proposed Plan (USAF, 2002) for Site FT001 were to protect human health and the environment by:

- Restricting subsurface activities at the site to ensure that petroleum hydrocarbons do not migrate to groundwater or surface water.

Petroleum hydrocarbons remain in the subsurface soil at concentrations that exceed ADEC Method Two Migration-to-Groundwater Cleanup Levels; therefore, the soil at FT001 is not available for unrestricted use. Inhalation or direct contact exposure pathways do not appear to be risks.

2.9.2 FT002

The RAOs presented in the Proposed Plan (USAF, 2002) for Site FT002 were to protect human health and the environment by:

- Restricting subsurface activities at the site to ensure that petroleum hydrocarbons do not migrate to groundwater or surface water.
- Monitoring the groundwater at FT002-MA until contaminant concentrations fall below RBCLs.

- Monitoring the surface water and sediment at FT002-ADDA until contaminant concentrations fall below RBCLs.

Fuel-related benzene concentrations remain above RBCLs at FT002. Other petroleum hydrocarbons and fuel-related compounds are present in the groundwater, although at concentrations below the RBCLs. In addition, petroleum hydrocarbons remain in the subsurface soil at concentrations that exceed ADEC Method Two Migration-to-Groundwater Cleanup Levels; therefore, the soil at FT002 is not available for unrestricted use. RRO in fresh surface water, and DRO and RRO in fresh sediments, exceed the RBCLs for the rock sandpiper. The RAOs for FT002 are listed in **Table 2-6**. The values in the table are risk-based (except where noted) and were derived from the HHERA conducted for the site (USAF, 2006).

Table 2-6
Remedial Action Objectives for FT002

Exposure Pathway	Analyte	Receptors	RBCL
Groundwater	Benzene	Human	0.10 mg/L
	DRO	Human	2.4 mg/L
	Ethylbenzene	Human	1.2 mg/L
	GRO	Human	13 mg/L
	RRO	Human	4.5 mg/L
	Toluene	Human	6.4 mg/L
	Xylenes	Human	3.0 mg/L
	TAH	Ecological	0.010 mg/L[1]
	TAqH	Ecological	0.015 mg/L[1]
Fresh Surface Water	RRO	Rock Sandpiper	0.039 mg/L
	TAH	Ecological	0.010 mg/L[1]
	TAqH	Ecological	0.015 mg/L[1]
Fresh Sediment	DRO	Rock Sandpiper	1,016 mg/Kg
	RRO	Rock Sandpiper	1,016 mg/Kg

Key:
1 Values from 18 Alaska Administrative Code 70.020
DRO – diesel range organics
GRO – gasoline range organics
mg/Kg – milligrams per kilogram
mg/L – milligrams per liter
RBCL – risk-based cleanup level (USAF, 2006)
RRO – residual range organics
TAH – total aromatic hydrocarbons
TAqH – total aqueous hydrocarbons

ICs restricting groundwater use will remain in place until groundwater contaminant concentrations at the site fall below ADEC Groundwater Cleanup Levels listed in 18 AAC 75.345, Table C and TAH and TAqH meet the Water Quality Standards listed in 18 AAC

70.020. ICs restricting disturbance of subsurface soil will remain until the cleanup levels listed in 18 AAC 74.341, Tables B1 and B2 are achieved.

2.9.3 FT003

The RAOs presented in the Proposed Plan (USAF, 2002) for Site FT003 were to protect human health and the environment by:

- Restricting subsurface activities at the site to ensure that petroleum hydrocarbons do not migrate to groundwater or surface water.

Petroleum hydrocarbons remain in the subsurface soil at concentrations that exceed ADEC Method Two Migration-to-Groundwater Cleanup Levels; therefore, the soil at FT003 is not available for unrestricted use. Inhalation and direct contact exposure pathways do not appear to be risks.

Petroleum hydrocarbons also remain in the groundwater at concentrations that exceed ADEC groundwater cleanup levels. In addition to the RAOs presented in the Proposed Plan, the following RAO applies to FT003:

- Monitoring the groundwater at FT003 for petroleum hydrocarbons until contaminant concentrations fall below the cleanup levels listed in 18 AAC 75.345, Table C.

2.10 Description of Alternatives

The remedial alternatives considered for FT001, FT002, and FT003 were presented in the Proposed Plan (USAF, 2002) and are summarized below.

2.10.1 Description of Remedy Components

The remedial alternatives discussed below were evaluated in the RI/FS to address the contaminated media at ERP Sites FT001, FT002, and FT003.

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 would be no way to assess/measure the rate of attenuation due to the lack of monitoring.

Institutional Controls (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 a restriction on groundwater use at the site. In the event that 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.

Under the **Excavation and Removal** Alternative, contaminated soils/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.

Monitored Natural Attenuation (MNA) includes biological, chemical, or physical processes that reduce the mass or concentration of contaminants over time or distance from the source. The MNA remedial alternative includes collecting samples to monitor the natural processes. Samples of affected media are collected and analyzed to ensure that contaminant levels are decreasing as expected.

Long-Term Management is an adaptive alternative to make recurring decisions to continue or change remedies that are already in place or will be put in place. It often includes sampling such as MNA, to measure the change in contaminant concentrations over time. 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. Long-term management (often denoted as LTM) may include sampling, but can include other things such as maintaining a landfill cap.

Bioventing stimulates the natural biodegradation of aerobically degradable compounds in soil by providing oxygen to existing soil microorganisms. In contrast to soil vapor vacuum extraction, bioventing uses low air flow rates to provide only enough oxygen to sustain microbial activity. Oxygen is most commonly supplied through direct air injection into residual contamination in soil. In addition to degradation of adsorbed fuel residuals, volatile compounds are biodegraded as vapors move slowly through biologically active soil.

The following remedial alternatives were considered in the RI/FS for ERP Site FT001:

- No Action
- ICs
- Excavation and Removal

The following remedial alternatives were considered in the RI/FS for the three areas at ERP Site FT002:

- FT002-MA:
  - No Action
  - ICs
  - Bioventing and Monitoring
- FT002-FTA:
  - No Action
  - ICs
- FT002-ADDA:
  - No Action

- ICs
- Excavation and Removal
- Long-Term Management and MNA

Since the RI/FS was conducted in 1996, the following remedial actions have been completed at FT002:

- FT002-MA – Bioventing and initiation of monitoring (still ongoing).
- FT002-ADDA – Excavation and disposal of drums and contaminated sediment.

The following remedial alternatives were considered in the RI/FS for ERP Site FT003:

- No Action
- ICs
- Excavation and Removal

2.10.2 Common Elements and Distinguishing Features of Each Alternative

A summary of the elements common to each alternative and features that distinguish one alternative from another at ERP Sites FT001, FT002, and FT003 are presented in **Tables 2-7**, **2-8**, and **2-9**, respectively.

2.10.3 Expected Outcome of Each Alternative

A summary of the expected outcome of each alternative is presented in **Tables 2-10**, **2-11**, and **2-12** for ERP Sites FT001, FT002, and FT003, respectively.

2.11 Principal Threat Wastes

The National Oil and Hazardous Substances Pollution Contingency Plan 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 that 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 FT001, FT002, and FT003.

2.12 Selected Remedy

The primary indicator of remedial action performance will be satisfying the RAOs for ERP Sites FT001, FT002, and FT003 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

Table 2-7
Features of FT001 Alternatives

Evaluation Criteria	No Action	ICs	Excavation and Removal
Protective of Human Health and the Environment	No	Yes	Yes
Long-Term Effectiveness and Permanence	No	Yes	Yes
Reduction of Toxicity, Mobility, and Volume Through Treatment	No	No	Yes
Short-Term Effectiveness	No	Yes	No
Implementability	Easy	Easy	Moderate
Cost	$0	$0.25M	$0.93M
State Acceptance	No	Yes	Yes
Community Acceptance	No	Yes	Yes

Key:
IC – Institutional Controls
M – million

Table 2-8
Features of FT002 Alternatives

Evaluation Criteria	No Action	ICs (FT002-FTA)	ICs and LTM/MNA (FT002-ADDA/MA)	Excavation and Removal
Protective of Human Health and the Environment	No	Yes	Yes	Yes
Long-Term Effectiveness and Permanence	No	Yes	Yes	Yes
Reduction of Toxicity, Mobility, and Volume Through Treatment	No	No	No	Yes
Short-Term Effectiveness	No	Yes	Yes	No
Implementability	Easy	Easy	Easy	Moderate
Cost	$0	$0.3M	$0.8M	$5M
State Acceptance	No	Yes	Yes	Yes
Community Acceptance	No	Yes	Yes	Yes

Key:
ADDA – Abandoned Drum Disposal Area
FTA – Fire Training Area
IC – Institutional Controls
M – million
MA – Aircraft Mock-up Area
MNA – Monitored Natural Attenuation
LTM – Long Term Management

Table 2-9
Features of FT003 Alternatives

Evaluation Criteria	No Action	ICs	Excavation and Removal
Protective of Human Health and the Environment	No	Yes	Yes
Long-Term Effectiveness and Permanence	No	Yes	Yes
Reduction of Toxicity, Mobility, and Volume Through Treatment	No	No	Yes
Short-Term Effectiveness	No	Yes	No
Implementability	Easy	Easy	Moderate
Cost	$0	$0.25M	$0.93M
State Acceptance	No	Yes	Yes
Community Acceptance	No	Yes	Yes

Key:
IC – Institutional Controls
M – million

Table 2-10
Expected Outcome of Each Alternative at FT001

Criteria	No Action	ICs	Excavation and Removal
Available uses of land upon achieving cleanup levels.	Cannot determine when cleanup levels will be achieved.	Land appropriate for industrial use with restrictions on subsurface activities.	Land appropriate for unlimited use.
Time frame to achieve available land use.	Unknown	As soon as ICs are in place.	2 years
Available uses of groundwater upon achieving cleanup levels.	NA	NA	NA
Time frame to achieve available groundwater use.	NA	NA	NA
Other impacts or benefits associated with alternative.	Unacceptable human and ecological risk.	Efficient use of available resources.	Contaminants would be removed from the site.

Key:
IC – Institutional Controls
NA – Not applicable because groundwater is not considered a viable resource at this site.

Table 2-11
Expected Outcome of Each Alternative at FT002

Criteria	No Action	ICs (FT002-FTA)	ICs and LTM/MNA (FT002-ADDA/MA)	Excavation and Removal
Available uses of land upon achieving cleanup levels.	Cannot determine when cleanup levels will be achieved.	Land appropriate for industrial use with restrictions on subsurface activities.	Land appropriate for industrial use with restrictions on subsurface activities.	Land appropriate for unlimited use.
Time frame to achieve available land use.	Unknown	As soon as ICs are in place.	As soon as ICs are in place.	2 years
Available uses of groundwater upon achieving cleanup levels.	Cannot determine when cleanup levels will be achieved.	Naturally occurring metals restrict unlimited use.	Naturally occurring metals restrict unlimited use.	Existing groundwater contamination not addressed by this alternative.
Time frame to achieve available groundwater use.	Unknown	Groundwater at FT002-FTA already within acceptable limits for anthropogenic contaminants.	To be determined by sampling when anthropogenic contaminant levels are acceptable.	Unknown
Other impacts or benefits associated with alternative.	Unacceptable human and ecological risks.	Efficient use of available resources.	Will determine when ICs are no longer required for groundwater and surface water.	Soil contaminants would be removed from the site.

Key:
ADDA – Abandoned Drum Disposal Area
FTA – Fire Training Area
IC – Institutional Controls
LTM – Long Term Monitoring
MA – Aircraft Mock-up Area
MNA – Monitored Natural Attenuation

Table 2-12
Expected Outcome of Each Alternative at FT003

Criteria	No Action	ICs	Excavation and Removal
Available uses of land upon achieving cleanup levels.	Cannot determine when cleanup levels will be achieved.	Land appropriate for industrial use with restrictions on subsurface activities.	Land appropriate for unlimited use.
Time frame to achieve available land use.	Unknown	As soon as ICs are in place.	2 years
Available uses of groundwater upon achieving cleanup levels.	Cannot determine when cleanup levels will be achieved.	Naturally occurring metals restrict unlimited use.	Groundwater contamination not addressed by this alternative.
Time frame to achieve available groundwater use.	Unknown	Groundwater already within acceptable limits for anthropogenic contaminants.	Groundwater already within acceptable limits for anthropogenic contaminants.
Other impacts or benefits associated with alternative.	Unacceptable human and ecological risk.	Efficient use of available resources.	Soil contaminants would be removed from the site.

Key:
IC – Institutional Controls

successful implementation, operation, maintenance, and completion of the performance measures will achieve a protective and legally compliant remedy for FT001, FT002, and FT003. This section describes the selected remedies and provides specific performance measures for the selected remedies.

FT001. The selected remedial alternative for ERP Site FT001 is ICs to ensure that the contaminants remain undisturbed. ICs are easily implemented and the most cost-effective remedy compliant with applicable laws and protective of human health and the environment. Further remedial action beyond ICs would not significantly reduce risk. The selected remedy is considered to best meet the site RAOs for FT001.

FT002. The selected remedial alternative for ERP Site FT002 is ICs at each of the three areas to ensure that exposure to contaminants does not occur while natural processes attenuate contaminant concentrations. Similar to FT001, ICs are the sole remedy at FT002-FTA. At FT002-MA, the selected remedy is ICs with MNA of groundwater. ICs with MNA of surface water and sediment is the selected remedy at FT002-ADDA. ICs and MNA are easily implemented and the most cost-effective remedies that are compliant with applicable laws and protective of human health and the environment. Further remedial action beyond ICs and MNA would not significantly reduce risk. The selected remedies are considered to best meet the site RAOs for FT002.

FT003. The selected remedial alternative for ERP Site FT003 is ICs to ensure that contaminants remain undisturbed and MNA of groundwater. ICs and MNA are easily implemented and the most cost-effective remedy compliant with applicable laws and protective of human health and the environment. Further remedial action beyond ICs and MNA would not significantly reduce risk. The selected remedy is considered to best meet the site RAOs for FT003.

2.12.1 Summary of the Rationale for the Selected Remedy

The USAF and ADEC believe that the selected remedy at each ERP site will be protective of human health and the environment and will comply with the applicable regulations.

2.12.2 Description of the Selected Remedy

The USAF will implement, monitor, maintain, and enforce the ICs identified below in accordance with State of Alaska 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-contaminated soils or groundwater 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 the sites to restrict excavation of soil and restrict groundwater use. The Plan will contain a map indicating site locations, with restrictions on any invasive activities that could potentially compromise the integrity of soil covers and expose potential contaminants. Dig permits issued by the Base Operating Contractor are required for any excavation or well installation at Eareckson AS. The objective of the ICs are to prevent access or use of soil and groundwater contaminated with petroleum hydrocarbons, VOCs, and/or SVOCs. Prior to approving a permit, the Plan will be reviewed to ensure that invasive activities are not taking place within the boundary of the sites where land use has been restricted.
- The remedy has been selected under state law and the USAF will obtain prior concurrence from ADEC to terminate the ICs, modify current land use, or allow anticipated actions that might disrupt protectiveness of ICs. In the unlikely event that the property is to be transferred, the USAF will notify ADEC at least 30 days prior to any transfer taking place.
- The ICs will remain in effect until the petroleum hydrocarbon concentrations, VOCs, and/or SVOCs in soil are determined to be less than the ADEC 18 AAC 75.341 Method Two cleanup levels and groundwater meets the cleanup levels listed in 18 AAC 75.345, Table C. In addition, ICs will remain until groundwater meets the TAH and TAqH requirements in 18 AAC 70.020.
- The Air Force will ensure, as appropriate, that any contractor, tenant, or other authorized occupant of land subject to LUC's is informed of the LUCs and is made subject to the requirements of such LUCs.

USAF will enforce the ICs by the following actions:

- USAF land records and the Plan will be updated to include site boundaries and the IC requirements. The ERP site boundaries shown on Figures 2-2, 2-3, and 2-4 are based on existing surveys and observations, including observation of disturbed soil, visible debris, and plant growth, and/or geophysics and will be considered site boundaries for the ICs.
- Perform visual inspections in conjunction with MNA sampling to verify effectiveness of the ICs and report inspection results to ADEC. Inspection reports will be prepared and submitted with the MNA reports to evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. The inspection will include:
  - Any activity that is inconsistent with the IC requirements, objectives or controls, or any action that may interfere with effectiveness of the IC shall be addressed by USAF as soon as practicable after discovery, but in no case will the process be initiated later than 10 days after the USAF becomes aware of the breach.
  - USAF shall provide notice to ADEC as soon as practicable after discovery of any activity that is inconsistent with IC requirements, objectives or controls, or any action that may interfere with the effectiveness of the IC.
- In the event that the ICs fail or are deficient and could imminently lead to actual risk to human health and the environment, USAF will address the situation promptly, including notification of ADEC.
- USAF will obtain ADEC approval prior to conducting any excavation or well installation activities with the contaminated areas.

In addition to ICs at FT002-MA, MNA will be conducted. MNA will consist of groundwater monitoring once every 2 years by collecting groundwater samples analyzed for the following:

- GRO by AK101
- DRO by AK102
- RRO by AK103
- BTEX by SW8260B
- PAH by 8270C

A monitoring report will be provided to ADEC following each monitoring event. Groundwater monitoring can be discontinued after contaminant concentrations fall below the levels listed in Table 2-6 (Section 2.9.2) for two consecutive monitoring events.

In addition to ICs at FT002-ADDA, MNA will be conducted. MNA will consist of monitoring surface water and sediments at sample locations FT002-ADA, FT002-ADB, and FT002-ADC. Surface water and sediment samples will be collected at each of the three sample locations every 2 years and analyzed for the following:

- DRO by AK102 (sediment only)
- RRO by AK103
- TAH by EPA Method 8260B
- TAqH by EPA Method 8260B and 8270C

Surface water and sediment monitoring can be discontinued after contaminant concentrations fall below the levels listed in Table 2-6 (Section 2.9.2) for two consecutive monitoring events.
In addition to ICs at FT003, MNA will be conducted. MNA will consist of groundwater monitoring once every 2 years by collecting groundwater samples analyzed for the following:

- DRO by AK102
- VOCs by 8260B
- SVOCs by 8270C

To verify the conclusion that the metals in the groundwater and surface water at FT002 and FT003 are at naturally occurring concentrations, additional groundwater sampling for metals will be performed at FT002-MA and FT003. The sampling will be conducted within 5 years and the results reported to ADEC. The samples will be analyzed for the following metals by EPA method 6020A (7471A for mercury):

- Aluminum
- Antimony
- Arsenic
- Barium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Silver

The results of the groundwater metals re-sampling will be compared to **Table 2-13** to evaluate whether the concentrations are naturally occurring or exceed ADEC levels. If the results indicate that the concentrations do not appear to be naturally occurring, then the selected remedy may need to be reassessed.

2.12.3 Summary of Estimated Remedy Costs

The selected remedies for ERP Sites FT001, FT002, and FT003 are mostly administrative in nature and the expected costs are minimal (Tables 2-7, 2-8, and 2-9, respectively).

2.12.4 Expected Outcomes of Selected Remedy

The expected outcome of the selected remedies for ERP Sites FT001, FT002, and FT003 is long-term management of wastes left in place while natural processes attenuate contaminant concentrations. The remedies will maintain the exposure models that the risks are based on.

Table 2-13
Groundwater and Surface Water Metals Cleanup and Background Levels

Metal	ADEC Groundwater Cleanup Level[1] (mg/L)	Groundwater Background Level[2] (mg/L)	ADEC Surface Water Cleanup Level[3] (mg/L)	Surface Water Background Level[4] (mg/L)
Aluminum	0.05	34.87	0.087 (total)	0.8970
Antimony	0.006	ND	0.006	ND
Barium	2.0	0.660	2	0.0070
Cadmium	0.005	0.0022	Exp{0.7409[ln(hardness)] – 4.719} * {1.101672-[ln(hardness)(0.041838)]}	ND
Chromium (total)	0.10	0.048	0.100 (total)	ND
Lead	0.015	0.0197	Exp{1.273[ln(hardness)] – 4.705} * {1.46203-[ln(hardness)(0.145712)]}	0.0057
Mercury	0.002	ND	0.77 (dissolved)	ND
Selenium	0.05	0.0027	5.0	0.0026
Silver	0.10	0.0012	Exp{1.72[ln(hardness)] – 6.59} * 0.85	ND

Key:
1 – From 18 AAC 75.345, Table C
2 – From the 1995 RI/FS report (USAF, 1995), Volume I, Table 3.3-6, 97.5 percentile
3 – From 18 AAC 70.020, most stringent value listed.
4 – From the 1995 RI/FS report (USAF, 1995), Volume I, Table 3.3-7, 97.5 percentile
AAC – Alaska Administrative Code
mg/L – milligrams per liter
ND – not detected
RI/FS – Remedial Investigation/Feasibility Study

2.13 Statutory Determinations

Laws and regulations established by the State of Alaska are applicable to the three ERP sites. Petroleum hydrocarbons and fuel-related compounds, which are considered a hazardous substance under State of Alaska laws and regulations, are present in the soil (FT001, FT002, and FT003), groundwater (FT002), sediment (FT002), and surface water (FT002) at concentrations that are 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 media and potential exposure to contaminated material at ERP Sites

FT001, FT002, and FT003. Exposure pathways have been eliminated by preventing dermal contact, ingestion, and inhalation of contaminants.

2.13.2 Compliance with State Regulations

The remedies will be implemented in accordance with the applicable site cleanup rules defined in 18 AAC 75.300 through 75.390.

2.14 Documentation of Significant Changes

There have been no significant changes to the proposed remedies presented in the Proposed Plan for ERP Site FT001. At FT003, MNA of groundwater was not presented in the Proposed Plan but is part of the remedy in this decision document. At both FT002 and FT003, additional sampling for metals in groundwater and surface water was not presented in the Proposed Plan, but is part of the remedy in this Decision Document.

3.0 Responsiveness Summary

This section provides a summary of the public comments regarding the Proposed Plan for remedial action at ERP Sites FT001, FT002, and FT003, Eareckson AS. No written comments were received on the Proposed Plan.

3.1 Stakeholder Comments and Lead Agency Responses

Not Applicable – no comments were received on the Proposed Plan for remedial action at ERP Sites FT001, FT002, and FT003.

3.2 Technical and Legal Issues

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

4.0 References

Alaska Department of Environmental Conservation (ADEC). 2000. Risk Assessment Procedures Manual. ADEC Division of Spill Prevention and Response. Contaminated Sites Remediation Program. June.

ADEC. 2002. Cumulative Risk Guidance. November.

ADEC. 2006. 18 AAC 70 Water Quality Standards, as amended though September 1, 2006.

ADEC. 2008. 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations, as amended through October 9, 2008.

ADEC. 2010. Risk Assessment Procedures Manual. ADEC, Division of Spill Prevention and Response, Contaminated Sites Remediation Program. Draft. July.

JRB Associates (JRB). 1984. Phase I, Records Search Report. Prepared for the U.S. Air Force by JRB Associates. September.

U.S. Air Force (USAF). 1988. Comprehensive Plan, Shemya Air Force Base. Prepared by TRA/FARR & Dowl Engineers for the U.S. Air Force Alaskan Command. August 29.

USAF. 1990. Installation Restoration Program Stage 1 Final Technical Report for Shemya Air Force Base. Prepared by. CH2M Hill. 10 August.

USAF. 1991. Preliminary Assessment Report. Prepared by 11ACW/DEV. 04 October.

USAF. 1993. Shemya Air Force Base, Alaska, 1992 Installation Restoration Program Field Investigation Report. Prepared for the Alaska Air Command 5099 ACES/CC. February.

USAF. 1994a. Final Community Relations Plan. Prepared for the U.S. Air Force. August.

USAF. 1994b. Ecological Risk Assessment Process Report. Prepared by the 611 CES/CEVR.

USAF. 1995. Remedial Investigation/Feasibility Study, Volumes I and II. Prepared by Jacobs Engineering Group, Inc., for the U.S. Air Force. August.

USAF. 1996a. Remedial Investigation/Feasibility Study, Volume III of IV. Prepared by Jacobs Engineering Group, Inc., for the U.S. Air Force. January.

USAF. 1996b. Remedial Investigation/Feasibility Study, Volume IV of IV and Appendices M through Y. Prepared by Jacobs Engineering Group, Inc., for the U.S. Air Force. March.

USAF. 1996c. Remedial Investigation/Feasibility Study, Appendix H. Prepared by Jacobs Engineering Group, Inc., for the U.S. Air Force. March.

USAF. 1996d. Technical Memorandum. Results of 1995 IRP Field Program. Prepared by Jacobs Engineering Group, Inc. for the U.S. Air Force, 611th Air Support Group, 611th Civil Engineer Squadron, Elmendorf AFB, Alaska, and Eareckson Air Station, Alaska. January.

USAF. 1999a. Remedial Investigation, Basewide Groundwater Monitoring Report, Aug – Sep 98. Prepared by Jacobs Engineering Group, Inc., for the U.S. Air Force. 19 June.

USAF. 1999b. Technical Memorandum. FT002 Bioventing Remedial Action Report. 30 April.

USAF. 2000. Comprehensive Basewide Monitoring Report, Jun 99. Prepared by Jacobs Engineering Group, Inc., for the U.S. Air Force. 31 January.

USAF. 2001a. Technical Memorandum Final Risk Assessment Assumptions Report. Prepared by Montgomery Watson for the U.S. Air Force. 08 June.

USAF. 2001b. Final Basewide Monitoring Program Report, 2000. Prepared by Montgomery Watson for the U.S. Air Force. 27 July.

USAF. 2002. Final Proposed Plan for Remedial Action, Eareckson Air Station, Shemya Island, Alaska. Prepared by Montgomery Watson for the U.S. Air Force. March.

USAF. 2005. Basewide Monitoring Program, 2004 Supplemental Field Investigation at Sites LF18, FT001, FT002, and FT003. Final. January.

USAF. 2006. Human Health and Ecological Risk Assessments for FT001, FT002, FT003, and SS07. Final. December.

USAF, 2009. Underground Storage Tank Removals at Building 625 and ERP Site FT003. Final. June.

U.S. Environmental Protection Agency (USEPA). 2000. Ecological Soil Screening Level Guidance – Draft. United States Environmental Protection Agency. July.

U.S. Geological Survey (USGS), 1987. Element Concentrations in Soils and Other Surficial Materials of Alaska, U.S. Geological Survey Professional Paper 1458.

Final

Appendix A.
Sample Results Summary Tables

TABLE A-1
SURFACE SOIL SAMPLE RESULTS SUMMARY
FT001
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Inorganics									
Aluminum	16200	6060	4	4	100%	24715	na	na	na
Antimony	**38.45**	ND	4	2	50%	ND	41	na	3.6
Arsenic	**29.2**	ND	4	1	25%	5.26	4.5	na	3.9
Barium	**588**	18.7	4	4	100%	65.42	20300	na	1100
Beryllium	0.69	ND	4	3	75%	6.75	200	na	42
Cadmium	**9.65**	1.1	4	4	100%	0.591	79	na	5
Chromium	**83.6**	7.3	4	4	100%	14.98	300	na	25
Cobalt	**24.15**	5.4	4	4	100%	13.89	na	na	na
Copper	**216**	**66.7**	4	4	100%	42.67	4100	na	460
Lead	**482**	ND	5	4	80%	19.93	400	na	na
Manganese	**685**	198	4	4	100%	522	na	na	na
Molybdenum	12.5	ND	4	2	50%	ND	na	na	na
Nickel	**106**	7.2	4	4	100%	33.54	2000	na	86
Silver	2.9	ND	4	3	75%	5.806	510	na	11.2
Thallium	**45**	**6.5**	4	4	100%	na	8.1	na	1.9
Vanadium	100	21.9	4	4	100%	103.21	710	na	3400
Zinc	**1215**	**93.1**	4	4	100%	88.70	30400	na	4100
VOCs									
Ethylbenzene	3.5015	ND	4	1	25%	na	10100	110	6.9
Toluene	1.93	ND	4	1	25%	na	8100	220	6.5
Total Xylenes	1.1085	ND	4	1	25%	na	20300	63	63
SVOCs									
bis(2-Ethylhexyl)phthalate	0.79	ND	4	3	75%	na	220	na	13
Butyl benzyl phthalate	0.2525	ND	4	2	50%	na	2900	na	920
Dibenzofuran	0.092	ND	4	1	25%	na	200	na	11
Di-n-butyl phthalate	0.16	ND	4	2	50%	na	7900	na	80

TABLE A-1
SURFACE SOIL SAMPLE RESULTS SUMMARY
FT001
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Dioxins/Furans									
2,3,7,8-TCDD TEQc	0.000013	0.000013	2	2	100%	na	0.000047	na	0.000058
Total Penta-Dioxins[b]	0.015	ND	4	3	75%	na	na	na	na
Pentachlorinated Dibenzofurans[l]	0.0011	ND	4	2	50%	na	na	na	na
Polynuclear Aromatic Hydrocarbons									
Anthracene	0.098	ND	4	1	25%	na	20600	na	3000
Benzo(a)anthracene	0.22	ND	4	1	25%	na	4.9	na	3.6
Benzo(a)pyrene	0.2	ND	4	2	50%	na	0.49	na	2.1
Benzo(b)fluoranthene	0.28	ND	4	1	25%	na	4.9	na	12
Benzo(k)fluoranthene	0.084	ND	4	1	25%	na	49	na	120
Chrysene	0.44	ND	4	2	50%	na	490	na	360
Fluoranthene	0.49	ND	4	1	25%	na	1900	na	1400
Fluorene	0.078	ND	4	1	25%	na	2300	na	220
2-Methylnaphthalene	0.1625	ND	4	1	25%	na	280	750	6.1
Naphthalene	0.273	ND	4	2	50%	na	1400	28	20
Phenanthrene	0.63	ND	4	1	25%	na	20600	na	3000
Pyrene	0.46	ND	4	1	25%	na	1400	na	1000
Petroleum Hydrocarbons									
Petroleum Hydrocarbons	2300	2300	1	1	100%	na	na	na	na

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75 Table B1 and B2 Soil Cleanup Levels, Under 40 inch Zone

[c] Ingestion for petroleum hydrocarbons

mg/kg - Milligrams per kilogram.
na - Not available.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-2
SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
FT001
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Inorganics									
Aluminum	27100	10900	7	7	100%	41799	na	na	na
Antimony	**4.7**	ND	7	4	57%	ND	41	na	3.6
Arsenic	**14.6**	ND	7	4	57%	5.74	4.5	na	3.9
Barium	**105**	22.1	7	7	100%	90.31	20300	na	1100
Beryllium	0.86	0.42	7	7	100%	ND	200	na	42
Cadmium	**3.1**	1.2	7	7	100%	0.269	79	na	5
Chromium	**26.2**	5.1	7	7	100%	53.54	300	na	25
Cobalt	**23.5**	8.8	7	7	100%	21.27	na	na	na
Copper	135	42.3	7	7	100%	378.1	4100	na	460
Lead	**280**	ND	8	3	38%	5.12	400	na	na
Manganese	**1020**	272	7	7	100%	627	na	na	na
Molybdenum	4.3	ND	7	1	14%	110.65	na	na	na
Nickel	30.8	8.2	7	7	100%	439.86	2000	na	86
Selenium	**41.4**	ND	7	1	14%	48.1	510	na	3.4
Silver	0.65	ND	7	5	71%	9.57	510	na	11.2
Thallium	**119**	**16.2**	7	7	100%	na	8.1	na	1.9
Vanadium	**152**	42.8	7	7	100%	123.0	710	na	3400
Zinc	**226**	41	7	7	100%	89.9	30400	na	4100
VOCs									
2-Butanone (MEK)	1.4	ND	8	1	13%	na	60800	23300	59
Benzene	**1.6**	ND	7	2	29%	na	150	11	0.025
Ethylbenzene	**8.3**	ND	7	4	57%	na	10100	110	6.9
Toluene	**51**	ND	7	4	57%	na	8100	220	6.5
Total Xylenes	**130**	ND	7	5	71%	na	20300	63	63
SVOCs									
bis(2-Ethylhexyl)phthalate	0.078	ND	14	3	21%	na	220	na	13
Di-n-butyl phthalate	0.71	ND	8	3	38%	na	7900	na	80

TABLE A-2
SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
FT001
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Polynuclear Aromatic Hydrocarbons									
Benzo(a)anthracene	0.076	ND	7	1	14%	na	4.9	na	3.6
Benzo(a)pyrene	0.063	ND	7	1	14%	na	0.49	na	2.1
Benzo(b)fluoranthene	0.062	ND	7	1	14%	na	4.9	na	12
Benzo(k)fluoranthene	0.058	ND	7	1	14%	na	49	na	120
Chrysene	0.14	ND	7	1	14%	na	490	na	360
Fluoranthene	0.073	ND	7	1	14%	na	1900	na	1400
Indeno(1,2,3-c,d)pryene	0.069	ND	7	1	14%	na	4.9	na	41
Pyrene	0.045	ND	7	2	29%	na	1400	na	1000
Petroleum Hydrocarbons									
Petroleum Hydrocarbons	2000	2000	1	1	100%	na	na	na	na

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75 Table B1 and B2 Soil Cleanup Levels, Under 40 inch Zone

[c] Ingestion for petroleum hydrocarbons

mg/kg - Milligrams per kilogram.
na - Not available.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-3
MARINE SEDIMENT SAMPLE RESULTS SUMMARY
FT001
EARECKSON AS, ALASKA

Constituent	Marine Sediment Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Benchmark Criteria[B] (mg/kg)
Inorganics							
Aluminum	**13,100**	**13,100**	1	1	100%	10,092	na
Antimony	1.7	1.7	1	1	100%	3.364	2
Arsenic	**23.7**	**23.7**	1	1	100%	59.37	8.2
Barium	12.1	12.1	1	1	100%	48.52	na
Cadmium	0.24	0.24	1	1	100%	0.568	1.2
Chromium	**45.3**	**45.3**	1	1	100%	22.5	81
Cobalt	8.8	8.8	1	1	100%	9.84	na
Copper	**73.8**	**73.8**	1	1	100%	39.49	34
Lead	**4**	**4**	1	1	100%	3.5	47
Magnesium	9,070	9,070	1	1	100%	11,620	na
Manganese	458	458	1	1	100%	504	na
Molybdenum	**16.4**	**16.4**	1	1	100%	6.55	na
Nickel	**82.5**	**82.5**	1	1	100%	99.9	21
Selenium	0.49	0.49	1	1	100%	0.4909	na
Vanadium	66.6	66.6	1	1	100%	81.57	na
Zinc	43.3	43.3	1	1	100%	62.89	150

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]Benchmark Criteria is equal to the EPA OSWER Value, the NOAA ER-L, or the FDEP TEL criteria for marine sediment

COPEC - Chemical of potential ecological concern.
mg/kg - Milligrams per kilogram.
na - Not available.

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-4
GROUNDWATER SAMPLE RESULTS SUMMARY
FT001
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Cleanup Level[b] (mg/L)
Inorganics							
Aluminum	28.4	28.4	1	1	100%	34.87	na
Barium	0.0835	0.0835	1	1	100%	0.66	2.0
Beryllium	0.0014	0.0014	1	1	100%	0.002	0.004
Cadmium	**0.0029**	**0.0029**	1	1	100%	0.0022	0.005
Chromium	**0.0096**	**0.0096**	1	1	100%	0.048	0.10
Cobalt	0.0412	0.0412	1	1	100%	0.0868	na
Copper	0.072	0.072	1	1	100%	0.233	1.0
Manganese	1.77	1.77	1	1	100%	3.64	na
Molybdenum	0.004	0.004	1	1	100%	0.0128	na
Silver	**0.0018**	**0.0018**	1	1	100%	0.0012	0.10
Thallium	**0.0357**	**0.0357**	1	1	100%	ND	0.002
Vanadium	0.136	0.136	1	1	100%	0.2028	0.26
Zinc	0.163	0.163	1	1	100%	0.545	5.0

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75, Table C. Groundwater Cleanup Levels

mg/L - Milligrams per liter.
na - Not available.
ND - Not detected.

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-5
SURFACE SOIL SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Inorganics									
Aluminum	16,900	4,830	4	4	100%	24,715	na	na	na
Arsenic	**10.2**	**<7**	4	1	25%	5.26	4.5	na	3.9
Barium	43.1	7.0	4	4	100%	65.42	20300	na	1100
Beryllium	0.41	<0.22	4	3	75%	6.75	200	na	42
Cadmium	**1.5**	<0.44	4	2	50%	0.591	79	na	5
Chromium	**17.1**	3.3	4	4	100%	14.98	300	na	25
Cobalt	13.6	4.3	4	4	100%	13.89	na	na	
Copper	**52.5**	39.3	4	4	100%	42.67	4100	na	460
Lead	2	1.6	7	3	43%	19.93	400	na	
Magnesium	10,400	4,750	4	4	100%	11,816	na	na	
Manganese	448	140	4	4	100%	522	na	na	
Nickel	19.1	4.4	4	4	100%	ND	2000	na	86
Selenium	**11.3**	**<7**	4	1	25%	33.54	510	na	3.4
Silver	0.25	<0.22	4	1	25%	5.806	510	na	11.2
Thallium	**67.8**	**2.5**	4	4	100%	na	8.1	na	1.9
Vanadium	94.4	13.1	4	4	100%	103.21	710	na	3400
Zinc	57.2	24.9	4	4	100%	88.70	30400	na	4100.00
VOCs									
1,1,2,2-Tetrachloroethane	**5**	<0.0011	5	1	20%	na	42	5.5	0.017
2-Butanone (MEK)	8.6	<0.6555	5	1	20%	na	60800	23300	59
Benzene	**6.2**	**<0.6555**	5	3	60%	na	150	11	0.025
Ethylbenzene	**56**	<0.6555	6	4	67%	na	10100	110	6.9
Methylene chloride	**3.5**	**0.3305**	6	3	50%	na	1100	160	0.016
Tetrachloroethene	**3.3**	**<0.6555**	5	1	20%	na	15	10	0.024
Toluene	**210**	<0.6555	6	4	67%	na	8100	220	6.5
Total Xylenes	**680**	0.3345	7	7	100%	na	20300	63	63

TABLE A-5
SURFACE SOIL SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
SVOCs									
bis(2-Ethylhexyl)phthalate	2.2	<1.45	4	1	25%	na	220	na	13
Dibenzofuran	1.7	<1.45	4	1	25%	na	200	na	11
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene	**45**	<1.45	4	4	100%	na	280	750	6.1
Fluoranthene	1.5	0.76	5	1	20%	na	1900	na	1400
Fluorene	2.2	<1.45	5	3	60%	na	2300	na	220
Naphthalene	**27**	<1.45	5	4	80%	na	1400	28	20
Phenanthrene	1.6	0.94	5	3	60%	na	20600	na	3000
Pyrene	1.3	1.3	4	1	25%	na	1400	na	1000
Petroleum Hydrocarbons									
Petroleum Hydrocarbons (Total)	7,500	300	3	3	100%	na	na	na	na

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75 Table B1 and B2 Soil Cleanup Levels, Under 40 inch Zone

[c] Ingestion for petroleum hydrocarbons

mg/kg - Milligrams per kilogram
na - Not available
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-6
SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Inorganics									
Aluminum	13,600	9,090	8	8	100%	41,799	na	na	na
Antimony	**4.1**	ND	5	1	20%	ND	41	na	3.6
Arsenic	**11.6**	ND	8	7	88%	5.74	4.5	na	3.9
Barium	63.7	16	8	8	100%	90.31	20300	na	1100
Beryllium	0.63	ND	8	7	88%	ND	200	na	42
Cadmium	**1.8**	0.1	8	8	100%	0.269	79	na	5
Chromium	23.3	13.6	8	8	100%	53.54	300	na	25
Cobalt	9.9	4.8	8	8	100%	21.27	na	na	na
Copper	37	16.3	8	8	100%	378.1	4100	na	460
Lead	**10.3**	ND	10	5	50%	5.12	400	na	na
Magnesium	11,500	4,960	8	8	100%	14,950	na	na	na
Manganese	498	183	8	8	100%	627	na	na	na
Molybdenum	0.51	ND	8	3	38%	110.65	na	na	na
Nickel	43.9	14.9	8	8	100%	439.86	2000	na	86
Silver	0.31	ND	8	4	50%	9.57	510	na	11.2
Thallium	**61.7**	**32.1**	5	5	100%	na	8.1	na	1.9
Vanadium	92.5	54.9	8	8	100%	123	710	na	3400
Zinc	60.8	31.5	8	8	100%	89.90	30400	na	4100

TABLE A-6
SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
VOCs									
1,2,4-Trimethylbenzene	2.6	0.015	2	2	100%	na	5100	49	23
1,3,5-Trimethylbenzene	0.92	0.014	2	2	100%	na	5100	42	23
2-Butanone (MEK)	0.05	ND	6	1	17%	na	60800	23300	59
4-Methyl-2-pentanone (MIBK)	0.015	ND	6	2	33%	na	8100	2100	8.1
Acetone	5.4	ND	7	2	29%	na	91300	68600	88
Benzene	**22**	ND	7	5	71%	na	150	11	0.025
Chlorobenzene	0.018	ND	6	2	33%	na	2000	200	0.63
Ethylbenzene	**120**	ND	7	5	71%	na	10100	110	6.9
Methylene chloride	**3.3**	ND	8	3	38%	na	1100	160	0.016
m,p-Xylene	23	0.0096	10	10	100%	na	na	na	na
o-xylene	3.8	0.0087	8	7	88%	na	na	na	na
Toluene	550	ND	8	6	75%	na	8100	220	na
Total Xylenes	**640**	ND	10	8	80%	na	20300	63	63
SVOCs									
bis(2-Ethylhexyl)phthalate	0.79	ND	5	1	20%	na	220	na	13
Dibenzofuran	1.2	ND	6	2	33%	na	200	na	11
n-Nitrosodiphenylamine	0.95	ND	6	1	17%	na	750	na	15

TABLE A-6
SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Polynuclear Aromatic Hydrocarbons									
2-Methylnaphthalene	**32**	ND	8	6	75%	na	280	750	6.1
Acenaphthene	0.73	ND	6	1	17%	na	2800	na	180
Benzo(a)anthracene	0.0035	0.0035	6	1	17%	na	4.9	na	3.6
Benzo(b)fluoranthene	0.00256	0.00256	6	1	17%	na	4.9	na	12
Chrysene	0.00693	0.00693	6	1	17%	na	490	na	360
Fluoranthene	0.00634	0.00634	11	1	9%	na	1900	na	1400
Fluorene	1.6	ND	7	3	43%	na	2300	na	220
Naphthalene	18	ND	8	6	75%	na	1400	28	20
Phenanthrene	1.9	ND	7	3	43%	na	20600	na	3000
Pyrene	0.0165	0.0165	11	1	9%	na	1400	na	1000
Petroleum Hydrocarbons									
Diesel Range Organics (DRO)	**1,300**	6.4	24	22	92%	na	10250	12500	250
Gasoline Range Organics (GRO)	108.1	0.64	17	16	94%	na	1400	1400	300
Petroleum Hydrocarbons (Total)	12,000	12,000	1	1	100%	na	na	na	na
Residual Range Organics (RRO)	323	38.1	6	6	100%	na	10000	22000	11,000

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75 Table B1 and B2 Soil Cleanup Levels, Under 40 inch Zone

[c] Ingestion for petroleum hydrocarbons

mg/kg - Milligrams per kilogram
na - Not available
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-7
SEDIMENT SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Freshwater Sediment Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Benchmark Criteria[b] (mg/kg)
Inorganics							
Aluminum	11,304	2,090	7	7	100%	16,413	25,000
Antimony	**6.9**	<0.8	6	3	50%	ND	2
Arsenic	**126**	5.8	7	7	100%	8.19	9.79
Barium	**199**	20	7	7	100%	49.1	na
Beryllium	0.37	0.18	6	5	83%	0.345	na
Cadmium	**1.1**	0.12	6	5	80%	0.311	0.99
Chromium	**26.8**	<3.9	6	6	100%	20.37	43.4
Cobalt	23.96	<0.96	6	6	100%	8.61	na
Copper	**75.4**	15.3	7	7	100%	34.16	31.6
Lead	**100**	<0.95	7	6	86%	24.99	35.8
Magnesium	8,121	1,690	7	7	100%	11,644	na
Manganese	**2,651**	<8.7	7	6	86%	935	1673
Mercury	0.0448	0.015	6	2	30%	ND	0.18
Molybdenum	**5.55**	0.62	4	2	50%	1.196	na
Nickel	**29.8**	14	6	5	83%	45.93	22.7
Selenium	**92.4**	<0.5	6	3	60%	0.553	na
Silver	**7.59**	0.3	6	3	40%	1.092	1
Thallium	34.3	12.6	6	2	30%	ND	na
Vanadium	**199**	67.6	7	7	100%	87.74	na
Zinc	73.1	34.2	6	6	100%	87.37	121

TABLE A-7
SEDIMENT SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Freshwater Sediment Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Benchmark Criteria[b] (mg/kg)
VOCs							
1,2,4-Trimethylbenzene	3.6	0.0039	12	8	67%	na	na
1,3,5-Trimethylbenzene	0.46	<0.0057	10	4	40%	na	na
4-Isopropyltoluene	0.0627	<0.0057	6	1	17%	na	na
Acetone	0.044	0.044	3	1	33%	na	na
Benzene	0.045	0.005	9	5	56%	na	0.057
Ethylbenzene	0.55	0.0049	10	6	60%	na	3.6
Isopropylbenzene (Cumene)	0.014	<0.0057	7	1	14%	na	na
Methylene chloride	0.011	0.011	6	1	17%	na	na
m,p-xylenes (sum of isomers)	**10**	0.009	13	10	77%	na	0.67
n-Butylbenzene	0.022	<0.0057	7	1	14%	na	na
n-Propylbenzene	0.025	<0.0057	7	1	14%	na	na
o-xylene	0.65	0.005	10	6	60%	na	0.67
Toluene	0.55	0.0033	8	4	50%	na	0.67
Total Xylenes	0.17	0.014	4	3	75%	na	na
SVOCs							
4-Methylphenol	2.4	<0.6	7	1	14%	na	na
bis(2-Ethylhexyl)phthalate	**1.29**	**0.33**	7	2	29%	na	0.182
Polynuclear Aromatic Hydrocarbons							
Fluoranthene	0.0653	0.0653	6	1	17%	na	0.0774
Naphthalene	**0.26**	0.011	12	3	25%	na	0.07
Pyrene	0.039	0.039	8	1	13%	na	0.204

TABLE A-7
SEDIMENT SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Freshwater Sediment Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Benchmark Criteria[b] (mg/kg)
Petroleum Hydrocarbons							
Gasoline Range Organics (GRO)	1,400	<3.5	13	10	77%	na	na
Diesel Range Organics (DRO)	**6,407.8**	13.5	14	14	100%	na	1016[c]
Residual Range Organics (RRO)	**13,278**	397	2	2	100%	na	1016[c]

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]Benchmark Criteria is equal to the Consensus-based Freshwater TEC, the ARCS-TEC, or the Ontario MOE-Low

[c]ADEC Method Four Risk Based Cleanup Level

mg/kg - Milligrams per kilogram
na - Not available
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-8
SURFACE WATER SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Fresh Surface Water Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Benchmark Criteria[b, c] (mg/L)
Inorganics							
Aluminum	**0.4416**	0.071	6	4	67%	0.897	0.087
Antimony	0.0256	0.0111	6	3	50%	ND	0.03
Arsenic	**0.0072**	**0.0036**	6	3	50%	0.0029	0.15
Barium	**0.0827**	**0.0072**	6	6	100%	0.007	na
Beryllium	0.0004	0.0004	6	1	17%	ND	0.0053
Cadmium	**0.0022**	0.0003	5	2	40%	ND	0.0011
Copper	0.0043	0.0017	6	3	50%	0.0159	0.009
Lead	0.002	0.0018	6	2	33%	0.0057	0.0025
Magnesium	9	7.4833	6	6	100%	23.15	na
Manganese	0.3779	0.1633	6	6	100%	0.432	1
Silver	**0.0022**	**0.0022**	6	1	17%	ND	0.00012
Vanadium	**0.0201**	0.0053	6	5	83%	0.0074	na
Zinc	0.0094	0.0036	6	4	67%	0.0563	0.11
VOCs							
1,1-Dichloropropene	0.0025	<0.001	8	2	25%	na	na
1,2,4-Trimethylbenzene	0.0067	<0.001	8	3	38%	na	na
1,3,5-Trimethylbenzene	0.0014	<0.001	8	2	25%	na	na
1,3-Dichloropropane	0.0027	0.0023	8	2	25%	na	na
1-Chlorohexane	0.0034	<0.001	5	1	20%	na	na
Benzene	**0.54**	<0.001	10	6	60%	na	0.7
sec-Butylbenzene	0.0019	<0.001	8	2	25%	na	na
Ethylbenzene	0.13	0.000023	10	6	60%	na	3.2
m,p-xylene (sum of isomers)	0.57	0.00012	10	7	70%	na	na
n-Propylbenzene	0.0363	<0.001	6	1	17%	na	na
o-xylene	0.02	0.000024	8	4	50%	na	na
Toluene	1.3	0.00014	10	6	60%	na	5
Total Xylenes	0.00015	0.00015	2	1	50%	na	na

TABLE A-8
SURFACE WATER SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Fresh Surface Water Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Benchmark Criteria[b, c] (mg/L)
SVOCs							
2-Methylphenol	0.014153	<0.0099	6	1	17%	na	na
Polynuclear Aromatic Hydrocarbons							
Acenaphthene	0.000475	0.000295	6	2	33%	na	0.52
Fluoranthene	0.0000525	<0.0000476	6	1	17%	na	0.016
Fluorene	0.000169	0.000124	6	2	33%	na	0.03
Naphthalene	0.0062	<0.001	10	1	10%	na	0.62
Petroleum Hydrocarbons							
Gasoline Range Organics (GRO)	7.2	0.024	10	7	70%	na	na
Diesel Range Organics (DRO)	1.1	<0.1	9	7	78%	na	na
Residual Range Organics (RRO)	**0.257**	**0.152**	2	2	100%	na	0.039[d]

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]Benchmark Criteria is the USEPA Ambient Water Quality Criteria, or an alternate water quality criteria.

[c]Alternate sources of water quality criteria include, in order of preference: (1) NAWQC-Marine Chronic: (2) NAWQC-Freshwater Acute: (3)NAWQC-Marine Acute.

[d]ADEC Method Four Risk Based Cleanup Level

mg/L - Milligrams per liter
na - Not available
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-9
GROUNDWATER SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Cleanup Level[b] (mg/L)
Inorganics							
Aluminum	62.5	<0.1	18	18	100%	34.87	na
Antimony	**0.0256**	0.0122	9	8	89%	ND	0.019[c]
Arsenic	**0.019**	0.0035	15	12	80%	0.0176	0.0044[c]
Barium	0.13	0.0047	19	18	95%	0.66	2
Beryllium	**0.0031**	0.0005	12	5	42%	0.002	0.004
Cadmium	**0.0029**	0.0002	12	10	83%	0.0022	0.0010[c]
Chromium	0.019	0.0031	14	9	64%	0.048	0.1
Cobalt	0.0097	0.0012	18	9	50%	0.0868	na
Copper	0.049	0.0014	19	17	89%	0.233	1
Lead	0.0095	0.0008	13	7	54%	0.0197	0.015
Magnesium	39.2	<0.2	20	20	100%	63.38	na
Manganese	1.76	<0.0118	19	19	100%	3.64	na
Molybdenum	0.0017	0.0006	10	4	40%	0.0128	na
Nickel	0.021	0.0045	14	6	43%	0.1053	0.1
Selenium	0.0008	0.0008	9	1	11%	0.0027	0.05
Vanadium	**0.29**	0.0059	18	17	94%	0.0208	0.26
Zinc	0.088	0.0063	16	13	81%	0.545	5

TABLE A-9
GROUNDWATER SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Cleanup Level[b] (mg/L)
VOCs							
1,1-Dichloroethene	0.0014	<0.001	8	1	13%	na	0.007
1,2,4-Trimethylbenzene	0.12	<0.001	9	2	22%	na	1.8
1,3,5-Trimethylbenzene	0.047	<0.001	9	2	22%	na	1.8
Acetone	0.0028	0.0025	7	2	29%	na	33
Benzene	**0.397**	0.00026	14	7	50%	na	0.005
Carbon Disulfide	0.0017	0.00041	9	3	33%	na	3.7
Ethylbenzene	0.653	0.0001	14	8	57%	na	0.7
Isopropylbenzene	0.028	<0.001	9	2	22%	na	3.7
Methylene chloride	0.00093	0.00011	16	6	38%	na	0.005
m,p-xylene	3.2	0.00017	11	4	36%	na	na
n-Propylbenzene	0.000021	0.0000080	9	2	22%	na	0.37
o-xylene	0.66	<0.001	11	2	18%	na	na
Toluene	0.20	0.00055	12	4	33%	na	1
Total Xylenes	0.0025	0.00033	7	4	57%	na	10
SVOCs							
2,4-Dimethylphenol	0.026	0.0018	10	2	20%	na	0.73
2-Methylphenol	0.018	<0.009901	10	1	10%	na	1.8
4-Methylphenol	0.031	0.00277	9	2	22%	na	0.18
Benzoic acid	0.002	0.002	10	1	10%	na	150
bis(2-Ethylhexyl)phthalate	**0.012**	0.0023	12	6	50%	na	0.006
Di-n-octyl phthalate	0.002	0.002	10	1	10%	na	1.5
Phenol	0.011	0.00178	10	2	20%	na	11

TABLE A-9
GROUNDWATER SAMPLE RESULTS SUMMARY
FT002
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Cleanup Level[b] (mg/L)
Polynuclear Aromatic Hydrocarbons							
2-Methylnaphthalene	0.0014	0.001	10	2	20%	na	0.15
Naphthalene	**17**	0.00002326	16	6	38%	na	0.73
Petroleum Hydrocarbons							
GRO (SW8015)	0.19	0.0058	6	6	100%	na	na
DRO (SW8100)	0.36	0.11	3	3	100%	na	na
GRO (AK101)	**16.1**	0.05	9	4	44%	na	2.2
DRO (AK102)	**2.9**	0.13	10	10	100%	na	1.5
RRO (AK103)	0.318	0.306	2	2	100%	na	1.1

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75, Table C. Groundwater Cleanup Levels, except where noted

[c]ADEC Method Four Risk Based Cleanup Level

DRO - Diesel range organics
GRO - Gasoline range organics
RRO - Residual range organics
mg/L - Milligrams per liter
na - Not available
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-10
SURFACE SOIL SAMPLE RESULTS SUMMARY
FT003
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Inorganics									
Lead	2.3	2.3	1	1	100%	19.93	400	na	na
VOCs									
Acetone	0.013	0.013	1	1	100%	na	91300	68600	88
Methylene chloride	0.015	0.015	1	1	100%	na	640	25	0.016
Petroleum Hydrocarbons									
Petroleum Hydrocarbons (Total)	170	170	1	1	100%	na	na	na	na

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75 Table B1 and B2 Soil Cleanup Levels, Under 40 inch Zone

[c] Ingestion for petroleum hydrocarbons

mg/kg - Milligrams per kilogram
na - Not available
VOCs - Volatile organic compounds

TABLE A-11
SUBSURFACE SOIL SAMPLE RESULTS SUMMARY
FT003
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/kg)	Cleanup Level[b] (mg/kg) Direct Contact[c]	Outdoor Inhalation	Migration to Groundwater
Inorganics									
Aluminum	17,000	11,000	2	2	100%	41,799	na	na	na
Arsenic	3	3	1	1	100%	5.74	4.5	na	3.9
Barium	84	7.2	2	2	100%	90.31	20300	na	1100
Cadmium	0.15	0.15	1	1	100%	0.269	79	na	5
Chromium	**33**	16	2	2	100%	53.54	300	na	25
Cobalt	18	8.9	2	2	100%	21.27	na	na	na
Copper	55	37	2	2	100%	378.1	4100	na	460
Lead	3.3	3.3	2	2	100%	5.12	400	na	na
Manganese	400	350	2	2	100%	627	na	na	na
Molybdenum	12	12	1	1	100%	110.65	na	na	na
Nickel	33	30	2	2	100%	439.86	2000	na	86
Vanadium	110	40	2	2	100%	123	710	na	3400
Zinc	110	65	2	2	100%	89.9	30400	na	4100
VOCs									
Acetone	0.021	0.021	1	1	100%	na	91300	68600	88
Methylene chloride	**0.021**	**0.021**	1	1	100%	na	1100	160	0.016
Toluene	0.003	0.003	1	1	100%	na	8100	220	6.5
SVOCs									
Di-n-butyl phthalate	3.64	2.83	2	2	100%	na	7900	na	80
Petroleum Hydrocarbons									
Petroleum Hydrocarbons (Total)	565	565	1	1	100%	na	na	na	na

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75 Table B1 and B2 Soil Cleanup Levels, Under 40 inch Zone

[c] Ingestion for petroleum hydrocarbons

mg/kg - Milligrams per kilogram
na - Not available
SVOCs - Semivolatile organic compounds
VOCs - Volatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

TABLE A-12
GROUNDWATER SAMPLE RESULTS SUMMARY
FT003
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Background Concentration 0.975 Quantile[a] (mg/L)	Cleanup Level[b] (mg/L)
Inorganics							
Aluminum	**160**	**13**	2	2	100%	10.82	na
Barium	**0.375**	**0.16**	2	2	100%	0.125	2
Chromium	**0.22**	0.0075	2	2	100%	0.0162	0.1
Cobalt	**0.052**	**0.052**	1	1	100%	0.0153	na
Lead	**0.0155**	**0.0155**	1	1	100%	0.0079	0.015
Manganese	2.8	1.9	2	2	100%	1.17	na
Nickel	**0.15**	**0.15**	1	1	100%	0.0328	0.1
Vanadium	**0.16**	**0.16**	1	1	100%	0.0574	0.26
Zinc	**0.27**	0.051	2	2	100%	0.118	5
SVOCs							
bis(2-Ethylhexyl)phthalate	**0.029**	**0.009**	2	2	100%	na	0.006
Polynuclear Aromatic Hydrocarbons							
Acenaphthene	0.0027	0.0027	1	1	100%	na	2.2
2-Methylnaphthalene	0.0089	0.0089	1	1	100%	na	0.15
Phenanthrene	0.0045	0.0045	1	1	100%	na	11

Notes:

[a]Eareckson Air Station, Alaska, Remedial Investigation/Feasibility Study Report, Volume I, August 1995

[b]ADEC 18 AAC 75, Table C. Groundwater Cleanup Levels

mg/L - Milligrams per liter
na - Not available
SVOCs - Semivolatile organic compounds

Bold - Indicates concentration exceeds the cleanup level.

Final

Appendix B.
Regulatory Comments and Correspondence

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

SARAH PALIN, GOVERNOR

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File # 2649.38.002
2649.38.003
2649.38.004

November 26, 2008

Keith Barnack, Remedial PM
United States Air Force
611 Air Support Group
Environmental Restoration Section
10471 20th Street Ste 302
Elmendorf AFB, AK 99506-2200

Re: Draft Non-CERCLA Decision Document for FT01, FT02, and FT03 dated October 2008, Eareckson Air Station, Alaska

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the Draft version of the Non-CERCLA Decision Document for Lightning Strike/Burn Area (FT01), Aircraft Mock-up Area/Fire Training Area/Abandoned Drum Disposal Area (FT02), and Fire Department Foam Training Area (FT03) at Eareckson Air Station in our office on October 20, 2008.

We have completed our review of the Draft Decision Document and have provided comments on the Review Comments Form that is attached to this letter.

Thank you for providing a copy of the October 2008 version of the Draft Decision Document for FT01, FT02, and FT03. I look forward to a response to comments and working through these issues to produce a final document that we can agree upon. If you have any questions regarding this letter, please contact me at 907-269-3077 or jonathan.schick@alaska.gov.

Sincerely,

Jonathan Schick
Environmental Program Specialist

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document for FT01, FT02, and FT03

DATE: November 26, 2008 **REVIEWER: Jonathan Schick** **PHONE: 907 269-3077**	**Action taken on comment by:**

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	General	In order to grant a cleanup complete decision for these sites, the groundwater contamination at the sites must be determined to be in a stable or decreasing trend. Due to the lack of contemporary data available and the number of years since the last sampling event, a closure decision may not be appropriate at this time. Current groundwater data should provide the evidence that that the contaminant plume is decreasing as compared to the latest results from 8-10 years ago and as many as 16 years ago in some instances.			
2	Section 1.2	Please change the language in the second paragraph of this section to conditional closure to read, "..being implemented as part of the cleanup complete with Institutional Controls (ICs) determination for the three ERP sites.."			
3	Section 1.4	Please add a note in the section describing the selected remedy for FT01 to include mention that the ICs will restrict access to groundwater at the site.			
4	Section 1.4	The State does not concur with the frequency of surface water and sediment monitoring at site FT02-ADDA. The frequency f sampling should be every 2 years to coincide with the groundwater monitoring at the neighboring site FT02-MA. The contaminant levels in the			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document for FT01, FT02, and FT03

DATE: November 26, 2008 **REVIEWER: Jonathan Schick** **PHONE: 907 269-3077**	**Action taken on comment by:**

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		sediment are relatively high and the sediment and surface water at the site are probably the most probable act as a contaminant pathway to receptors on-site.			
5	Section 1.7	Please remove the words "previously undiscovered" at the end of this section.			
7	Figure 2-2	Please provide any available groundwater data for the FT1-W1 monitoring well depicted on the figure, whether in the text or on the figure to demonstrate that there were no exceedences in the samples from this location.			
8	Section 2.2	In the 6th paragraph of this section, the text seems to be redundant where it states that, "Contaminants detected in groundwater include benzene, toluene, and BTEX…" The acronym BTEX includes benzene and toluene. Also if this is a base wide summary of Site history, then other contaminants should be included on this list, namely DRO.			
9	Section 2.2	In the last paragraph of this section regarding ERP Site FT03, the text states that an empty UST was discovered. Was this tank removed? Were any samples collected in association with this UST or its removal.? Please add text to clarify the current status of the UST .			
10	Section 2.5.2.2	In the third paragraph of this section please clarify if the bedrock is 55 feet above or below			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document for FT01, FT02, and FT03

DATE: November 26, 2008 REVIEWER: Jonathan Schick PHONE: 907 269-3077	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		msl. There are several instances in the recently submitted RODs that the distinction of above or below msl is not stated. Please perform a universal document check for "msl" to ensure that they are all properly identified as above or below msl.			
11	Section 2.6.2.1	Please not that 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations was updated as of October 9, 2008.			
12	Table 2-8	Please explain why excavation and removal is not considered to be effective in the short term.			
13	Section 2.12.2	The frequency f sampling should be every 2 years to coincide with the groundwater monitoring at the neighboring site FT02-MA. The contaminant levels in the sediment are relatively high and the sediment and surface water at the site are probably the most probable act as a contaminant pathway to receptors on-site.			
14	Section 2.12.2	The parameters for monitoring the surface water needs to be expanded to include TAH and TAqH sample analyses as those are applicable to the State's cleanup levels for surface water. VOCs have been detected at elevated levels in the sediment and so monitoring should include these parameters. Additionally the surface water should be monitored for the presence of			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document for FT01, FT02, and FT03

DATE: November 26, 2008 **REVIEWER: Jonathan Schick** **PHONE: 907 269-3077**	**Action taken on comment by:**

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		petroleum sheen to adhere to the Water Quality Standards.			
15	Table 2-13	Please not that 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations was updated as of October 9, 2008.			
16	Section 2.12.2	Bullet 2 under ICs: Please explain how a change in the Base Master Plan could affect the ICs.			
17	Section 2.12.2	A bullet should be added to the ICs section to establish a periodic schedule to report on the effectiveness and maintenance of the ICs. A 5 year review would be adequate as a form of notification that he ICs are still in place and are effective.			
18	Section 2.12.2	Please provide the State with survey data and an up to date map showing the extent of the ICs. This will help us to accurately depict the restricted area on the State's IC database.			
19	Section 2.12.2	In the IC section the State is concerned about being notified in the event of a property transfer. Please include language that states that the ADEC will be notified at least 30 days prior to transfer to give us an opportunity to make sure that the ICs are sufficient at the time and sufficiently detailed in the transfer documents.			
20	Section 2.12.2	In the third bullet regarding ICs, please rephrase this portion of the document to state that this			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document for FT01, FT02, and FT03

DATE: November 26, 2008 **REVIEWER: Jonathan Schick** **PHONE: 907 269-3077**	**Action taken on comment by:**

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		remedy has been selected under state law and the USAF will obtain ADEC concurrence to modify or terminate the IC's, modify land use….			
21	Page 1-3	Please change the language in this section that lacks certainty. The text states that, at FT01, "concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels may exceed ADEC's most stringent cleanup levels." ; At FT02 FTA, "concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels may exceed ADEC's most stringent cleanup levels"; and at FT03, the same language. Please state that the specific compounds are in excess of the most stringent cleanup level if this is the case based on the best available data. If this is still an outstanding question then additional sampling may be warranted. The ICs are being implemented to protect humans from exposure to this contamination, so it should be adequately investigated and documented what levels are present in the soil and groundwater currently at the sites in question.			

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Non CERCLA Decision Document FT01, FT02, FT03
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: November 26, 2008 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
1	General	In order to grant cleanup completion decision for these sites, the groundwater contamination at the sites must be determined to be in stable or decreasing trend. Due to the lack of contemporary data available and the number of years since the last sampling event, a closure decision may not be appropriate at this time. Current groundwater data should provide the evidence that the contaminant plume is decreasing as compared to the latest results from 8-10 years ago and as many as 16 years ago in some instances.	The Air Force believes that further groundwater sampling, beyond what is specified in the Decision Document, is not necessary to safeguard human health and the environment. The Air Force moved from the investigated phase to the decision phase with ADEC concurrence with the Proposed Plan. The groundwater situation at each site is briefly summarized below: FT01 Groundwater was encountered at a single location at site FT01. Groundwater at site FT01 was analyzed in 1992, 1993, and 1994. As mentioned in the report, groundwater at the site is marine influenced and inadequate quality for potable uses. Field analytical samples were analyzed for BTEX and petroleum hydrocarbons and no constituents were detected in these samples. Fixed laboratory samples were analyzed for VOCs, SVOCs, pesticides/PCBs, and metals. Although several metals were detected, no VOCs, SVOCs, pesticides, PCBs, or dioxins were detected in these samples. Sediment samples have also been collected at the tidal zone around FT01. No BTEX or petroleum hydrocarbons were detected in these samples. FT02 Analytical results for groundwater monitoring for site FT02 have demonstrated a general decreasing trend in the concentration of contaminants (see 2000 BMP). Only recent supplemental sampling conducted in 2004 has shown a slight increase in BTEX concentrations, however, benzene was still the only constituent to exceed its cleanup level. Groundwater sampling every 2 years is part of the selected remedy for this site.

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Non CERCLA Decision Document FT01, FT02, FT03
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: November 26, 2008 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
			FT03 Groundwater from this site has to travel a considerable distance to reach any receptors. The results of the investigations to not suggest that an extensive groundwater contaminant plume exists or is likely.
2	Section 1.2	Please change the language in the second paragraph of this section to conditional closure to read "…being implemented as part of the cleanup complete with Institutional Controls (ICs) determination for the three ERP sites…"	The comment will be incorporated. The sentence will be modified to incorporate the terms "cleanup complete with Institutional Controls (ICs)."
3	Section 1.4	Please add a note in the section describing the selected remedy for FT01 to include mention that the ICs will restrict access to groundwater at the site.	The comment will be incorporated. A sentence will be included indicating that implementing ICs at FT01 will allow only restricted access to the groundwater at the site.
4	Section 1.4	The State does not concur with the frequency of surface water and sediment monitoring at site FT02-ADDA. The frequency of sampling should be every two years to coincide with the groundwater monitoring at the neighboring site FT02-MA. The contaminant levels in the sediment are relatively high and the sediment and surface water at the site are probably the most probable acting as a contaminant pathway to receptors on-site.	The comment will be incorporated. Sediment and surface water sampling frequency will be modified to "once every 2 years."
5	Section 1.7	Please remove the words "previously undiscovered" at the end of the section.	Concur, the comment will be incorporated.
6	Figure 2-2	Please provide any available groundwater data for the FT1-W1 monitoring well depicted on the figure, whether in the text or on the figure to demonstrate that there was no exceedences in the sample from this location.	The comment will be incorporated. Fixed laboratory samples were collected from FT1-W1 in 1992 and 1994. Results from these analyses will be depicted on Figure 2-2.
7	Section 2.2	In the 6th paragraph of this section, the text seems to be redundant where it states that, "Contaminants detected in the groundwater include benzene, toluene, and BTEX…" The acronym BTEX includes benzene and toluene. Also if this is base wide summary of Site history, then other contaminants should be included on this list, namely DRO.	This paragraph will be written to include a broader range of contaminants found in the island's groundwater and to remove the redundancy.
8	Section 2.2	In the last paragraph of this section regarding ERP Site FT03, the text states that an empty UST was discovered. Was this tank removed? Were any samples collected in association with this UST or its removal? Please add text to clarify the current status of the UST.	This tank was removed in July 2008. A report will be provided under separate cover. A summary of this effort and findings will be added to this section.

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Non CERCLA Decision Document FT01, FT02, FT03
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: November 26, 2008 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
9	Section 2.5.2.2	In the third paragraph of this section please clarify if the bedrock is 55 feet above or below msl. There are several instances in the recently submitted RODs that the distinction of above or below msl is not stated. Please perform a universal document check for "msl" to ensure that they are all properly identified as above or below msl.	The comment will be incorporated. The complete report will be reviewed to ensure that data are properly indicated whether they are above or below msl.
10	Section 2.6.2.1	Please note that 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations was updated as of October 9, 2008.	The comment will be incorporated. The reference "ADEC, 2005" will be replaced with "ADEC, 2008."
11	Table 2-8	Please explain why excavation and removal is not considered to be effective in the short term.	It is meant to show that it would take longer to carry out this alternative and therefore not being effective in the short term because the contamination remains in place with no safeguards. This is essentially what was presented in the proposed plan.
12	Section 2.12.2	The frequency of sampling should be every 2 years to coincide with the groundwater monitoring at the neighboring site FT02-MA. The contaminant levels in the sediment are relatively high and the sediment and surface water at the site are probably the most probable acting as a contaminant pathway to receptors on-site.	The comment will be incorporated. Sediment and surface water sampling frequency will be modified to "once every 2 years."
13	Section 2.12.2	The parameters for monitoring the surface water need to be expanded to include TAH and TAqH sample analyses as those are applicable to the State's cleanup levels for surface water. VOCs have been detected at elevated levels in the sediment and so monitoring should include these parameters. Additionally the surface water should be monitored for the presence of petroleum sheen to adhere to the Water Quality Standards.	The Air Force disagrees. The risk assessment for the site concluded that volatile organics do not pose an unacceptable risk and the sampling parameters were agreed upon with ADEC in the Proposed Plan.
14	Table 2-13	Please note that 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations was updated as of October 9, 2008.	The comment will be incorporated. The reference "ADEC, 2005" will be replaced with "ADEC, 2008."
15	Section 2.12.2	Bullet 2 under ICs: Please explain how a change in the Base Master Plan could affect the ICs.	A change in the Base Master Plan could affect the sites if development is proposed on or near the sites. However, this bullet does appear to be redundant as the third bullet specifies obtaining ADEC concurrence prior to modifying current land use at the sites. Therefore, the second bullet will be deleted.
16	Section 2.12.2	A bullet should be added to the ICs section to establish a periodic schedule to report on the effectiveness and maintenance of the ICs. A 5 year review would be adequate as a form of notification that the ICs are still in place and are effective.	The paragraph and list of bullets that starts with "In addition to the above ICs,…" will be replaced with the following:

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Non CERCLA Decision Document FT01, FT02, FT03
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: November 26, 2008 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
			USAF will enforce the ICs by the following actions: • USAF land records and the Plan will be updated to include site boundaries and the IC requirements. The ERP site boundaries shown on Figures 2-2, 2-3, and 2-4 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. Survey data and an up to date map showing the extent of the ICs will be provided to the State under separate cover. • Perform visual inspections to verify effectiveness of the ICs and report inspection results to ADEC. Inspection reports will be prepared no less often than once every five years to evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. o Any activity that is inconsistent with IC requirements, objectives or controls, or any action that may interfere with the effectiveness of the IC shall be addressed by the USAF as soon as practicable after discovery, but in no case will the process be initiated later than 10 days after the USAF becomes aware of the breach. o USAF shall provide notice to ADEC as soon as practicable after discovery of any activity that is inconsistent with IC requirements, objectives or controls, or any action that may interfere with the effectiveness of the IC. • In the event that the ICs fail or are deficient and could imminently lead to actual risk to human health and the

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Non CERCLA Decision Document FT01, FT02, FT03
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: November 26, 2008 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
			environment, USAF will address the situation promptly, including notification of ADEC. • USAF will obtain ADEC approval prior to conducting any excavation activities within the contaminated areas.
17	Section 2.12.2	Please provide the State with survey data and an up to date map showing the extent of the ICs. This will help us to accurately depict the restricted area on the State's IC database.	See response to comment 16.
18	Section 2.12.2	In the IC section the State is concerned about being notified in the event of a property transfer. Please include language that states that the ADEC will be notified at least 30 days prior to the transfer to give us an opportunity to make sure that the ICs are sufficient at the time and sufficiently detailed in the transfer documents.	The comment is noted. Language indicating that the State will be provided notice at least 30 days prior to the transfer of the property will be incorporated into the third bullet in this section.
19	Section 2.12.2	In the third bullet regarding ICs, please rephrase this portion of the document to state that this remedy has been selected under state law and the USAF will obtain ADEC concurrence to modify or terminate the IC's, modify land use…	The comment will be incorporated. Section 2.12.2, third bullet, will be modified as requested.
20	Page 1-3	Please change the language in this section that lacks certainty. The text states that at FT01, "concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels may exceed ADEC's most stringent cleanup levels." ; At FT02 FTA, "concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels may exceed ADEC's most stringent cleanup levels"; and at FT03, the same language. Please state that the specific compounds are in excess of the most stringent cleanup level if this is the case based on the best available data. If this is still an outstanding question then additional sampling may be warranted. The ICs are being implemented to protect humans from exposure to this contamination, so it should be adequately investigated and documented what levels are present in the soil and groundwater currently at the sites in question.	Based on soil sampling conducted primarily in the early to mid 1990's, contaminant concentrations did exceed ADEC's most stringent cleanup levels for soil. Given the length of time that has past, it is possible that the contaminant concentrations have now attenuated to below the cleanup levels. However, given the considerable expense of conducting subsurface investigations on Shemya Island and the high probability that not all of the contaminants have attenuated below cleanup levels, the Air Force has chosen to conservatively assume that the contamination remains and to safeguard against their disturbance.

Richard Girouard

From: Schick, Jonathan S (DEC) [jonathan.schick@alaska.gov]
Sent: Friday, April 17, 2009 9:27 AM
To: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR; Richard Girouard
Subject: RE: TAH and TAqH sampling at FT02

The short answer is yes. This is from the regs.

For investigation of contaminated sites and evaluating TAH and TAqH under 18 AAC 75.345(f), unless there is a specific permit requirement to use the EPA 600 series methods (e.g. an NPDES permit, etc), the following EPA SW-846 Methods are approved alternatives for TAH and TAqH
determinations:
--TAH (BTEX): Methods 8021B or 8260B
--TAqH (BTEX + PAH): Methods 8270C (including SIMS) or 8310 for the list of 16 PAHs listed by EPA Method 610

Jonathan Schick
Environmental Program Specialist
ADEC Contaminated Sites Program
(907) 269-3077

-----Original Message-----
From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [mailto:Keith.Barnack@ELMENDORF.af.mil]
Sent: Friday, April 17, 2009 8:34 AM
To: Richard Girouard; Schick, Jonathan S (DEC)
Subject: RE: TAH and TAqH sampling at FT02

Jonathan's call.

// signed //

Keith J. Barnack
Remedial Project Manager
611 CES/CEAR
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-----Original Message-----
From: Richard Girouard [mailto:Richard.Girouard@us.mwhglobal.com]
Sent: Friday, April 17, 2009 8:24 AM
To: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR; Jonathan Schick
Subject: TAH and TAqH sampling at FT02

Keith/Jonathan,

I have a question on the sampling that we are calling out in the ROD for FT02. We've added in text stating that the sampling will include TAH and TAqH for the surface water at FT02-

ADDA. My question is in regards to the analytical method. 18 AAC 70 calls out EPA 602 with xylenes or
624 for TAH, and 610 or 625 for TAqH. To be consistent with past sampling and future sampling at other sites, do we want to call out 8260 and 8270 as the methods to use instead? The regs allow this if ADEC approves it.

Rick

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

SARAH PALIN, GOVERNOR

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File # 2649.38.002
2649.38.003
2649.38.004

June 9, 2009

Keith Barnack, Remedial PM
United States Air Force
611 Air Support Group
Environmental Restoration Section
10471 20th Street Ste 302
Elmendorf AFB, AK 99506-2200

Re: Pre-final "Non-CERCLA Decision Document for Lightning Strike/Burn Area (FT01), Aircraft Mock-up Area/ Fire Training Area/ Abandoned Drum Disposal Area(FT02, and Fire Department Foam Training Area (FT03)", Eareckson Air Station, dated April 2009

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the document referenced above on April 20, 2009. We have completed our review and provided comments in the attached table.

Thank you for submitting the Pre-final version of this Decision Document for our review. I look forward to working with you to address these issues and develop a final Decision Document for these sites. We would be happy to meet with you to discuss and resolve any outstanding issues. If you have any questions regarding this letter, please contact me at 907-269-3077 or jonathan.schick@alaska.gov.

Sincerely,

Jonathan Schick
Environmental Program Specialist

Attachment: DEC comments on Pre-final Non-CERCLA Decision Document for FT01, FT02, and FT03

cc (via email): Jennifer Currie, DOL
John Halverson, DEC

Alaska Department of Environmental Conservation
Comments on the Pre-Final Non-CERCLA Decision Document FT01, FT02, and FT03
Eareckson Air Station, Alaska
Document Date: April 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: June 9, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	General		This document does not include any tables that display the contaminant levels in various media at the sites. The text in the document qualitatively describes the analytical results with terms like low levels, or slightly exceeds, but there is little to no hard data. The document should include tables that show the ranges and/or maximum contaminant levels detected at each site in the various media. Tables be added to depict background levels of inorganics and cleanup levels, including the basis for them. Also please add some discussion regarding the methods used to calculate the background levels for the sites. Table 2-3 provides only the analyses performed and no results. Tables, depicting results and comparing them to background and cleanup levels would be much more informative.	
2.	1-1	1.2	Please revise the third sentence to state, "The State of Alaska Department of Environmental Conservation (ADEC) has determined that proper implementation of the selected remedy will comply with state law."	
3.	1-3	1.4	In the section describing FT01 please indicate which media has been impacted by the contamination at the site. Also in this paragraph and in many other places throughout the document the text states that there are petroleum hydrocarbons and volatile and semi-volatile compounds that may exceed cleanup levels. Please clarify by comparing any VOC and SVOC results to the applicable cleanup levels and mention that the results from petroleum sampling has some level of uncertainty because of the older analytical methods that were used, but that they appear to exceed the cleanup levels.	
4.	1-3	1.4	In the section describing FT02 please identify the media where compounds associated with fuels exceed the ADEC's cleanup level. Additionally, the text states that there is petroleum hydrocarbon contamination that may exceed ADEC's most stringent cleanup levels. Please elaborate by comparing any VOC or SVOC results to the applicable cleanup level and mention that the results from petroleum sampling has some level of uncertainty because of the old sampling analysis methods, but that they appear to exceed the cleanup levels.	
5.	1-4	1.4	In the section describing FT03 please identify the media where compounds associated with fuels exceed the ADEC's cleanup level.	

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Eareckson Air Station, Alaska
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Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
6.	1-4	1.5	Please delete "that are applicable or relevant and appropriate to the remedial action" - this document is specific to state law, ARARs do not apply.	
7.	1-4	1.5	Please delete the sentence regarding a bias against off-site treatment and disposal as there is no acknowledged bias against that in state regulations or the NCP.	
8.	1-4	1.5	In the third paragraph of this section, please delete the words "under State of Alaska regulations" because it is redundant with the rest of the sentence.	
9.	1-4	1.6	In the FT01 and FT02 portions of this section, the text states that there is metals and petroleum hydrocarbon contamination that might exceed ADEC Method Two or most stringent cleanup levels. Please clarify by comparing any VOC and SVOC results to the applicable cleanup level and mention that the results from petroleum sampling have some level of uncertainty because older analytical methods were used, but that they appear to exceed the cleanup levels. In the case where the metals did not exceed the RBCL, then we should be able to say definitively if the ADEC's cleanup levels were exceeded. In the FT03 portion of this section the text also states that the petroleum hydrocarbon concentrations might exceed ADEC's most stringent cleanup levels. This should be changed because we know from the 2008 UST removal that there is residual DRO soil contamination at levels up to 5,800 mg/kg, well over the cleanup level.	
10.	1-5	1.6	In the last paragraph on page 1-5 please change the text as the State of Alaska does not have balancing or modifying criteria.	
11.	1-6	1.7	Please change the text of the second sentence in this section so that it reads, "ADEC has determined that proper implementation of the USAF's selected remedy will comply with State laws.	
12.	2-4	2.1.2	Please describe the historic use of FT02 in this section.	

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Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
13.	2-4	2.2	Please delete the term CERCLA from the second sentence of this section.	
14.	2-7	2.2	Please delete the last sentence in the second paragraph on this page that begins with the words, "Contamination of sediments and surface water…"	
15.	2-7	2.2	In the third paragraph on this page, please delete the words, "very isolated" from the text. Also please delete the following sentence that begins, "Groundwater contamination is noted…" This language is vague and does not add any substantive information to the document.	
16.	2-10	2.2	The State is concerned with the increasing levels of contaminant concentrations at FT02 specifically since the bioventing system stopped operating. According to the text all of the BTEX concentrations have increased since the bioventing system stopped operating with benzene detected above the cleanup level. Also metals in the sediments are increasing and the DRO concentrations are increasing. These results indicate that the bioventingg system may have been taken off line before it had treated all of the available contamination and therefore restarting the system may be a viable option for treatment.	
17.	2-10	2.2	In the last paragraph of Section 2.2 the new text states that the DRO concentrations were detected at a maximum concentration of 5,800 mg/kg. This information should be carried throughout the document where there is some remaining question regarding FT03 having soil that ***might*** exceed the cleanup level.	
18.	2-23	2.6.2.3	The document needs to support the assertion that many of the contaminants of concern (specifically metals) are naturally occurring. Please insert a table that shows the ranges and/or maximum contaminant levels detected at the site. The table should also include any background levels and cleanup levels or risk based screening levels. Also please describe the methods used to calculate the background levels for the sites. If sufficient documentation cannot be provided, additional metals sampling should be added to the monitoring program at these sites similar to the additional metals sampling suggested in the Landfill Site RODs to determine the current levels of metals at the sites without interference from the matrix.	
19.	2-23	2.6.2.3	The last paragraph of this section states that there was low level concentrations of petroleum hydrocarbons. Please clearly state whether the sample results were above or below the cleanup levels and define which levels are being used for comparison. Metals are believed	

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Comments Developed: June 9, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			to be naturally occurring here as well. Some documentation will need to be provided to support this assertion that all of these metals are naturally occurring.	
20.	2-24	2.6.2.4	The last paragraph of this section states that metals, VOCs, SVOCs and PAHs, and petroleum hydrocarbons were detected in the soil at FT02. The document needs to be more detailed in describing which contaminants were detected above the cleanup levels. The statement that these compounds were detected or the tables that show that these analyses were performed at a site (Table 2-3) do not provide the necessary information to support the decisions being proposed in the document. More detail is required.	
21.	2-28	2.6.2.4	In the fourth paragraph on page 2-28 please remove the words, "In general". Also this paragraph and the next one contain the same language that the petroleum hydrocarbons are at concentrations that might exceed ADEC groundwater cleanup levels. If the document can state that the Method four criteria were not exceeded, then there should be enough data to state whether the State's cleanup levels were exceeded.	
22	2-32	2.7.1	Please describe the current land use within this section, rather than just stating that it is not expected to change.	
23	2-32	2.8	Please delete the date that is in parentheses regarding the Alaska regulation. The dates are only necessary when defining a specific guidance document or procedures manual but not the regulations generally.	
24	2-35	2.8.1.4	In the first paragraph of this section please delete the word unrestricted as a "transit walker" (someone walking across the site?) is not equivalent to an unrestricted land use scenario.	
25	2-36	2.8.1.4	The second paragraph on this page and again in the Tier II Ecological Risk section states that the Method Four RBCL was exceeded for Tahllium at the site, but that it is naturally occurring. Documentation will need to be provided to support the assertion that all of these metals are naturally occurring. If sufficient evidence cannot be provided, additional sampling for metals should be added to the monitoring program at these sites to determine background and current site specific levels of metals are at the sites without interference	

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Document Date: April 2009
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Comments Developed: June 9, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			from the analytical matrix.	
26	2-41	2.8.2.2	In the section labeled Tier I Petroleum Hydrocarbons please change the DRO Method Two migration to groundwater cleanup level to 250 mg/kg. Also please change the RRO comparison level to 10,000 mg/kg (ingestion) as it is the more restrictive than the migration to groundwater criteria.	
27	2-43	2.8.2.4	The section labeled Tier II Human Risk again discounts the thallium concentrations because of interference from the 6010 method. The State's recommendation that additional metals samples be added to the monitoring program at these sites similar to the additional metals sampling that is suggested at the Landfill Site RODs to determine what the current levels of metals are at the sites without interference from the analytical matrix.	
28	2-51	Table 2-6	Please move this table into the section regarding FT02 instead of FT03 to avoid confusion. Also please provide the basis for the RBCLs listed in the table.	
29	2-51	2.10.1	The "institutional controls" for FT02 and perhaps FT03 (it is unclear in the document whether groundwater beneath FT03 meets the Table C groundwater cleanup levels or that inorganics are within natural background levels) need to include a restriction on groundwater use until the water quality is suitable for unrestricted use. This comment needs to be addressed throughout the document where ICs are described.	
30	2-53	Table 2-7, Table 2-8 and Table 2-9	Please remove the row of this table that refers to ARARs as this is not applicable to this Non-CERCLA Decision Document.	
31	2-55	Tables 2-10, 2-11, and 2-12	These Tables present a bias against off-site transport of waste. There is no such bias under state law or the NCP and this language should be removed from the tables.	

Alaska Department of Environmental Conservation
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Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
32	2-57	2.12	Throughout this section the remedy is said to be compliant with ARARs. Since this is not a CERCLA document, ARARs do not apply. Please remove the term ARARs from the text in this section and replace it with "applicable laws".	
33	2-58	2.12.1	Please change the text in the first sentence of this section so that it reads, "The USAF and ADEC believe that the selected remedy at each ERP site will be protective of human health and the environment and will comply with the applicable regulations."	
34	2-58	2.12.1	The bullets in this section refer to criteria and ARARs that are only applicable to a CERCLA decision document.	
35	2-58	2.12.2	The State does not concur that monitoring one well every two years is adequate to be protective of human health and the environment. This document should not prescribe the well to be monitored as that may need to change in the future. The well or wells to be monitored in the future should be agreed upon in the work plan phase of the proposed remedy. The text should state that MNA of groundwater is part of the selected remedy.	

Richard Girouard

From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [Keith.Barnack@ELMENDORF.af.mil]
Sent: Tuesday, July 07, 2009 2:30 PM
To: Schick, Jonathan S (DEC)
Cc: Mattson, Steve Civ USAF PACAF 611 CES/CEAR; Richard Girouard
Subject: Earekson RTCs FT ROD and DD
Attachments: RTC Pre-Final CERCLA FT ROD Jun 2009.doc; RTC PRE-FINAL NON-CERCLA FT DD JUN 2009.doc

Jonathan: Attached are the second round of RTCs to ADEC comments on the ROD and DD for FT001, FT002, and FT003. Let us know if our RTCs are acceptable. Thanks:

Keith

// signed //

Keith J. Barnack
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Alaska Department of Environmental Conservation
Comments on the Pre-Final Non-CERCLA DD for FT01, FT02, and FT03
Eareckson Air Station, Alaska
Document Date: April 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: June 9, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Air Force Response
1.	General		This document does not include any tables that display the contaminant levels in various media at the sites. The text in the document qualitatively describes the analytical results with terms like low levels, or slightly exceeds, but there is little to no hard data. The document should include tables that show the ranges and/or maximum contaminant levels detected at each site in the various media. Tables should be added to depict background levels of inorganics and cleanup levels, including the basis for them. Also please add some discussion regarding the methods used to calculate the background levels for the sites. Table 2-3 provides only the analyses performed and no results. Tables, depicting results and comparing them to background and cleanup levels would be much more informative.	Tables with the requested information will be added. Discussion concerning the development of background concentrations for metals on Shemya Island will be added. Additional discussion on metal concentrations in Alaskan soils by others (USGS) will be included as well as activities that can release these metals to the environment.
2.	1-1	1.2	Please revise the third sentence to state, "The State of Alaska Department of Environmental Conservation (ADEC) has determined that proper implementation of the selected remedy will comply with state law."	The sentence will be revised.
3.	1-3	1.4	In the section describing FT01 please indicate which media has been impacted by the contamination at the site. Also in this paragraph and in many other places throughout the document the text states that there are petroleum hydrocarbons and volatile and semivolatile compounds that may exceed cleanup levels. Please clarify by comparing any VOC and SVOC results to the applicable cleanup levels and mention that the results from petroleum sampling has some level of uncertainty because of the older analytical methods that were used, but that they appear to exceed the cleanup levels.	Text will be added to indicate the impacted media. Discussion comparing detected petroleum, VOC, and SVOC, concentrations to cleanup levels will also be added.
4.	1-3	1.4	In the section describing FT02 please identify the media where compounds associated with fuels exceed the ADEC's cleanup level. Additionally, the text states that there is petroleum hydrocarbon contamination that may exceed ADEC's most stringent cleanup levels. Please elaborate by comparing any	Text will be added to indicate the impacted media. Discussion comparing detected petroleum, VOC, and SVOC, concentrations to cleanup levels will also be added.

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Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Air Force Response
			VOC or SVOC results to the applicable cleanup level and mention that the results from petroleum sampling has some level of uncertainty because of the old sampling analysis methods, but that they appear to exceed the cleanup levels.	
5.	1-4	1.4	In the section describing FT03 please identify the media where compounds associated with fuels exceed the ADEC's cleanup level.	Text will be added to indicate the impacted media.
6.	1-4	1.5	Please delete "that are applicable or relevant and appropriate to the remedial action" – this document is specific to state law, ARARs do not apply.	The text will be deleted.
7.	1-4	1.5	Please delete the sentence regarding a bias against off-site treatment and disposal as there is no acknowledged bias against that in state regulations or the NCP.	The sentence will be deleted.
8.	1-4	1.5	In the third paragraph of this section, please delete the words "under State of Alaska regulations" because it is redundant with the rest of the sentence.	The text will be deleted.
9.	1-4	1.6	In the FT01 and FT02 portions of this section, the text states that there is metals and petroleum hydrocarbon contamination that might exceed ADEC Method Two or most stringent cleanup levels. Please clarify by comparing any VOC and SVOC results to the applicable cleanup level and mention that the results from petroleum sampling have some level of uncertainty because older analytical methods were used, but that they appear to exceed the cleanup levels. In the case where the metals did not exceed the RBCL, then we should be able to say definitively if the ADEC's cleanup levels were exceeded. In the FT03 portion of this section the text also states that the petroleum hydrocarbon concentrations might exceed ADEC;s most stringent cleanup levels. This should be changed because	Discussion comparing detected petroleum, VOC, and SVOC, concentrations to cleanup levels will also be added to this section. Discussion of uncertainty in the results will also be included. The FT03 text will be revised.

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			we know from the 2008 UST removal that there is residual DRO soil contamination at levels up to 5,800 mg/kg, well over the cleanup level.	
10.	1-5	1.6	In the last paragraph on page 1-5 please change the text as the State of Alaska does not have balancing or modifying criteria.	The text will be revised.
11.	1-6	1.7	Please change the text of the second sentence in this section so that it reads, "ADEC has determined that proper implementation of the USAF's selected remedy will comply with State laws.	The text will be changed.
12.	2-4	2.1.2	Please describe the historic use of FT02 in this section.	A description of historical use of FT02 will be added to the section.
13.	2-4	2.2	Please delete the term CERCLA from the second sentence of this section.	The term will be deleted.
14.	2-7	2.2	Please delete the last sentence in the second paragraph on this page that begins with the words, "Contamination of sediments and surface water…"	The sentence will be deleted.
15.	2-7	2.2	In the third paragraph on this page, please delete the words, "very isolated" from the text. Also please delete the following sentence that begins, "Groundwater contamination is noted…" This language is vague and does not add any substantive information to the document.	The text will be deleted.
16.	2-10	2.2	The State is concerned with the increasing levels of contaminant concentrations at FT02 specifically since the bioventing system stopped operating. According to the text all of the BTEX concentrations have increased since the bioventing system stopped operating with benzene detected above the cleanup level. Also metals in the sediments are increasing and the DRO concentrations are increasing. These results indicate that the bioventing system may have been taken off line before it had treated all of the available contamination	The preferred remedy as outlined in the Proposed Plan is ICs with Monitored Natural Attenuation.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Air Force Response
			and therefore restarting the system may be a viable option for treatment.	
17.	2-10	2.2	In the last paragraph of Section 2.2 the new text states that the DRO concentrations were detected at a maximum concentration of 5,800 mg/kg. This information should be carried throughout the document where there is some remaining question regarding FT03 having soil that *might* exceed the cleanup level.	Text regarding exceeding the cleanup level at FT03 will be revised to reflect the 2008 sampling results.
18.	2-23	2.6.2.3	The document needs to support the assertion that many of the contaminants of concern (specifically metals) are naturally occurring. Please insert a table that shows the ranges and/or maximum contaminant levels detected at the site. The table should also include any background levels and cleanup levels or risk based screening levels. Also please describe the methods used to calculate the background levels for the sites. If sufficient documentation cannot be provided, additional metals sampling should be added to the monitoring program at these sites similar to the additional metals sampling suggested in the Landfill Site RODs to determine the current levels of metals at the sites without interference from the matrix.	A table with the requested information will be added. Discussion concerning the development of background concentrations for metals on Shemya Island will be added. Additional discussion on metal concentrations in Alaskan soils by others (USGS) will be included as well as activities that can release these metals to the environment.
19.	2-23	2.6.2.3	The last paragraph of this section states that there was low level concentrations of petroleum hydrocarbons. Please clearly state whether the sample results were above or below the cleanup levels and define which levels are being used for comparison. Metals are believed to be naturally occurring here as well. Some documentation will need to be provided to support this assertion that all of these metals are naturally occurring.	The section will be revised to compare analyte concentrations to cleanup levels. Additional discussion on metals will also be added.
20.	2-24	2.6.2.4	The last paragraph of this section states that metals, VOCs, SVOCs and PAHs, and petroleum hydrocarbons were detected in the soil at FT02. The document needs to be more detailed in describing which contaminants were detected above the cleanup levels. The statement that these compounds were detected or the tables that show that these analyses were	More detail will be added concerning analyte concentrations and cleanup levels.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Air Force Response
			performed at a site (Table 2-3) does not provide the necessary information to support the decisions being proposed in the document. More detail is required.	
21.	2-28	2.6.2.4	In the fourth paragraph on page 2-28 please remove the words, "In general." Also this paragraph and the next one contain the same language that the petroleum hydrocarbons are at concentrations that might exceed ADEC groundwater cleanup levels. If the document can state that the Method four criteria were not exceeded, then there should be enough data to state whether the State's cleanup levels were exceeded.	The section will be revised.
22.	2-32	2.7.1	Please describe the current land use within this section, rather than just stating that it is not expected to change.	A description of the land use will be added to the section.
23.	2-32	2.8	Please delete the date that is in parentheses regarding the Alaska regulation. The dates are only necessary when defining a specific guidance document or procedures manual but not the regulations generally.	The date will be deleted.
24.	2-35	2.8.1.4	In the first paragraph of this section please delete the word unrestricted as a "transit walker" (someone walking across the site?) is not equivalent to an unrestricted land use scenario.	The word "unrestricted" will be deleted.
25.	2-36	2.8.1.4	The second paragraph on this page and again in the Tier II Ecological Risk section states that the Method Four RBCL was exceeded for thallium at the site, but that it is naturally occurring. Documentation will need to be provided to support the assertion that all of these metals are naturally occurring. If sufficient evidence cannot be provided, additional sampling for metals should be added to the monitoring program at these sites to determine background and current site specific levels of metals are at the sites without interference from the analytical matrix.	The Air Force disagrees. There were no industrial or military operations that would have discharged these metals so they have to be naturally occurring. Additional discussion on metal concentrations in Alaskan soils by others (USGS) as well as activities that can release these metals to the environment will be discussed. In addition, discussion concerning thallium and matrix interference will be added. These metals were listed and ruled out as contaminants in the Proposed Plan for the site along with the preferred remedy. There were no objections at that time.

Alaska Department of Environmental Conservation
Comments on the Pre-Final Non-CERCLA DD for FT01, FT02, and FT03
Eareckson Air Station, Alaska
Document Date: April 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: June 9, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Air Force Response
26.	2-41	2.8.2.2	In the section labeled Tier I Petroleum Hydrocarbons please change the DRO Method Two migration to groundwater cleanup level to 250 mg/kg. Also please change the RRP comparison level to 10,000 mg/kg (ingestion) as it is more restrictive than the migration to groundwater criteria.	The values will be changed.
27.	2-43	2.8.2.4	The section labeled Tier II Human Risk again discounts the thallium concentrations because of interference from the 6010 method. The State's recommendation that additional metals samples be added to the monitoring program at these sites similar to the additional metals sampling that is suggested at the Landfill Site RODs to determine what the current level of metals are at the sites without interference from the analytical matrix.	The Air Force disagrees. There were no industrial or military operations that would have discharged these metals so they have to be naturally occurring. Additional discussion on metal concentrations in Alaskan soils by others (USGS) as well as activities that can release these metals to the environment will be discussed. In addition, discussion concerning thallium and matrix interference will be added. These metals were listed and ruled out as contaminants in the Proposed Plan for the site along with the preferred remedy. There were no objections at that time.
28.	2-51	Table 2-6	Please move this table into the section regarding FT02 instead of FT03 to avoid confusion. Also please provide the basis for the RBCLs listed in the table.	The table will be moved and the basis for the RBCLS will be listed.
29.	2-51	2.10.1	The "institutional controls" for FT02 and perhaps FT03 (it is unclear in the document whether groundwater beneath FT03 meets the Table C groundwater cleanup levels or that inorganics are within natural background levels) need to include a restriction on groundwater use until the water quality is suitable for unrestricted use. This comment needs to be addressed throughout the document where ICs are described.	ICs throughout the document will be revised to include restrictions on groundwater use.
30.	2-53	Table 2-7, Table 2-8 and Table 2-9	Please remove the row of this table that refers to ARARs as this is not applicable to this Non-CERCLA Decision Document.	The tables will be modified as requested.
31.	2-55	Tables 2-10, 2-11, and 2-12	These Tables present a bias against off-site transport of waste. There is no such bias under state law or the NCP and this language should be removed from the tables.	The tables will be modified as requested.

Alaska Department of Environmental Conservation
Comments on the Pre-Final Non-CERCLA DD for FT01, FT02, and FT03
Eareckson Air Station, Alaska
Document Date: April 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: June 9, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Air Force Response
32.	2-57	2.12	Throughout this section the remedy is said to be compliant with ARARS. Since this is not a CERCLA document, ARARs do not apply. Please remove the term ARARs from the text in this section and replace it with "applicable laws."	The term "ARARs" will be replaced with "applicable laws."
33.	2-58	2.12.1	Please change the text in the first sentence of this section so that it reads, "The USAF and ADEC believe that the selected remedy at each ERP site will be protective of human health and the environment and will comply with the applicable regulations."	The text will be changed as requested.
34.	2-58	2.12.1	The bullets in this section refer to criteria and ARARs that are only applicable to a CERCLA decision document.	The section will be revised.
35.	2-58	2.12.2	The State does not concur that monitoring one well every two years is adequate to be protective of human health and the environment. This document should not prescribe the well to be monitored as that may need to change in the future. The well or wells to be monitored in the future should be agreed upon in the work plan phase of the proposed remedy. The text should state that MNA of groundwater is part of the selected remedy.	The section will be revised to remove listing a specific monitoring well for sampling.

Richard Girouard

From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [Keith.Barnack@ELMENDORF.af.mil]
Sent: Thursday, October 15, 2009 2:29 PM
To: Schick, Jonathan S (DEC)
Cc: Halverson, John E (DEC); Mattson, Steve Civ USAF PACAF 611 CES/CEAR; Richard Girouard; Klasen, James F Civ USAF 11 AF 11AF/JACE; Verplancke, Glen D Civ USAF PACAF AFCEE/EXHP
Subject: RE: Eareckson Meeting 30 Sep 09

Jonathan: We accept ADEC's conditions outlined in your email below dated 9 Oct 09. We will press forward to finish these RODS. I anticipate having draft finals in February 2010. The long lag time is due to time needed to secure additional funding to finish this contract. Thanks:

Keith

// signed //

Keith J. Barnack
Remedial Project Manager
611 CES/CEAR
10471 20th ST, STE 302
Elmendorf AFB AK 99506-2200
DSN 317-552-5160
COM (907) 552-5160
keith.barnack@elmendorf.af.mil

-----Original Message-----
From: Schick, Jonathan S (DEC) [mailto:jonathan.schick@alaska.gov]
Sent: Friday, October 09, 2009 12:39 PM
To: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR
Cc: Halverson, John E (DEC); Mattson, Steve Civ USAF PACAF 611 CES/CEAR
Subject: RE: Eareckson Meeting 30 Sep 09

Keith,

Sorry for the delayed response to your email but we were all out of the office in Program Meetings in Fairbanks this week.

I wanted to briefly summarize the discussions and outcomes from our meeting on Wed September 30th regarding the Landfill and Fire Training Ground RODs.

Our conversations were mainly focused on the metals remaining on-site at the landfills and it was agreed that sampling for these metals would occur as part of the long term monitoring program at the landfills in either the summer of 2010 or the summer of 2011. We also agreed that if there is a risk demonstrated in the next round of sampling then the remedy will be reevaluated at that time to make sure that it is still protective. If the established ICs are found to not be protective then additional capping may be necessary.

Additional language will need to be added to the ROD to describe the sampling methodology. We discussed the possibility of using the Multi-Incremental Sampling techniques to give us a defensible average concentration for the extent of the surface soil in within the landfill boundaries. I would like to see analysis for all metals so that we have a good idea for what kinds of levels are remaining out there on the surface with the latest sampling methodology with the least amount of interference possible.

We also discussed the need to revisit the risk evaluation performed on the site in 2003 because of changes in cleanup levels and toxicity values that may affect the listed contaminants of concern. We have discussed this issue in-house with our risk assessor and it was agreed that the risk evaluation will need to be revisited to determine if any analytes would need to be added to the list of COCs because of a change in the toxicity value, or if any of the previously identified COCs would be carried further through the risk evaluation because of a change in the toxicity value. Many of these values have changed since the risk evaluation was performed in 2003. I discussed this with John Halverson, and we agreed that it would be more sensible to re-visit the risk calculations once we have the data from the next round of sampling then all of the data should be reviewed and compared to the most current toxicity values. It is required for the 5-Year Review that all of the Toxicity values for the COCs are reviewed to see if the remedy is still protective.

So, the risk evaluation will be reviewed and re-run to see if the new values change the level of risk at the site, and to reevaluate the protectiveness of the remedy at the time of the 5-year review.

For the Fire Training Ground sites, we discussed the protectiveness of MNA and agreed that there is no established trend in the data but that due to the nature of the COCs it should be attenuating naturally and the monitoring data will be reviewed at the 5-year review to determine if the selected remedy is still protective.

I am anticipating another round of Pre-Final RODs so that we can review the proposed sampling methodologies for the landfills and FTGs for the monitoring programs and to also review any new language that has been inserted regarding the background metals and the land use status issues.

Unfortunately, I have not had a chance to finalize our comments on the MMRP work because of my travels, but they will be sent to you in the early part of next week.

Have a great weekend and I will be in touch early next week.

Jonathan Schick

Environmental Program Specialist

ADEC Contaminated Sites Program

(907) 269-3077

From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [mailto:Keith.Barnack@ELMENDORF.af.mil]
Sent: Tuesday, October 06, 2009 2:48 PM
To: Schick, Jonathan S (DEC)
Cc: Halverson, John E (DEC); Mattson, Steve Civ USAF PACAF 611 CES/CEAR
Subject: Eareckson Meeting 30 Sep 09
Importance: High

Jonathan: Reference our meeting on 30 Sep 09 on the FT and LF ongoing DDs. Any word on the LF risk assessment issue resolution? Also, we are still awaiting the MMRP comments. Thanks:

Keith

// signed //

Keith J. Barnack

Remedial Project Manager

611 CES/CEAR

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STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

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File # 2649.38.002
2649.38.003
2649.38.004

June 15, 2010

Keith Barnack, Remedial PM
United States Air Force
611 Air Support Group
Environmental Restoration Section
10471 20th Street Ste 302
Elmendorf AFB, AK 99506-2200

Re: Pre-final "Non-CERCLA Decision Document for Lightning Strike/Burn Area (FT01), Aircraft Mock-up Area/ Fire Training Area/ Abandoned Drum Disposal Area(FT02, and Fire Department Foam Training Area (FT03)", Eareckson Air Station, dated March 2010

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the document referenced above on April 7, 2010. We have completed our review and provided comments in the attached table.

Thank you for submitting the Pre-final version of this Decision Document for our review. I look forward to working with you to address these issues and develop a final Decision Document for these sites. We would be happy to meet with you to discuss and resolve any outstanding issues. If you have any questions regarding this letter, please contact me at 907-269-3077 or jonathan.schick@alaska.gov.

Sincerely,

Jonathan Schick
Environmental Program Specialist

Attachment: DEC comments on Pre-final Non-CERCLA Decision Document for FT01, FT02, and FT03

cc (via email): Jennifer Currie, DOL
John Halverson, DEC

G:\SPAR\SPAR-CS\38 Case Files (Contaminated Sites)\2649 Eareckson\2649.38.002 EARECKSON FIRE TRAINING PIT 1 FT01\15 June 2010 Pre-Final Non-CERCLA DD Fire Training Grounds review ltr.doc

Alaska Department of Environmental Conservation
Comments on the Prefinal non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: March 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: June 14, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1-3	1.4	In the second paragraph under the Lightning Strike/Burn Area (FT001) section, please remove the words "may" and "low level" so that the sentence reads, "The site has widespread concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels exceeded ADEC's most stringent cleanup levels."	
2.	1-3	1.4	In the section describing FT002-FTA please remove the word "may" so that the sentence reads, "At FT002-FTA concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels exceeded ADEC's most stringent cleanup levels."	
3.	1-5	1.6	Under FT001 and FT002, it still states, "…contaminants might exceed ADEC's most stringent cleanup levels…". Please reword the text so that it states that contaminants exceeded ADEC's most stringent cleanup levels. Please check the entire document and make this change universally where any "may" or "might" statement is present.	
4.	2-55	Table 2-6	The values in this table do not agree with the values in Table A-9 in Appendix A. Please amend the values in Table A-9. Additionally please add text associated with this table that states that the values listed on the table are risk based cleanup levels. Monitoring will be required until the groundwater has achieved the surface water quality standards (TAH/TAqH and sheen) because the groundwater discharges directly to the surface water. Additionally, monitoring will be required until it is established that the groundwater impacts are stable or decreasing; and that Institutional Controls will remain in place until the Cleanup Levels in 18 AAC 75 Table C have been achieved for the groundwater and the soils have achieved the cleanup levels listed in 18 AAC 75 Table B1 and B2, thus the site would be available for unrestricted use.	

Alaska Department of Environmental Conservation
Comments on the Prefinal non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: March 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: June 14, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
5.	2-64	2.12.2	The values on Table 2-6 are risk based cleanup levels that are appropriate for groundwater where there is not a connection to surface water. Where surface water could be impacted, the monitoring should also be compared to the TAH/TAqH criteria in the water quality standards for site FT02 which is adjacent to surface water. Table 2-6 needs to include the TAH/TAqH criteria as that will need to be achieved before monitoring can be discontinued in the surface water and sediment.	
6.	2-65	2.12.2	Same comment as above regarding TAH/TAqH values on Table 2-6.	
7.	3-1	3.0	Please delete the second half of the last sentence in this section so that the sentence reads, "No written comments were received on the Proposed Plan."	
8.				

Alaska Department of Environmental Conservation
Comments on the Prefinal non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: March 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: June 14, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1-3	1.4	In the second paragraph under the Lightning Strike/Burn Area (FT001) section, please remove the words "may" and "low level" so that the sentence reads, "The site has widespread concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels exceeded ADEC's most stringent cleanup levels."	Concur
2.	1-3	1.4	In the section describing FT002-FTA please remove the word "may" so that the sentence reads, "At FT002-FTA concentrations of petroleum hydrocarbons and volatile and semi-volatile compounds associated with fuels exceeded ADEC's most stringent cleanup levels."	Concur
3.	1-5	1.6	Under FT001 and FT002, it still states, "…contaminants might exceed ADEC's most stringent cleanup levels…". Please reword the text so that it states that contaminants exceeded ADEC's most stringent cleanup levels. Please check the entire document and make this change universally where any "may" or "might" statement is present.	Concur. The change will be made throughout the document.
4.	2-55	Table 2-6	The values in this table do not agree with the values in Table A-9 in Appendix A. Please amend the values in Table A-9. Additionally please add text associated with this table that states that the values listed on the table are risk based cleanup levels. Monitoring will be required until the groundwater has achieved the surface water quality standards (TAH/TAqH and sheen) because the groundwater discharges directly to the surface water. Additionally, monitoring will be required until it is established that the groundwater impacts are stable or decreasing; and that Institutional Controls will remain in place until the Cleanup Levels in 18 AAC 75 Table C have been achieved for the groundwater and the soils have achieved the cleanup levels listed in 18 AAC 75 Table B1 and B2, thus the site would be available for unrestricted use.	The values in Table A-9 will be amended. The text in Section 2.9.2 will be modified to make it more clear that the values in Table 2-6 are risk based. In Section 2.9.2, in the paragraph after the 3 bullets, text will be added stating that ICs will remain until groundwater meets Table C

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
				levels and soil meets Table B1 and B2 levels. The Air Force believes that the stipulation in 2.12.2 (second paragraph from bottom of page 2-64) that groundwater monitoring can be discontinued only after concentrations are below Table 2-6 values for two consecutive monitoring events does establish that contaminant concentrations are stable or still decreasing. The discharges at FT002 ceased several decades ago and the bioventing system has been off for nearly 10 years. It is reasonable to expect that the contaminant plume has now reached a steady state condition. In addition, sampling data collected from the 1990's and after the bioventing system shutdown in 2000 and 2004, can be compared to new data to evaluate stability. TAH and TAqH values from 18

Alaska Department of Environmental Conservation
Comments on the Prefinal non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: March 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: June 14, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
				AAC 70.020 will be added to Table 2-6 for Fresh Surface waters. The Air Force disagrees that groundwater requires monitoring for TAH and TAqH as it will be directly monitored in surface water.
5.	2-64	2.12.2	The values on Table 2-6 are risk based cleanup levels that are appropriate for groundwater where there is not a connection to surface water. Where surface water could be impacted, the monitoring should also be compared to the TAH/TAqH criteria in the water quality standards for site FT02 which is adjacent to surface water. Table 2-6 needs to include the TAH/TAqH criteria as that will need to be achieved before monitoring can be discontinued in the surface water and sediment.	TAH and TAqH criteria will be added to Table 2-6 for surface water. The Air Force does not believe that monitoring groundwater for surface water criteria is necessary when surface water is being directly monitored.
6.	2-65	2.12.2	Same comment as above regarding TAH/TAqH values on Table 2-6.	Please see response to comment 5.
7.	3-1	3.0	Please delete the second half of the last sentence in this section so that the sentence reads, “No written comments were received on the Proposed Plan.”	Concur

STATE OF ALASKA

SEAN PARNELL, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
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File: 2649.38.002
2649.38.003
2649.38.004

September 3, 2010

Keith Barnack, Remedial PM
United States Air Force
611 Air Support Group
Environmental Restoration Section
10471 20th Street Ste 302
JBER, AK 99506-2200

Re: Pre-final v.3 "Non-CERCLA Decision Document for Lightning Strike/Burn Area (FT01), Aircraft Mock-up Area/ Fire Training Area/ Abandoned Drum Disposal Area (FT02), and Fire Department Foam Training Area (FT03)", Eareckson Air Station, dated August 2010

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the document referenced above on via email on August 17, 2010. We have completed our review and provided comments in the attached table.

ADEC does not concur with the proposed designation of cleanup complete for FT02 where monitoring is being conducted, nor at FT03 where additional groundwater data is required to characterize the nature and extent of the groundwater impacts. ADEC is not able to base decisions on field screening data alone characterizing the groundwater impacts at FT03.

Thank you for submitting the Pre-final version of this Decision Document for our review. I look forward to working with you to address these issues and develop a final Decision Document for these sites. We would be happy to meet with you to discuss and resolve any outstanding issues. If you have any questions regarding this letter, please contact me at 907-269-3077 or jonathan.schick@alaska.gov.

Sincerely,

Jonathan Schick
Environmental Program Specialist

Attachment: DEC comments on Pre-final Non-CERCLA Decision Document for FT01, FT02, and FT03

Cc (via email): Jennifer Currie, DOL
John Halverson, DEC

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: August 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: August 31, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	2-55	Table 2-6	In the previous round of comments on this document Comment #4 called for additional text stating that monitoring will be required until the groundwater has achieved the surface water quality standards (TAH/TAqH) and sheen, and that ICs will remain in place until cleanup levels in 18AAC 75 Table C for groundwater and Tabel B1 and B2 for soils have been achieved. Your response stated that in section 2.9.9 text will be added stating that change will be made. The new text only states that ICs will remain until the GW achieves Table C levels but does not mention the soil requirements. Also, the TAH and TAqH requirements for sampling were included in the table but should also be included in the text.	
2.	1-2	1.2	Please amend the first sentence on this page so that it reads, Petroleum substance are present at in soil at concentrations above 18 AAC 75 Method Two cleanup levels and in the groundwater exceeding Table C levels established in Alaska Site Cleanup Rules (18 AAC 75.325 through 75.390. Please remove the end of the sentence (by State of Alaska regulations)	
3.	1-2	1.2	The designation of cleanup complete is not appropriate for FT02 where monitoring is being conducted, nor at FT03 where additional groundwater data is required to characterize the nature and extent of the groundwater impacts. Metals analysis will be required at theses two sites in order to determine the current metals concentrations when an up-to date analysis and sampling methodology is used that will be less influenced by the presence of aluminum. These sites should remain active for the purpose of record keeping until the monitoring is no longer required.	
4.	1-2	1.3.2	Please reword the first sentence in this section to state that under the current land use, there is no unacceptable risk. Hazards may exist, but the ICs should prevent any exposure.	

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: August 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: August 31, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
5.	1-2	1.3.2	The third paragraph of this section states that petroleum hydrocarbons in the subsurface soils exceed ADEC Method Two levels, but the groundwater is also impacted, as high as 440 mg/L for DRO based on a field sample. Additional groundwater data is necessary in order to evaluate the protectiveness of this remedy. Based on our review of the site records, no follow-up sampling was conducted at this site and the variable field sample data is the only information that we have to base a decision on. Based on a result of 440 mg/L DRO, the selected remedy of only ICs is not appropriate.	
6.	1-3	1.4	At site FT002- ADDA, have TAH or TAqH been analyzed at the site? Sheens on the surface water were reported before and during operation of the bioventing system. When was the last observation of sheen recorded? Please discuss any relevant water quality data that is available for the site.	
7.	1-4	1.4	Please include requirements for periodic reporting on the effectiveness of the ICs in this bullet list.	
8.	2-22	2.6.1.3	Please include the activities associated with the UST removal activities that occurred during the 2008 field season. Results from those excavations should be included in the summaries of remaining subsurface contamination as well.	
9.	2-57	2.10.1	Near the end of this section, the text states that Since the RI/FS was conducted in 1996, the following remedial actions have been completed at FT002: Bioventing and monitoring. Until the cleanup levels have been met, then the monitoring program is not complete. Please revise this statement to say that bioventing has been completed and the monitoring of groundwater is on-going.	
10.	2-63	2.12.2	Please revise the third bullet in this section to state that The ICs will remain in effect until the petroleum hydrocarbon concentrations in soil and groundwater are determined to be less than the ADEC Method Two and Table C cleanup levels;	

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: August 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: August 31, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			and Water Quality Criteria in 18 AAC 70 for the groundwater and surface water at FT002.	
11.	2-63	2.12.2	In the second bullet list in the second bullet, please change this to state that the AF will perform inspections every other year and report accordingly. This way we will be more up to date on the site conditions and the inspections will coincide with the monitoring program. The inspection report could be included with the analytical report from the monitoring program.	
12.	2-64	2.12.2	At the top of this page, please amend the bullet list for groundwater samples at FT002 to include PAHs by 8270 so that TAH and TAqH can be calculated. Additionally, please change the methods for calculating the TAH and TAqH concentrations in the surface water and sediment monitoring from EPA Method 602 and 624 to collecting BTEX by 8260 and PAHs by 8270.	
13.	2-65	2.13.2	Please delete this sentence and replace it with, "The remedies will be implemented in accordance with the applicable site cleanup rules defined in 18 AAAC 75.300 through 75.390.	
14.	2-65	Table 2-13	Please delete this table as the Decision Document does not limit the applicability of the rest of the regulations that are not listed in this draft.	
15.	Appendix A	Tables A1-A12	Please show exceedances in bold print.	

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: August 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: August 31, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	2-55	Table 2-6	In the previous round of comments on this document Comment #4 called for additional text stating that monitoring will be required until the groundwater has achieved the surface water quality standards (TAH/TAqH) and sheen, and that ICs will remain in place until cleanup levels in 18AAC 75 Table C for groundwater and Tabel B1 and B2 for soils have been achieved. Your response stated that in section 2.9.9 text will be added stating that change will be made. The new text only states that ICs will remain until the GW achieves Table C levels but does not mention the soil requirements. Also, the TAH and TAqH requirements for sampling were included in the table but should also be included in the text.	Concur, the soil requirements will be added and the TAH and TAqH sampling requirements will be added to the text.
2.	1-2	1.2	Please amend the first sentence on this page so that it reads, Petroleum substance are present at in soil at concentrations above 18 AAC 75 Method Two cleanup levels and in the groundwater exceeding Table C levels established in Alaska Site Cleanup Rules (18 AAC 75.325 through 75.390. Please remove the end of the sentence (by State of Alaska regulations)	Concur, the sentence will be amended.
3.	1-2	1.2	The designation of cleanup complete is not appropriate for FT02 where monitoring is being conducted, nor at FT03 where additional groundwater data is required to characterize the nature and extent of the groundwater impacts. Metals analysis will be required at theses two sites in order to determine the current metals concentrations when an up-to date analysis and sampling methodology is used that will be less influenced by the presence of aluminum. These sites should remain active for the purpose of record keeping until the monitoring is no longer required.	Metals analysis at FT002 and additional sampling at FT003 are new ADEC requests. These requests were not made during ADEC's review of the October 2008 Draft, the April 2009 PreFinal, or the March 2010 PreFinal versions of this document. The Air Force would like to discuss this issue with ADEC.
4.	1-2	1.3.2	Please reword the first sentence in this section to state that under the current land use, there is no unacceptable risk. Hazards may exist, but the ICs should prevent any exposure.	Concur, the sentence will be revised.

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: August 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: August 31, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
5.	1-2	1.3.2	The third paragraph of this section states that petroleum hydrocarbons in the subsurface soils exceed ADEC Method Two levels, but the groundwater is also impacted, as high as 440 mg/L for DRO based on a field sample. Additional groundwater data is necessary in order to evaluate the protectiveness of this remedy. Based on our review of the site records, no follow-up sampling was conducted at this site and the variable field sample data is the only information that we have to base a decision on. Based on a result of 440 mg/L DRO, the selected remedy of only ICs is not appropriate.	Additional groundwater sampling at FT003 is a new ADEC request. This request was not made during ADEC's review of the October 2008 Draft, the April 2009 PreFinal, or the March 2010 PreFinal versions of this document. The Air Force would like to discuss this issue with ADEC.
6.	1-3	1.4	At site FT002- ADDA, have TAH or TAqH been analyzed at the site? Sheens on the surface water were reported before and during operation of the bioventing system. When was the last observation of sheen recorded? Please discuss any relevant water quality data that is available for the site.	Surface water and sediment samples collected from FT002-ADDA have been analyzed for VOCs (8260B) and SVOCs (8270C) and TAH/TAqH values can be calculated. The most recent sampling event was in 2000 and TAH was 17.7 ug/L and TAqH was 19.6 ug/L. A slight sheen was observed at the upgradient sample location but not downstream during this sampling event.
7.	1-4	1.4	Please include requirements for periodic reporting on the effectiveness of the ICs in this bullet list.	Concur, this will be added to the bullet list.
8.	2-22	2.6.1.3	Please include the activities associated with the UST removal activities that occurred during the 2008 field season. Results from those excavations should be included in the summaries of remaining subsurface contamination as well.	Concur, a discussion on the 2008 UST removal, including results, will be added.

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: August 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: August 31, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
9.	2-57	2.10.1	Near the end of this section, the text states that Since the RI/FS was conducted in 1996, the following remedial actions have been completed at FT002: Bioventing and monitoring. Until the cleanup levels have been met, the monitoring program is not complete. Please revise this statement to say that bioventing has been completed and the monitoring of groundwater is on-going.	Concur, the statement will be revised.
10.	2-63	2.12.2	Please revise the third bullet in this section to state that The ICs will remain in effect until the petroleum hydrocarbon concentrations in soil and groundwater are determined to be less than the ADEC Method Two and Table C cleanup levels; and Water Quality Criteria in 18 AAC 70 for the groundwater and surface water at FT002.	Concur, the bullet will be revised.
11.	2-63	2.12.2	In the second bullet list in the second bullet, please change this to state that the AF will perform inspections every other year and report accordingly. This way we will be more up to date on the site conditions and the inspections will coincide with the monitoring program. The inspection report could be included with the analytical report from the monitoring program.	Concur, the inspection schedule will be changed from 5 years to 2 years.
12.	2-64	2.12.2	At the top of this page, please amend the bullet list for groundwater samples at FT002 to include PAHs by 8270 so that TAH and TAqH can be calculated. Additionally, please change the methods for calculating the TAH and TAqH concentrations in the surface water and sediment monitoring from EPA Method 602 and 624 to collecting BTEX by 8260 and PAHs by 8270.	Concur, PAHs will be added to the analyte list for groundwater and TAH and TAqH analytical methods will be changed.
13.	2-65	2.13.2	Please delete this sentence and replace it with, “The remedies will be implemented in accordance with the applicable site cleanup rules defined in 18 AAAC 75.300 through 75.390.	Concur, the sentence will be replaced.

Alaska Department of Environmental Conservation
Comments on the Prefinal V.3 Non-CERCLA Decision Document for FT001, FT002, and FT003
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14.	2-65	Table 2-13	Please delete this table as the Decision Document does not limit the applicability of the rest of the regulations that are not listed in this draft.	Concur, Table 2-13 will be deleted.
15.	Appendix A	Tables A1-A12	Please show exceedances in bold print.	Concur, the values that exceed the most stringent cleanup level will be changed to bold print.

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

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2649.38.003
2649.38.004

September 28, 2010

Keith Barnack, Remedial PM
United States Air Force
611 Air Support Group
Environmental Restoration Section
10471 20th Street Ste 302
JBER, AK 99506-2200

Re: Pre-final v.4 "Non-CERCLA Decision Document for Lightning Strike/Burn Area (FT01), Aircraft Mock-up Area/ Fire Training Area/ Abandoned Drum Disposal Area (FT02), and Fire Department Foam Training Area (FT03)", Eareckson Air Station, dated September, 2010

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the document referenced above on via email on September 23, 2010. We have completed our review and provided comments in the attached table.

Thank you for submitting the Pre-final version of this Decision Document for our review. I look forward to working with you to address these issues and develop a final Decision Document for these sites. If you have any questions regarding this letter, please contact me at 907-269-3077 or jonathan.schick@alaska.gov.

Sincerely,

Jonathan Schick
Environmental Program Specialist

Attachment: DEC comments on Pre-final Non-CERCLA Decision Document for FT01, FT02, and FT03

Cc: (via email)
Jennifer Currie, DOL
John Halverson, DEC

Alaska Department of Environmental Conservation
Comments on the Prefinal V4 Non-CERCLA Decision Document for FT001, FT002, and FT003
Eareckson Air Station, Alaska
Document Date: September 2010
Commenter: Jonathan Schick; ADEC
Comments Developed: September 24, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1-4	1.4	Text describing FT002-MA in the first paragraph should also state that groundwater will be re-sampled for metals to verify assumptions made during the remedial investigation, risk assessment and ROD. Text describing FT002-ADDA should also state surface water will be re-sampled for metals to verify assumptions made during the remedial investigation, risk assessment and ROD. Text describing FT003 should state groundwater will be monitored for MNA of petroleum contamination and groundwater and surface water will be re-sampled for metals to verify assumptions made during the remedial investigation, risk assessment and ROD.	
2.	1-5	1.4	MNA monitoring at FT002 needs to include sampling and analysis for PAHs by SW827C to calculate TAqH levels.	
3.	1-6	1.4	Please replace the methods listed for TAH and TAqH analysis to 8260B and 8270C as noted later in the document.	
4.	1-6	1.4	Groundwater and surface water at FT002 and FT003 need to be analyzed for metals to determine if the levels support the assertion that the metals are not from anthropogenic sources. Please add text stating that the surface water and groundwater will be sampled and analyzed for metals at these two sites and add a table similar to Table 2-13 to display the surface water metals cleanup and background levels. Cleanup levels for metals in surface water can be found in the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances as amended through December 12, 2008.	

Alaska Department of Environmental Conservation
Comments on the Prefinal V4 Non-CERCLA Decision Document for FT001, FT002, and FT003
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Comments Developed: September 24, 2010

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
5.	1-8	1.7	Delete the word "new" in the sentence that states, "This decision may be reviewed and modified in the future if new information…".	
6.	2-63	2.12.2	The text states that Visual inspections will be performed in conjunction with the MNA sampling but Inspection reports will be prepared no less than once every five years. Please amend this to state that Inspection results will be reported within the MNA reports. An official Inspection report could be separately submitted on the five-year time frame.	
7.	2-65	2.12.2	In the newly added paragraph discussing metals analysis at the top of this page, please include the surface water sampling that will be conducted at FT002 and FT003 in this section as well as a table similar to 2-13 displaying the surface water metals cleanup and background levels.	
8.	2-65	2.12.2	Please amend the reference to Table 12-13 in the text to 2-13 in the second paragraph on this page.	
9.	Table 2-13		Please change the units in this table to mg/L and add the references for footnotes 1 and 2.	
10.	Table 2-13		Please change the cleanup level for aluminum in groundwater from NE to 0.05 mg/L as it is the secondary MCL for drinking water.	
11.	2-66	2.14	Please include the additional metals monitoring in groundwater and surface water for Sites FT002 and FT003 in the Documentation of Significant Changes section.	