Final

CERCLA
Record of Decision
OT048 (Water Gallery)

Final

EARECKSON AIR STATION, ALASKA

Prepared By

United States Air Force
Pacific Air Forces
Elmendorf AFB, Alaska

March 2010

Final

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Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ARAR	applicable or relevant and appropriate requirement
AS	Air Station
Army	U.S. Army
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
COE	U.S. Army Corps of Engineers
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DRO	diesel range organic
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
GRO	gasoline range organic
IC	Institutional Control
IRP	Installation Restoration Program
LUC	Land Use Control
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	Monitored Natural Attenuation
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	perchloroethylene
POL	petroleum, oil, and lubricant
RI/FS	Remedial Investigation/ Feasibility Study
ROD	Record of Decision
RRO	residual range organics
SVOC	semi-volatile organic compounds
TCE	trichloroethylene
TPH	Total Petroleum Hydrocarbons
USAF	U.S. Air Force
USC	United States Code
USGS	U.S. Geological Survey
VOC	volatile organic compounds
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:	OT048 (Water Gallery)

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. 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 U.S. Air Force (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 Record of Decision (ROD) presents the Selected Remedy for Environmental Restoration Program (ERP) Site OT048 at Eareckson AS, Alaska. As the lead agency, the USAF has selected this remedy. This ROD is issued by the USAF in accordance with, and satisfies the requirements of the:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, 42 United States Code (USC) 9601 et. seq.
- Executive Order 12580, 52 Federal Register 2923 (23 January 1987).
- National Oil and Hazardous Substance Pollution Contingency Plan (NCP), 40 Code of Federal Regulations 300 (to the extent practicable).
- Defense Environmental Restoration Program, 10 USC 2701 et seq.
- Alaska Oil and Hazardous Substance Pollution Control Act, 18 Alaska Administrative Code (AAC) 75 (ADEC, 2008).

This decision is based on the Administrative Record for the site. The State of Alaska Department of Environmental Conservation (ADEC) concurs that the selected remedy complies with State law. The U.S. Environmental Protection Agency (EPA) has been consulted consistent with the requirements of 10 USC 2705 and has chosen to defer to ADEC for regulatory oversight of the ERP at Eareckson AS. This ROD meets the requirements of Alaska State law and regulations, including but not limited to Title 46 of the Alaska Statues and the regulations promulgated thereunder.

1.3 Assessment of Site

1.3.1 Assessment Under CERCLA

Environmental investigations have demonstrated that trichloroethylene (TCE) concentrations in the groundwater at ERP Site OT048 to be above the ADEC cleanup level listed in State of Alaska regulations at 18 AAC 75.345 Table C – Groundwater Cleanup Levels.

Based on results of environmental investigations, there is a CERCLA hazardous substance (42 USC 9601(14)) considered a Contaminant of Concern (COC) at ERP Site OT048. The USAF has therefore determined that action is necessary under CERCLA to protect public health, welfare, and the environment at OT048. As the lead agent under CERCLA, this ROD documents the USAF's selected remedy.

1.3.2 Assessment Under Alaska State Regulations

The remedy satisfies state regulations.

1.4 Description of Selected Remedy

The USAF will implement, monitor, maintain, and enforce the Institutional Controls (ICs) identified below in accordance with State of Alaska regulations at 18 AAC 75.375. The 611th Civil Engineer Squadron will be the point of contact for ICs. The ICs for ERP Site OT048 consist of:

- The Eareckson AS Base General Plan (Plan) will be updated to show the boundaries of OT048 to restrict access to groundwater. The Plan will contain a map indicating the site location, with restrictions on any invasive activities. Dig permits issued by the Base Operating Contractor are required for any excavation at Eareckson AS. The objective of the ICs are to prevent access or use of the groundwater contaminated with TCE above ADEC cleanup levels. Prior to approving a permit, the Plan will be reviewed to ensure that invasive activities are not taking place within the boundary of the site that could potentially compromise natural processes that lead to attenuation of the contaminant concentration in the groundwater.
- This remedy has been selected under state law and the USAF will obtain concurrence from ADEC prior to terminating the ICs, modifying current land use, or allowing 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 TCE concentration in the groundwater is determined to be less than the ADEC groundwater cleanup level of 0.005 milligrams per liter (mg/L – 18 AAC 75.345, Table C) for three consecutive monitoring periods or years, whichever is longer.
- The USAF 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.

In addition to ICs, Monitored Natural Attenuation (MNA) will be implemented at the site. MNA will consist of groundwater monitoring at least once every 2 years by collecting groundwater samples and analyzing for TCE concentration. A monitoring report, including an evaluation of ICs, will be provided to ADEC following each monitoring event. Groundwater monitoring can be discontinued with ADEC concurrence after contaminant concentration falls below the ADEC groundwater cleanup level of 0.005 mg/L for three consecutive monitoring events or years, whichever is longer.

1.5 Statutory Determinations

The selected remedy for OT048 is protective of human health and the environment, complies with promulgated requirements that are applicable or relevant and appropriate to the remedial action, and is cost effective. The infiltration gallery contained within OT048 will continue to act as the primary source of potable water at Eareckson AS. As such, the infiltration gallery and associated equipment will be operated and monitored in a manner that is in compliance with the State of Alaska Drinking Water regulations (18 AAC 80).

1.6 Data Certification Checklist

The following information is included in the Decision Summary section of this ROD (Section 2). Additional information can be found in the Administrative Record file for OT048 at Eareckson AS, Alaska, which can be found at http://www.adminrec.com, and includes:

- List of COCs and their respective concentrations.
  - TCE.
- Baseline risk represented by the COCs.
  - See **Section 2.8** – Summary of Site Risks.
- Cleanup site specific levels established for COCs and the basis for these levels.
  - The site-specific TCE cleanup level is 0.005 mg/L (18 AAC 75.345, Table C). Regulatory cleanup levels established by ADEC and applicable this site are discussed in **Section 2.6.2.1**.
- 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 ROD.
  - See **Section 2.7** – Current and Potential Future Land and Resource Uses.
- Potential land and groundwater use that will be available at the site as a result of the selected remedy.
  - See **Section 2.7** – Current and Potential Future Land and 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.
  - The estimated costs for the selected remedial actions are provided in **Section 2.12** – Selected Remedy.
- Key factor(s) that led to selecting the remedy (i.e., describe how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision).
  - See **Section 2.12** – Selected Remedy.

1.7 Authorizing Signatures

This signature sheet documents the decision made for the Eareckson AS ERP Site OT048.

By signing this declaration, ADEC concurs that the USAF's selected remedies comply with State law.

The decision may be reviewed and modified in the future if new information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health or the environment. If additional contaminants are discovered, USAF and ADEC will determine the compliance levels for soil and groundwater cleanup actions.

_____ _____

ROBYN M. BURK, Colonel, USAF
Commander, 611th Air Support Group

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 Final Remedy for the site, explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

2.1 Site Name, Location, and Description

2.1.1 Site Name and Location

Site Name (Number) and ADEC Database Record Key Number:	Water Gallery (OT048) – 198125X904807
Site Location:	Eareckson AS, Alaska
Latitude and Longitude:	52 degrees – 43 minutes North 174 degrees – 07 minutes east of Greenwich
Point of Contact:	Mr. Keith Barnack – Project Manager Keith.barnack@elmendorf.af.mil (907) 552-5160 USAF 611 CES/CEAR 10471 20th Street – Suite 302 Elmendorf AFB, AK 99506-2200

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

2.1.2 Site Description

OT048 (Water Gallery) is located in the south-central portion of Shemya Island, east of Tower Road and west of Terminal Way (**Figure 2-1**). Topography at OT048 is relatively flat, with a gentle slope to the south-southeast. Within OT048, the primary surficial deposit is a highly organic peat layer from 1 to 10 feet thick. Depth to bedrock is approximately 20 feet below ground surface (bgs). Groundwater at OT048 generally flows to the south and drains into Gallery Creek. The depth to groundwater at OT048 is approximately 2 to 8 feet bgs. OT048 has been used since the early 1950s as the source of drinking water for Eareckson AS personnel. The Water Gallery intercepts groundwater using an underground system of perforated piping that collects and stores water for installation use.

As the lead agency for remedial activities, the USAF has conducted environmental restoration at OT048 in accordance with CERCLA under the Defense Environmental Restoration Program (DERP), which was established by Section 211 of the Superfund Amendments and Reauthorization Act of 1986. ADEC provides primary oversight of the environmental restoration actions.

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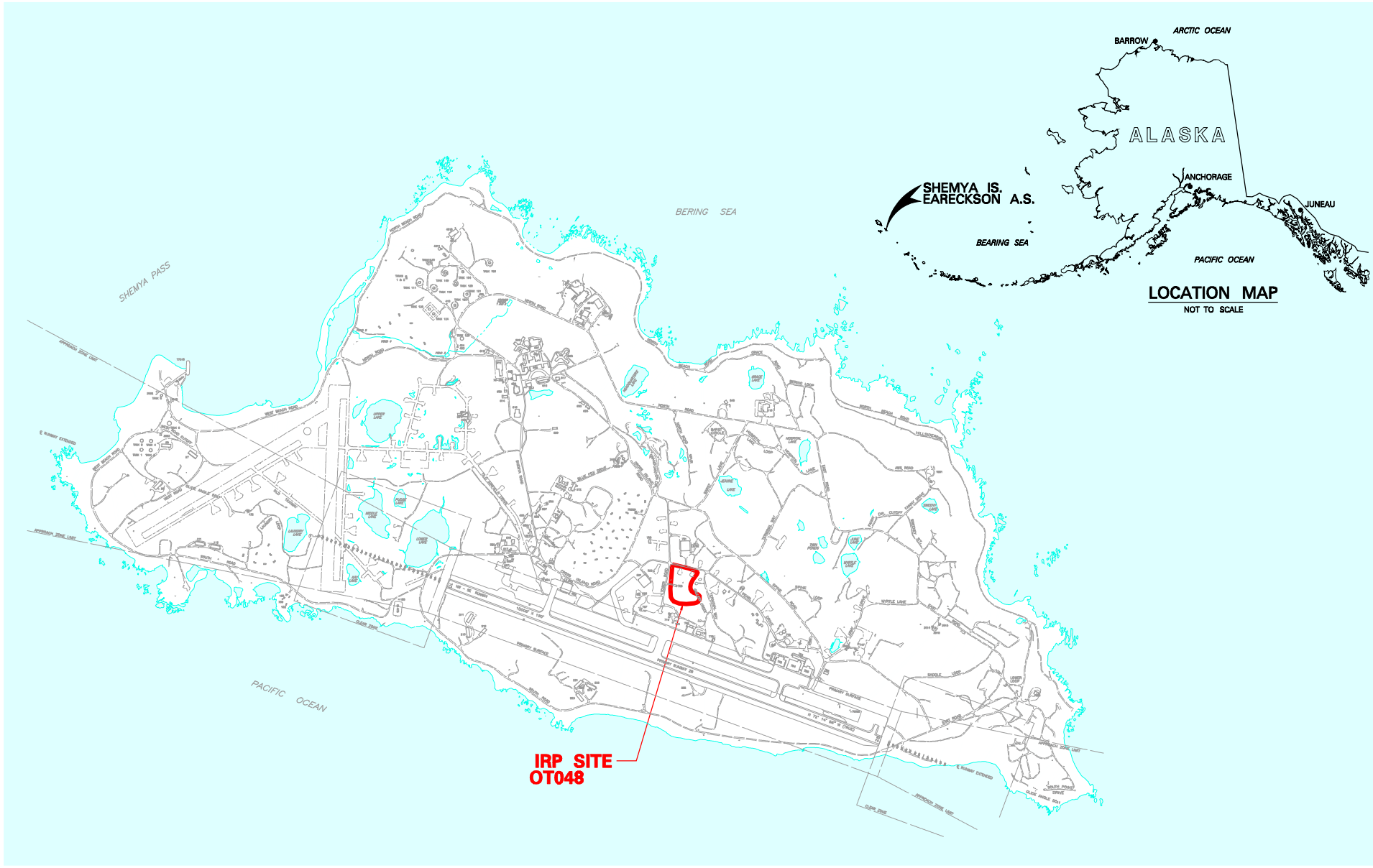

FIGURE 2–1

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
OT048 RECORD OF DECISION

LOCATION AND VICINITY MAP

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 ROD. It describes the CERCLA response actions undertaken at the site addressed in this ROD.

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 capacity to the present. In 1995, Eareckson AS was downsized and a USAF contractor is now operating the installation.

ERP Site OT048 is known as the "Water Gallery" because it is the collection point for all potable water used at Eareckson AS and acts as the water supply facility for the installation. Water reaches OT048 by the drainage of a series of shallow ponds located north of OT048. Water flowing through OT048 eventually drains into Gallery Creek.

Since the early 1950s, water has been collected at OT048 by an on-site infiltration system that has been upgraded several times. The upgrades were necessary to ensure that the water collected was potable. The infiltration system currently uses horizontal infiltration collectors to collect water. After the water is collected, the water is pumped through green sand filtration units to remove suspended solids, run through air strippers, chlorinated, and then placed in storage tanks. The renovated water collection system is capable of routinely pumping up to 300 gallons per minute of potable water. In the future, the infiltration system will also include a coagulation step to further reduce inorganic compounds.

Most of the areas adjacent to ERP Site OT048 (the Water Gallery) have been affected to some degree by base activities. Fuel and or solvent spill areas and potential contaminant source areas are located within the drainage basin that supports the Water Gallery. In addition, a sanitary waste sewer line traverses the Water Gallery near the infiltration units. To the northwest of OT048 is an abandoned fuel tank storage area (SS025). Two former aircraft parking areas and Hangar 4 are to the north. Two ERP source areas (SS013 and ST039) are located farther upgradient of OT048. All of the upgradient contaminant sources are either closed or currently being institutionally controlled and/or monitored under DERP. Waste management practices that contributed to contamination at these sites have ceased; therefore, the contaminant levels currently present at OT048 are not expected to increase.

From the mid-1980s through 2000, the USAF conducted environmental investigations at ERP Site OT048 to determine whether there is any contamination posing potentially unacceptable risk associated with past installation activities. A list and brief summary of key reports documenting conditions at OT048 include:

- **1988 USAF Bioenvironmental Engineering Office.** Eareckson AS bioenvironmental staff began collecting water samples from the base water supply in 1988. TCE and other chlorinated by-products were routinely detected. Greensand filtration units were installed to remove particulate and metals from the water at that time.
- **Water System Phase II, (Water Gallery), Petroleum, Oil, and Lubricant (POL) Contamination Investigations (USACE, 1989b).** As part of this investigation, 11 borings and eight wellpoints were installed under a USAF Military Construction/U.S. Army Corps of Engineers (COE) program. The objectives of the investigation were to determine the depth to bedrock, local hydrogeology, and the nature and extent of any contamination present. Possible sources of fuel contamination were discovered throughout OT048.
- **Installation Restoration Program (IRP) Site Investigation, Field Investigation Report (CH2M Hill, 1993).** In 1992, groundwater monitoring wells and wellpoints were installed, and soil and groundwater samples were collected under the Remedial Investigation/ Feasibility Study (RI/FS). TCE was consistently detected in groundwater at levels above regulatory limits. A fuel source was discovered upgradient of OT048 at sample location WP7 and, as a result, the soil surrounding WP7 was excavated and treated by bioremediation; however, a document discussing this excavation could not be found. No specific TCE source was identified that explains the groundwater TCE contamination. In 1993, groundwater was re-sampled and analyzed for TCE, among other contaminants.
- **Eareckson AS RI/FS Report, Volumes I and II (USAF, 1995).** In 1994, another round of groundwater samples was collected at OT048. In addition, four surface water samples were collected. A single groundwater sample was again collected in 1995 from Monitoring Well WGW7, a well in which TCE had been consistently detected. A drinking water sample was also collected from a tap at the installation.
- **Eareckson AS RI/FS Report, Volumes III and IV (USAF, 1996a, b, c).** Presents the analytical results for samples collected from 1988 through 1994**.**
- **1996 Technical Memorandum on the Results of 1995 IRP Field Program** (samples collected in 1995). This memorandum documents the collection of one groundwater sample from WGW4 during 1995.
- **1999-2000 Eareckson AS Comprehensive Basewide Monitoring Reports.** Persistent detection of TCE at OT048 resulted in OT048 being placed in the Eareckson Basewide Monitoring Program (USAF, 1999). Well WGW7 was sampled in 1998 (USAF, 1999), 1999 (USAF, 2000a), and 2000 (USAF, 2001a) as part of this program.
- **Final Basewide Monitoring Program Report, 2000 (USAF, 2001a).** Presents the results of groundwater sampling at OT048 (Well WGW7) in 2000 as part of this program.
- **Groundwater Monitoring, 2008**. Groundwater monitoring conducted at Monitoring Well WGW7 and the water gallery influent sump (WG11) to determine current TCE concentration.

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

2.3 Community Participation

A number of public participation activities were undertaken by the lead agency (the USAF) following preparation of the Proposed Plan and review by ADEC. The public participation process was performed in a manner consistent with NCP Section 300.430(f)(3).

Prior to conducting investigations at ERP Site OT048, the USAF initiated a community relations program for Eareckson AS. The final version of the Community Relations Plan was prepared in August 1994. Public meetings were held in Anchorage in 1994 (regarding environmental cleanup at Eareckson AS) and 2002 for seven ERP sites, including OT048, 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 Site OT048 is presented in **Table 2-1**, and the public comment period requirements are presented in **Table 2-2**.

Table 2-1
Public Notification of Document Availability for ERP Site OT048

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 Six Sites, including Site OT048, was published in the *Anchorage Daily News* in March 2002.

Notice of availability should consist of the following information:
• Site name and location
• Date and location of public meeting
• Identification of lead and support agencies
• Request for public comments
• Public participation opportunities including:
  o Location of information repositories and Administrative Record file
  o Methods by which the public may submit written and oral comments, including a contact person
  o Dates of public comment period
  o Contact person for the community advisory group (e.g., Restoration Advisory Board) if applicable
	The notice of availability included all of these components.

Key:
ERP – Environmental Restoration Program
RI/FS – Remedial Investigation/Feasibility Study

Table 2-2
Public Comment Period Requirements for ERP Site OT048

Requirement:	Satisfied by:
Lead agency should make document available to public for review on same date as newspaper notification.	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 the site 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 May 1 to May 31, 2002.
The lead agency must extend the public comment period by at least 30 additional days upon timely request.	The USAF received no requests to extend the public comment period for the site.
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 OT048 on May 2, 2002, at the Loussac Library in Anchorage, Alaska.

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

No comments on the Proposed Plans 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. OT048 is one of these ERP sites and is addressed in this ROD.

2.5 Site Characteristics

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

Shemya'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 cause 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.

2.5.3 Hydrogeology

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

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

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

Groundwater elevations in OT048 wells range from a low of approximately 81 feet above msl to a high of 131 feet above msl. The groundwater elevation near the main Water Gallery area averages approximately 118 feet above msl (**Figure 2-2**). Depth to groundwater in the OT048 area is approximately 2 to 18 feet bgs. Horizontal hydraulic gradients within the OT048 area vary from 0.015 feet per foot to 0.043 feet per foot. Based on groundwater depths within the lower portions of OT048, it appears that there may be limited hydraulic communication between the shallow groundwater and the surface water within Gallery Creek. Testing at monitoring wells in Management Zone 2 adjacent to OT048 revealed hydraulic conductivity values of approximately 0.037 centimeters per second. Geotechnical analysis of soil samples collected from the SS014 source area, located adjacent to OT048, showed an average porosity of 0.44 for the same general lithology. These data, along with hydraulic gradient information, were used to determine an average groundwater linear velocity of approximately 2,523 feet per year.

2.5.4 Surface Water Hydrology

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

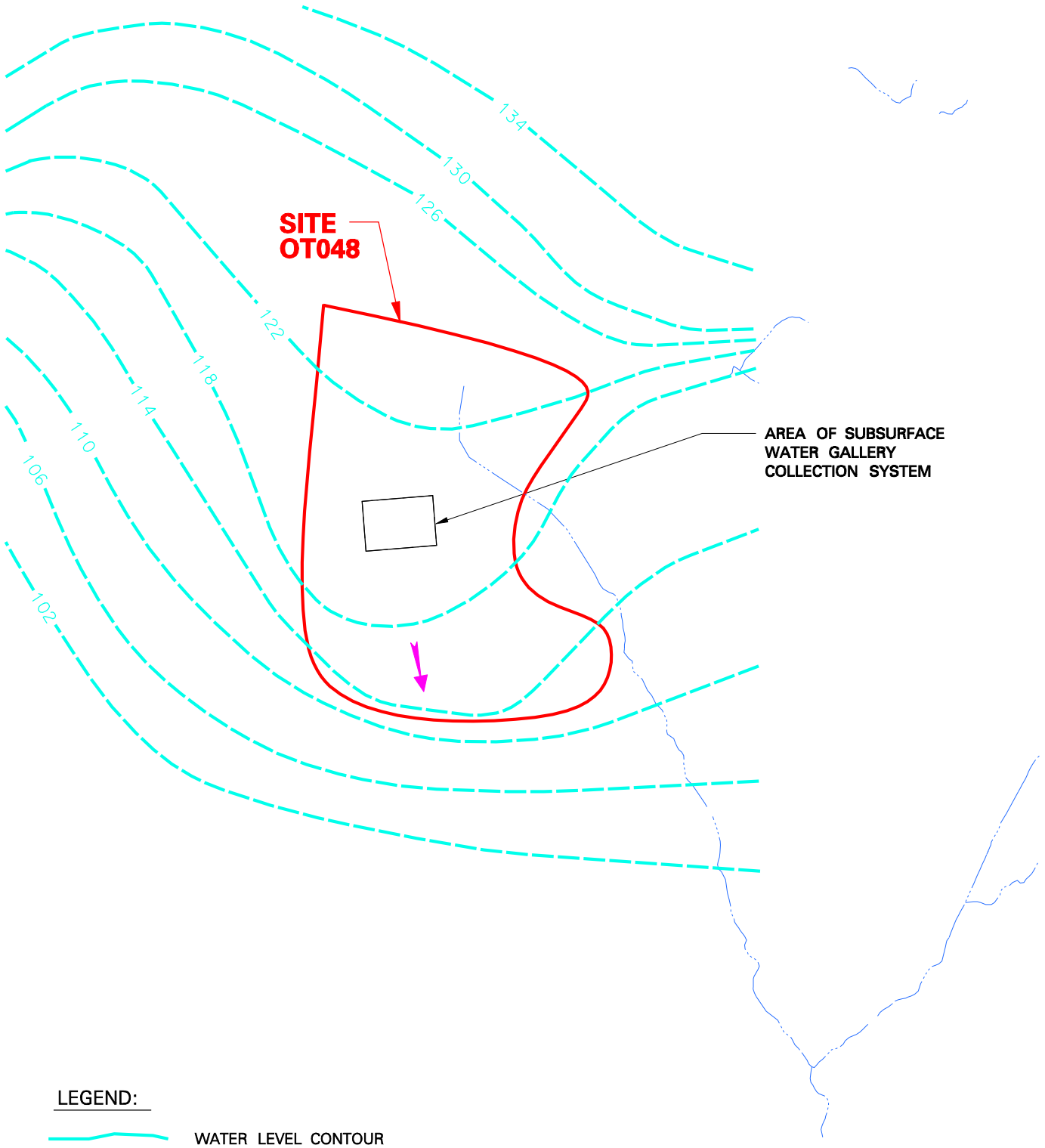

FIGURE 2–2

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
OT048 RECORD OF DECISION

POTENTIOMETRIC AND GROUNDWATER SURFACE MAP

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Gallery Creek represents the only significant surface-water body in the OT048 area. In general, precipitation infiltrates directly into the peat layer that is present throughout the majority of OT048 and eventually into the underlying shallow groundwater aquifer. As mentioned in Section 2.5.3, shallow aquifer conditions at OT048 may result in limited recharge of Gallery Creek. The creek originates within the OT048 area and extends southward to a culvert that carries water under the active runway to a discharge point along the southern coast. Except for the culvert used to divert water under the active runway, the general direction of flow within Gallery Creek does not appear to have changed significantly during the operational history of Eareckson AS. The drainage flows at approximately 80 gallons per minute; however, increased flow has been observed during days of high precipitation.

2.5.5 Drinking Water Resources

Since the advent of military activities in the 1940s on Shemya Island, a reliable source of drinking water has been important. The current source of potable drinking water at Eareckson AS is the installation's water gallery system, which has proven to be the most successful method of obtaining drinking water on the island.

Historical drinking water sources for military activities at Shemya have varied since its establishment as a military support base during WWII. Records suggest that from the 1940s to 1950s, drinking water was obtained from the island's lake system. After the lakes became contaminated with fuel product, another potable water source was sought. The COE installed 29 deep aquifer groundwater wells on the island in the 1950s.

Two of the deep wells (GW-400 and GW-410) installed by the COE were used as backup water supply wells for Eareckson AS. However, they were both decommissioned in 1998 to prevent possible exposure to humans due to drawdown of contaminated groundwater identified in nearby monitoring wells during previous ERP activities. The last round of analytical results prior to well decommissioning detected petroleum hydrocarbon contamination exceeding 18 AAC 75 groundwater cleanup levels.

In the late 1950s and early 1960s, the USAF constructed a water gallery system to collect and store surface water runoff and groundwater. The high precipitation rate assured a reliable source of drinking water. The water gallery was constructed with a series of subsurface, horizontal culverts installed at 10 to 15 feet bgs. The culverts collected water percolating through the soil, and diverted it to a collection and storage sump. Since that time, the water gallery system has been renovated at least twice, with the most recent upgrade completed in 1993.

As part of agreements with the EPA, water obtained from the gallery system is treated prior to use as a drinking water to meet State of Alaska regulations for a Class C Public Water System. Historically, the water gallery source has contained TCE; however, concentrations have been on the decline. Analytical results from groundwater samples collected from Monitoring Well WGW7 during the Year 2000 Basewide Monitoring Program (USAF, 2001a) indicated that the TCE concentration was below applicable drinking water maximum contaminant levels, while groundwater monitoring conducted in 2008 from Monitoring Well WGW7 indicated that the TCE concentration was slightly above the ADEC groundwater cleanup level. An additional

water sample collected during the 2008 monitoring effort from the water gallery influent sump (WG11) contained TCE well below the ADEC groundwater cleanup level. The source of TCE in the water gallery supply has not been identified, however, the most likely source was operations at Hanger 4.

2.5.6 Ecology

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 stopover 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.

Vegetative types at OT048 are dominated by grasses (*Elymus* spp.) in upland conditions, and sedges (*Carex* spp.) in low-lying moist conditions. In disturbed upland conditions, *Elymus* is intermixed with the Large Umbel Vegetative Community. Also intermixed with the *Elymus* and *Carex* communities are remnants of crowberry dwarf shrub tundra.

Arctic fox were observed throughout OT048. American pipit and snow buntings were also observed within the OT048 area.

Based on observations, receptors and habitats potentially affected by off island discharge of Gallery Creek include common eiders, mallards, red-faced cormorants, and glaucous-winged gulls. Pintail ducks and ruddy turnstone were observed foraging on the sandy shoreline in the vicinity of Gallery Creek. The shoreline habitat is identified as critical habitat for emperor geese (November to April) and is also a resting place for migrating waterfowl. Sea otters and harbor seals were observed using the offshore habitats adjacent to Gallery Creek.

2.5.7 Previous Site Characterization Activities

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

- 1989 Water System Phase II (Water Gallery) POL Contamination Investigations (USACE, 1989b)
- 1993 IRP Site Investigation, Field Investigation Report (samples collected in 1992 – CH2MHill, 1993)
- 1995/1996 Eareckson AS RI/FS Reports (USAF, 1995; 1996a, b, c)
- 1997 IRP Post RI/FS Monitoring Plan (USAF, 1997)
- 1999-2000 Eareckson AS Comprehensive Basewide Monitoring Reports (USAF, 1999, 2000a, 2001a)
- 2000 Drinking Water Quality Management Plan for Shemya Island, Alaska (USAF, 2000b)

2.6 Characteristics of the ERP Site

2.6.1 Remedial Activities Performed

During the 1989 investigation, the Hangar 4 area (north of OT048) was targeted as a potentially significant source because of past fuel-storage practices and reports of numerous fuel spills. POL constituents were detected in soils and it was determined that the hazardous constituents near the Hangar 4 area posed an "immediate threat" to the Water Gallery area (USACE, 1989a). The POL-contaminated soils near Hangar 4 were excavated in 1989 to prevent further migration of hazardous constituents (USACE, 1989b).

During the 1992 investigation, no TCE source was identified; however, a possible source of POL constituents was located under a bermed area near an abandoned pipeline. Soils in the area were excavated and stockpiled, and the trench was backfilled with clean sand (USAF, 1992).

Installed in the early 1950s, the Water Gallery used four horizontally placed infiltration collectors to intercept groundwater from the shallow aquifer. The original system collected and stored groundwater in a central holding tank located outside of the Water Gallery. After discovery of contaminants in the soil and groundwater in the vicinity of the Water Gallery, the system was upgraded in 1992 and currently uses eight horizontal infiltration collectors, some of which are original pipe and others which have been installed in different locations. After collection, the water is pumped through green sand filtration units to remove suspended solids. After filtration, the water is run through air strippers, chlorinated, and placed in storage tanks.

Air strippers were added to the water treatment system in 1994 to remove TCE from the drinking water. The air stripping facility consists of three 4-tray air stripper units, any pair of which has the capacity to process the total flow. One air stripper unit is maintained as a backup. Each stripper consists of a support structure on which the trays, influent and effluent water pumps, an air blower, air and water flow monitoring instruments and associated appurtenances are

mounted. The air stripper's transfer surface consists of baffled trays over which water passes under gravity flow. The water flow rate entering each stripper is measured after it passes through the influent pump. The pump pushes the water through a nozzle attached to the stripper lid into the top stripper tray. The water cascades down over the four levels of stripper trays into a sump. The effluent pump moves water from the sump, past a chlorine injector, and into the holding tanks. Air entering each air stripping unit is drawn through particulate filters by a blower and pushed up through perforations in the units' trays and out the exhaust stacks on the top of the stripper. The exhaust stack contains a mist eliminator to capture any entrained liquid. The exhaust stack discharge is at approximately 4 meters above adjacent ground surface. The elevation of the discharge was established by structural and draft effectiveness criteria.

2.6.2 Nature and Extent of Contamination

This section of the ROD establishes that there is evidence of contamination remaining above regulatory cleanup levels at the subject site by comparing investigation results to the applicable regulatory cleanup levels (18 AAC 75). The regulatory framework establishing applicable cleanup levels is discussed below, followed by a summary of environmental investigation results for the ERP site addressed in this ROD.

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 *Alaska 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. Method Two cleanup levels were used at ERP Site OT048 and are further discussed below.

For OT048, 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 for unlimited use and unrestricted exposure and are appropriate for use at Eareckson AS. Tabulated cleanup levels provided in 18 AAC 75 are considered protective of human health; ecological protectiveness is evaluated on a site-by-site basis. The ecological risk evaluation (discussed in Section 2.8.2 of this ROD) indicated that contamination from the subject site has not adversely affected the environment, nor would it be expected to do so in the future.

Groundwater. Tabulated groundwater cleanup levels provided in ADEC 18 AAC 75.345 Table C (hereinafter referred to as ADEC Groundwater Cleanup Levels) are considered protective for most groundwater uses, including drinking water, but not including aquaculture.

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.

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.

During investigations at ERP Site OT048, arsenic, antimony, and chromium were detected in soils at concentrations that exceeded ADEC Method Two Cleanup Levels. However, the concentrations were close to the background levels for these metals; therefore, these metals are not considered COCs or chemicals of ecological concern (Tables A-2, A-3 and A-4 in Appendix A). Chromium, lead, and nickel were detected in groundwater at concentrations exceeding ADEC Groundwater Cleanup Levels. Aluminum, chromium, lead, magnesium, manganese, nickel, and vanadium exceeded groundwater background levels. These metals were detected in a well downgradient from the site, but not at the site itself, and are not applicable to OT048. Antimony was also detected in the groundwater, but at concentrations that are consistent with background levels (Table A-6 in Appendix A).

2.6.2.3 Field Investigations

The overall objectives of the numerous investigations conducted at ERP Site OT048 were to identify the source and migration pathways associated with past site operations, and to determine the impacts to human and ecological receptors. In order to achieve these objectives, samples of surface soil, subsurface soil, surface water, sediment, and groundwater were collected for laboratory analysis. Surface soil samples are defined as a soil sample that was collected from 0 to 2 feet bgs. Subsurface soil samples are defined as a soil sample collected below 2 feet bgs. A summary of samples collected at OT048 is presented in **Table 2-3**.

Table 2-3 Summary of Samples Collected and Analyses Performed at ERP Site OT048

Media	Year	Laboratory[1]	Number of Samples	BTEX	TPH (E418.1)	TCE/PCE (SW8010)	VOCs	SVOCs (SW8270)	PPCBs (SW8080)	Metals	GRO	DRO	RRO (AK103)	Fuel Hydrocarbons	Common Anions (E300.1)
Surface Soil	1989	Onsite	11	A											
	1992	Onsite	57	B	√										
		Offsite	5				M	√	√	C					√
Subsurface Soil	1989	Onsite	33	A											
		Offsite	6				M[4]							N[5]	
	1992	Onsite[2]	41	B	√										
		Offsite	5				M	√	√	C					√
Surface Water	1994	Onsite	4	B		√					I	I			
Sediment	1994	Onsite	4	B		√					I	I			
Groundwater	1988-1992	Offsite[3]	26				F								
	1989	Onsite	12	A											
		Offsite	11				L[6]	√[7]						N	
	1992	Onsite	60	B		√									
		Offsite	2				M	√	√	G					
	1993	Onsite	4	B		√					I	I			
	1994	Onsite	5	B		√					I	I			
		Offsite	2				D	√	√	C	I	H			√
	1995	Offsite	1				L			E					
	1998	Offsite	1				D								
	1999	Offsite	1				D								
	2000	Offsite	1				D				J	K	√		
	2008	Offsite	2	B		√	D				J	K			

Key:
1 – Onsite laboratories were gas chromatographs located on Shemya Island. Offsite laboratories were ADEC-certified laboratories.
2 – Number of samples includes subsurface soil samples collected from wellpoints, trenches, and pits.
3 – Samples were collected from the drinking water system; however, the exact sampling locations are not known.
4 – One of six samples analyzed for VOCs.
5 – Five of six samples analyzed for fuel hydrocarbons by SW8015M.
6 – Four of 11 samples analyzed for VOCs.
7 – One of 11 samples analyzed for SVOCs.
√ – analysis preformed
A – Sample head space analysis using a gas chromatograph
B – SW8020
C – SW6010/7000
D – SW8260
E – SW6020
F –500 Series EPA Drinking Water Analyses
G – EPA200
H– SW8100
I – SW8015M
J – AK101
K – AK102
L – EPA524.2 or EPA502.1
M – SW8240
N – Fuel Identification and Quantification by SW8015M

ADEC – Alaska Department of Environmental Conservation
AK – Alaska Method
BTEX – benzene, toluene, ethylbenzene, and xylenes
DRO – diesel range organics
E – EPA Method
EPA – U.S. Environmental Protection Agency
ERP – Environmental Restoration Program
GRO – gasoline range organics
PCE –perchloroethylene
PPCBs – pesticides and polychlorinated biphenyls
RRO – residual range organics
SVOCs – semi-volatile organic compounds
SW – EPA Solid Waste Method
TCE – trichloroethylene
TPH – total petroleum hydrocarbons
VOCs – volatile organic compounds

A total of 294 primary samples were analyzed during investigations conducted at OT048. Surface soil samples were collected to pinpoint the areas with the highest soil contamination; the areas with the highest contamination were then re-sampled for off-site laboratory analysis. The on-site laboratory analyzed 231 of the 294 samples collected. The number of samples collected for each matrix according to each sampling year is listed in Table 2-3.

2.6.2.4 On-site Laboratory Sample and Analyses

Although the on-site laboratory analyses were subjected to the same quality assurance/quality control procedures as those of a standard, off-site analytical laboratory, field analytical data were not intended to be used for evaluation of risk to human health or the environment. Analytical results generated by the on-site laboratory were used as a screening tool to focus the collection of additional samples that were then shipped to an off-site laboratory for more definitive analysis.

In 1989, 11 surface soil, 33 subsurface soil, and 12 groundwater samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX). The on-site laboratory detected BTEX in soil at only one location (WGW2) at concentrations close to their respective method reporting limits, but below ADEC Method Two and Groundwater Cleanup Levels.

In 1992, 57 surface soil and 41 subsurface soil samples were analyzed for BTEX and Total Petroleum Hydrocarbons (TPH), and 60 groundwater samples were analyzed for BTEX, TCE, and perchloroethylene (PCE). All surface and subsurface soils samples were below ADEC Method Two Cleanup Levels for BTEX. TPH ranged from 25.5 to 4,763 milligrams/kilogram (mg/Kg) in surface soil and 19.1 to 98.3 mg/Kg in subsurface soil. A majority of TPH results above 100 mg/Kg were from samples collected north of the water gallery collection system and on the western border of OT048, near Tower Road. TPH results can include interferences from natural organic constituents in the soil, such as peat material, which is abundant on Shemya Island. TPH subsurface soil analytical results revealed TPH concentrations of less than 100 mg/Kg, which suggests that migration of TPH from surface to subsurface soils was minimal.

BTEX and PCE concentrations for groundwater samples collected in 1992 were all below ADEC Groundwater Cleanup Levels. There were seven groundwater samples with concentrations above the ADEC Groundwater Cleanup Level for TCE. The concentrations of TCE measured in groundwater ranged from nondetect to 0.0249 mg/L. TCE was consistently detected in Monitoring Wells WGW1, WGW3, WGW4, WGW5, and WGW7.

In 1993, four groundwater samples were collected and analyzed for BTEX, gasoline range organics (GRO), diesel range organics (DRO), TCE, and PCE. Each sample was nondetect for each of the above parameters, except for TCE. TCE was found at groundwater locations WGW4 (0.022 mg/L), WGW5 (0.005 mg/L), and WGW7 (0.021 mg/L) – above the ADEC 18 AAC 75.345, Table C, groundwater cleanup level of 0.005 mg/L.

In 1994, four surface water and sediment, and five groundwater samples were analyzed for BTEX, GRO, DRO, TCE, and PCE. All samples were nondetect for each of the parameters, with the exception of TCE. TCE was again detected above the ADEC Groundwater Cleanup Level of 0.005 mg/L at groundwater locations WGW4 (0.019 mg/L), WGW5 (0.008 mg/L), and

WGW7 (0.017 mg/L). TCE was also detected in surface water samples OT048-GC02 (0.003 mg/L) and OT048-GC03 (0.0013 mg/L).

2.6.2.5 Off-site Laboratory Sample and Analyses

Historical off-site laboratory results with detected concentrations above ADEC Method Two and Groundwater Cleanup Levels for samples collected at ERP Site OT048 during the RI/FS (1992 to 1995), Basewide Monitoring Program studies (1998 through 2000), and the 2008 groundwater monitoring are shown on **Figures 2-3** and **2-4** for soil and groundwater constituents, respectively.

Five surface soil samples were collected in 1992 for off-site laboratory analysis, based on the results from the on-site screening. Five polynuclear aromatic hydrocarbons (PAHs), chromium, and carbozole were detected above ADEC Method Two Cleanup Levels at one surface soil location, WP7. Subsequent to this discovery, the soil surrounding Sample WP7 was removed (Figure 2-3).

Arsenic and chromium at WP9 (6.8 mg/Kg and 38.7 mg/Kg, respectively) and chromium at WP21 (28.8 mg/Kg) were also detected in surface soil above ADEC Method Two Cleanup Levels (Figure 2-3). The concentrations of these two metals are below the statewide average in soil and are naturally occurring.

Five subsurface soil samples were collected in 1992 for off-site laboratory analysis, based on the results from the on-site screening. Antimony was detected in five subsurface soil samples at concentrations (7.6 to 24.8 mg/Kg) that exceeded ADEC Method Two Cleanup Levels. There are no anthropogenic sources of antimony at OT048 and it is naturally occurring.

In 1992, two groundwater samples collected from locations WGW3 and WGW4 were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals. Antimony (0.0311 mg/L) and TCE (0.015 mg/L) exceeded ADEC Groundwater Cleanup Levels at WGW4. For WGW3, only antimony (0.0311 mg/L) was found above the groundwater cleanup level of 0.006 mg/L. All other parameters were either not detected or below ADEC Groundwater Cleanup Levels.

In 1994, two groundwater samples collected from locations AP1230 and WGW7 were analyzed for VOCs, SVOCs, pesticides, PCBs, GRO, DRO, and metals. The metals aluminum, chromium, magnesium, manganese, nickel, lead, and vanadium exceeded ADEC Groundwater Cleanup Levels at location AP1230. This sample location is approximately 1,000 feet downgradient of the water gallery collection system. TCE was found at WGW7 at a concentration of 0.016 mg/L, above the ADEC Groundwater Cleanup Level. All other parameters were either not detected or below ADEC Groundwater Cleanup Levels in 1994.

In 1995, the groundwater at location WGW4 was sampled and analyzed for VOCs and metals. TCE was found at 0.024 mg/L. All other metals and VOCs were either not detected or below ADEC Groundwater Cleanup Levels at this location in 1995.

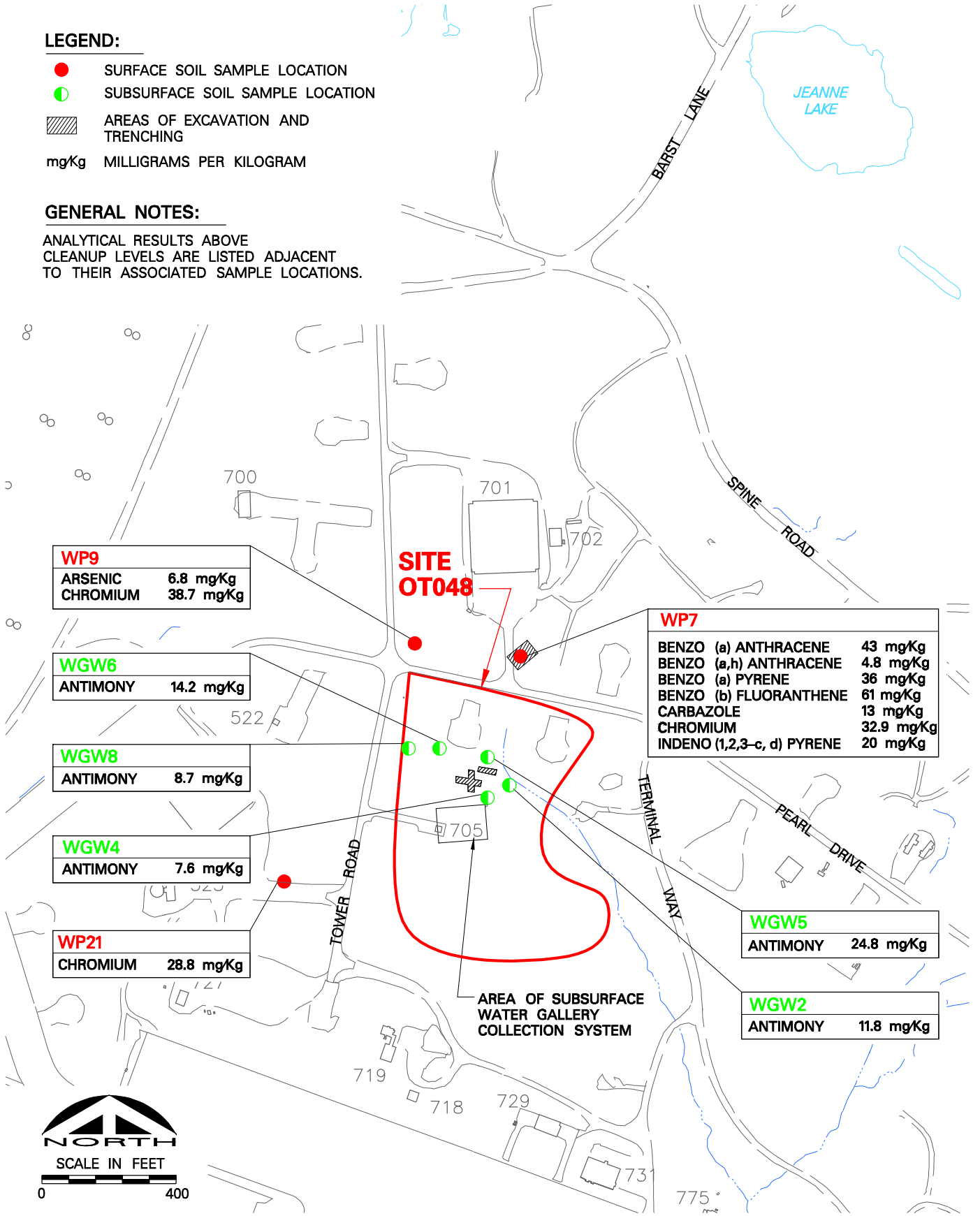

FIGURE 2–3

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
OT048 RECORD OF DECISION

SOIL SAMPLE LOCATIONS EXCEEDING CLEANUP LEVELS

JOB No. 1851213.10010401 TIME: 23-JAN-2008 19:23 FILE: C:\Proj\afcee\shemya\DecesionDoc2007\OT048\draft\FIG2-3.dgn

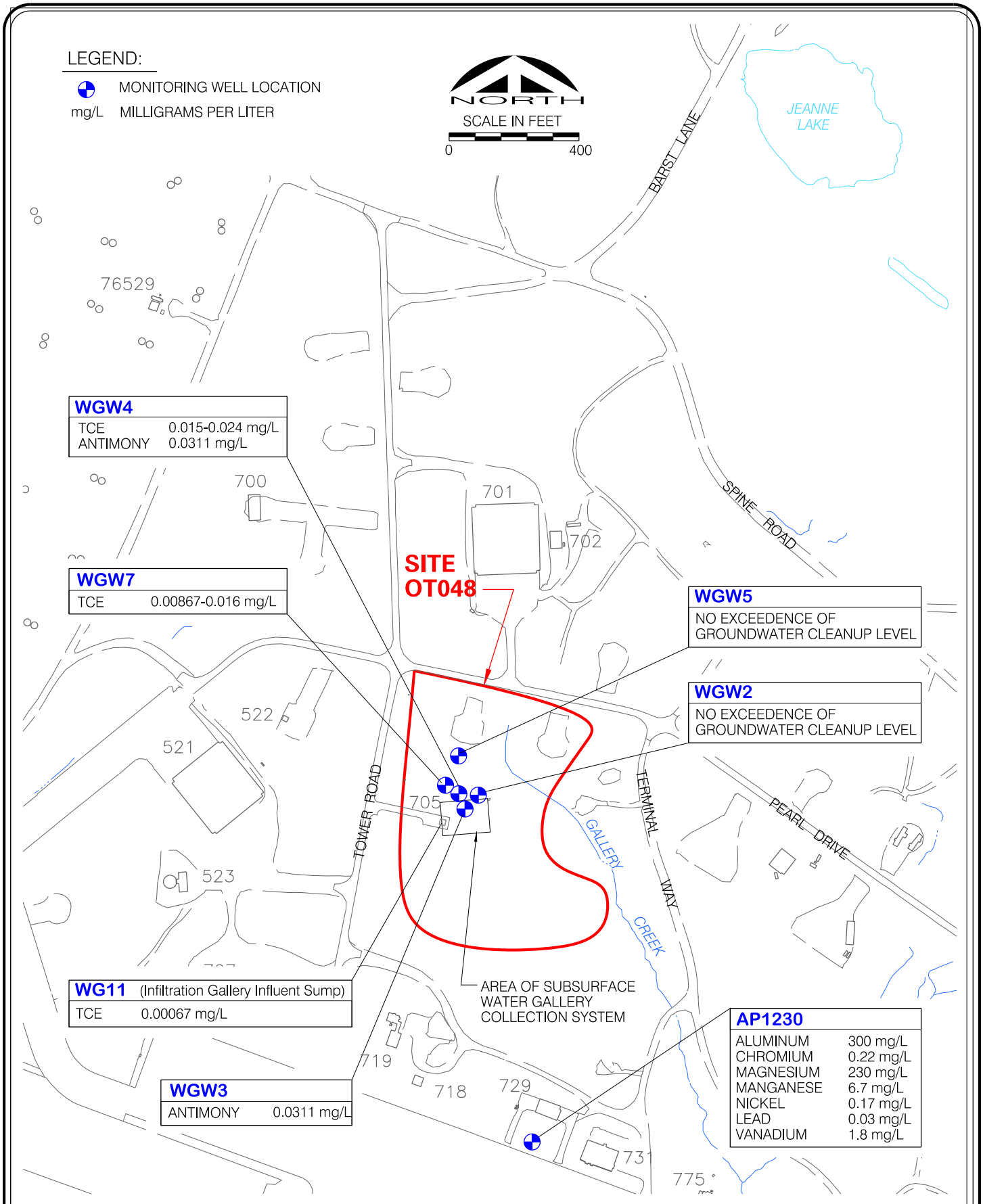

FIGURE 2-4

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
OT048 RECORD OF DECISION

GROUNDWATER SAMPLE LOCATIONS EXCEEDING CLEANUP LEVELS

FILE: D:\CAD\Proj\afcee\shemya\DecesionDoc2007\OT048\FINAL\FIG2-4.dgn
TIME: 18-MAR-2010 14:41
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In 1998 and 1999, the groundwater at location WGW7 was sampled and analyzed for VOCs. There were no VOCs detected, with the exception of TCE. In 1998, TCE was 0.00996 mg/L and in 1999 it was 0.00867, slightly above the ADEC Groundwater Cleanup Level.

Groundwater was sampled again at WGW7 in 2000 and analyzed for VOCs, GRO, DRO, and residual range organics (RRO). The TCE concentration in 2000 was 0.0047 mg/L, which was below the ADEC Groundwater Cleanup Level. There were no other VOCs detected during this sampling round. GRO, DRO, and RRO were reported at concentrations below the method reporting limits and are estimated values.

Groundwater was sampled in 2008 from monitoring well WGW7 and the infiltration gallery influent sump (WG11), where influent water is stored prior to being treated and used as drinking water. Samples were analyzed for VOCs, GRO, DRO, and polynuclear aromatic hydrocarbons (PAHs). The TCE concentration detected in Monitoring Well WGW7 was 0.00652 mg/L, which is above the ADEC Groundwater Cleanup Level of 0.005 mg/L. The TCE concentration detected in the sump sample was 0.000670 mg/L, which is below the ADEC Groundwater Cleanup Level. A graphical representation of the TCE concentration versus time measured at Monitoring Well WGW7 is shown on **Figure 2-5**.

2.6.3 Conceptual Site Model

The purpose of a conceptual site model (CSM) 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. A CSM for human health depicting complete and incomplete exposure pathways at ERP Site OT048 is shown on **Figure 2-6**. An ecological CSM is included as **Figure 2-7**.

2.7 Current and Potential Future Land and Resource Uses

Current and potential future land and resource uses at ERP Site OT048 are discussed in this section.

2.7.1 Land Use

Eareckson AS encompasses Shemya Island in its entirety. OT048 occupies a combined area of approximately 9 acres, and is located in the south-central portion of Shemya Island, east of Tower Road and west of Terminal Way (Figure 2-1). Shemya Island has no local communities or permanent residents; access to the island is limited to USAF approved activities only. The part time residents live and recreate in other areas of the island, outside of the OT048 boundaries. OT048 contains a pumphouse building and a sump used for collecting groundwater.

There are no current plans for any future development at OT048; therefore, the current land-use category of Community (water shed area) is not expected to change.

JOB No. 1851213.10010401 TIME: 30-JUL-2009 16:00 FILE: D:\CAD\Proj\afcee\shemya\DecesionDoc2007\OT048\draft - FINAL\Fig2-5.dgn

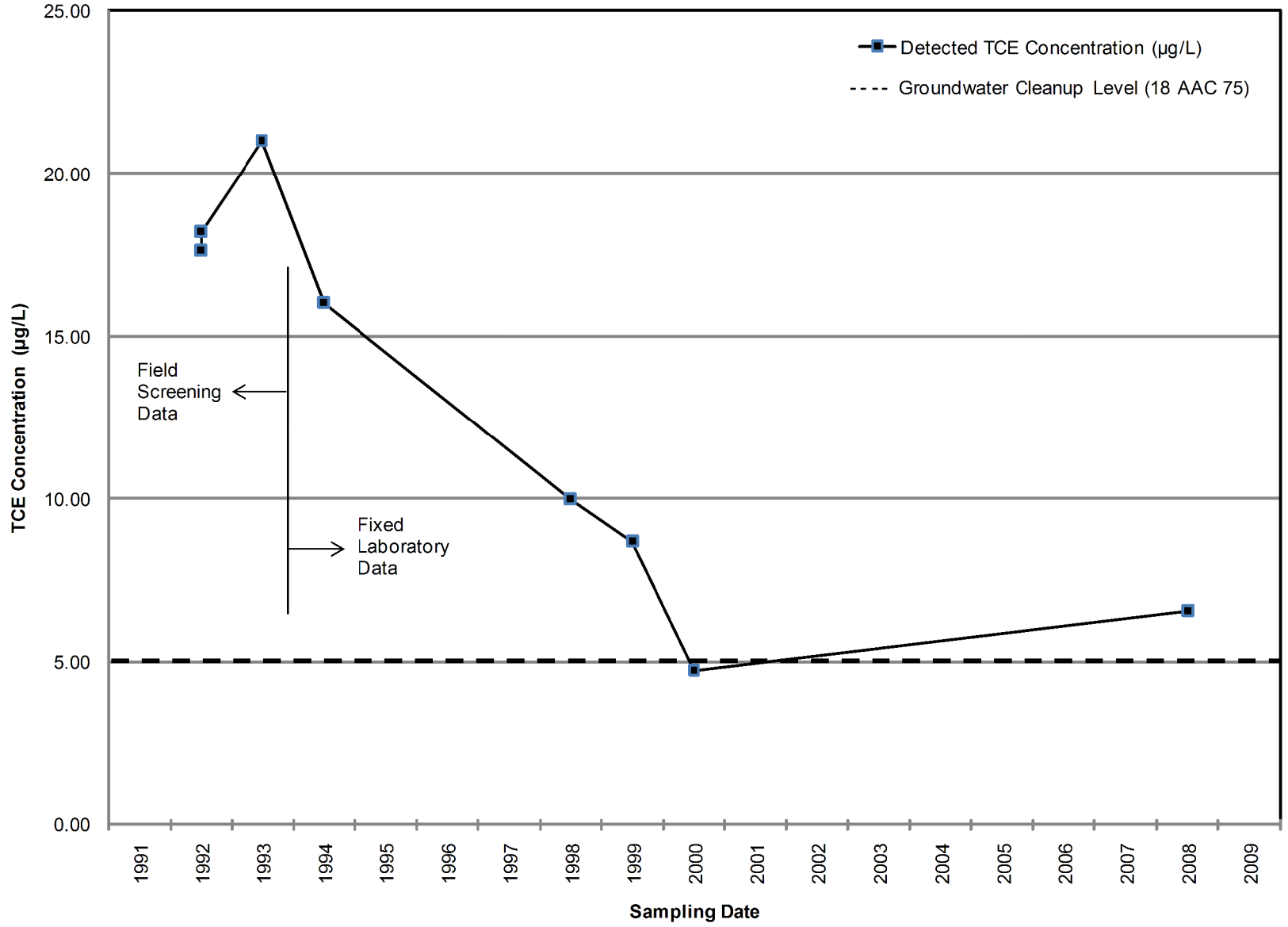
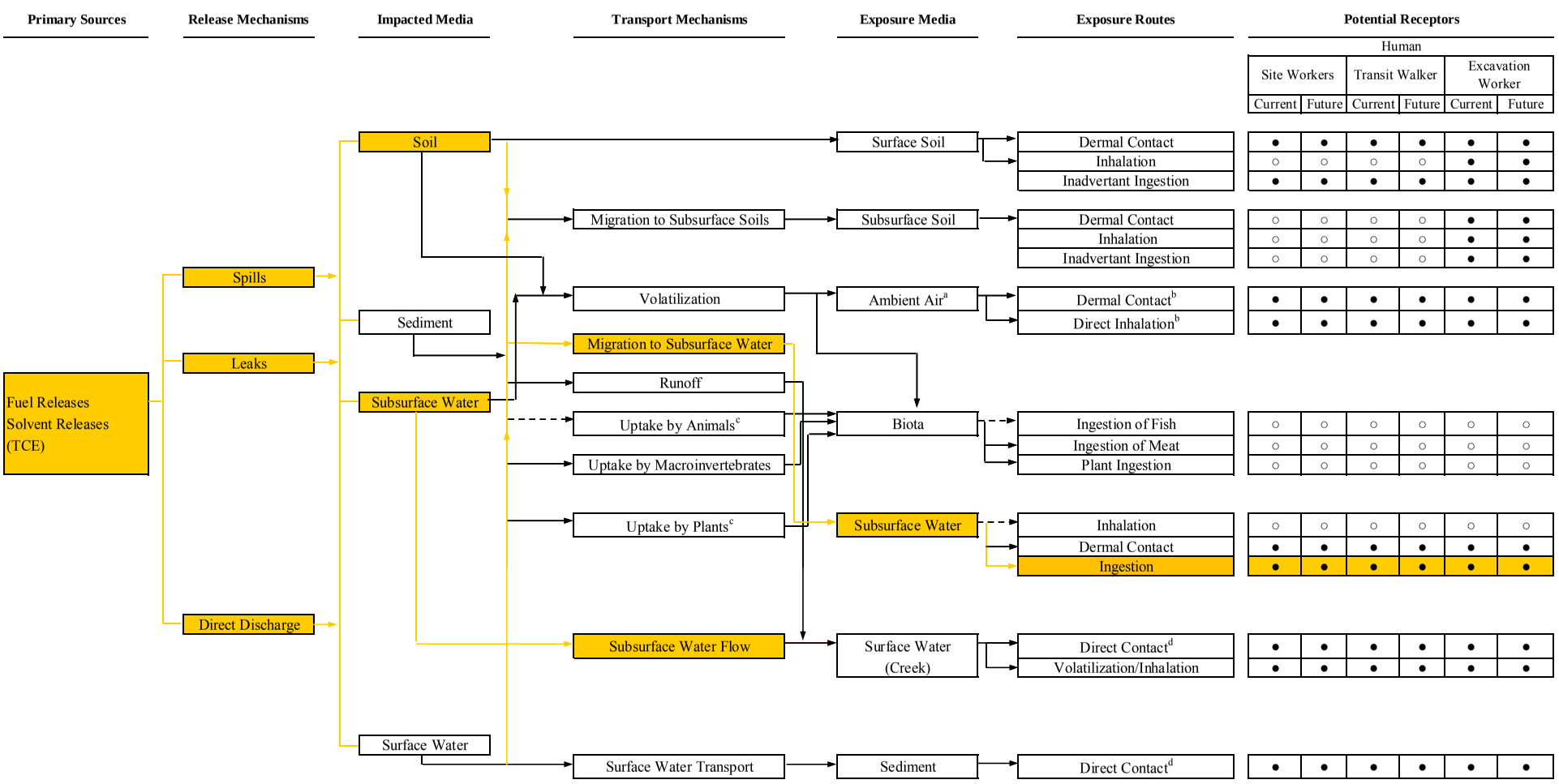


FIGURE 2-5

U.S. AIR FORCE, EARECKSON AIR STATION, ALASKA
OT048 RECORD OF DECISION

MONITORING WELL WGW7 TCE CONCENTRATIONS

Figure 2-6 Human Health Conceptual Site Model for Site OT048



Notes:

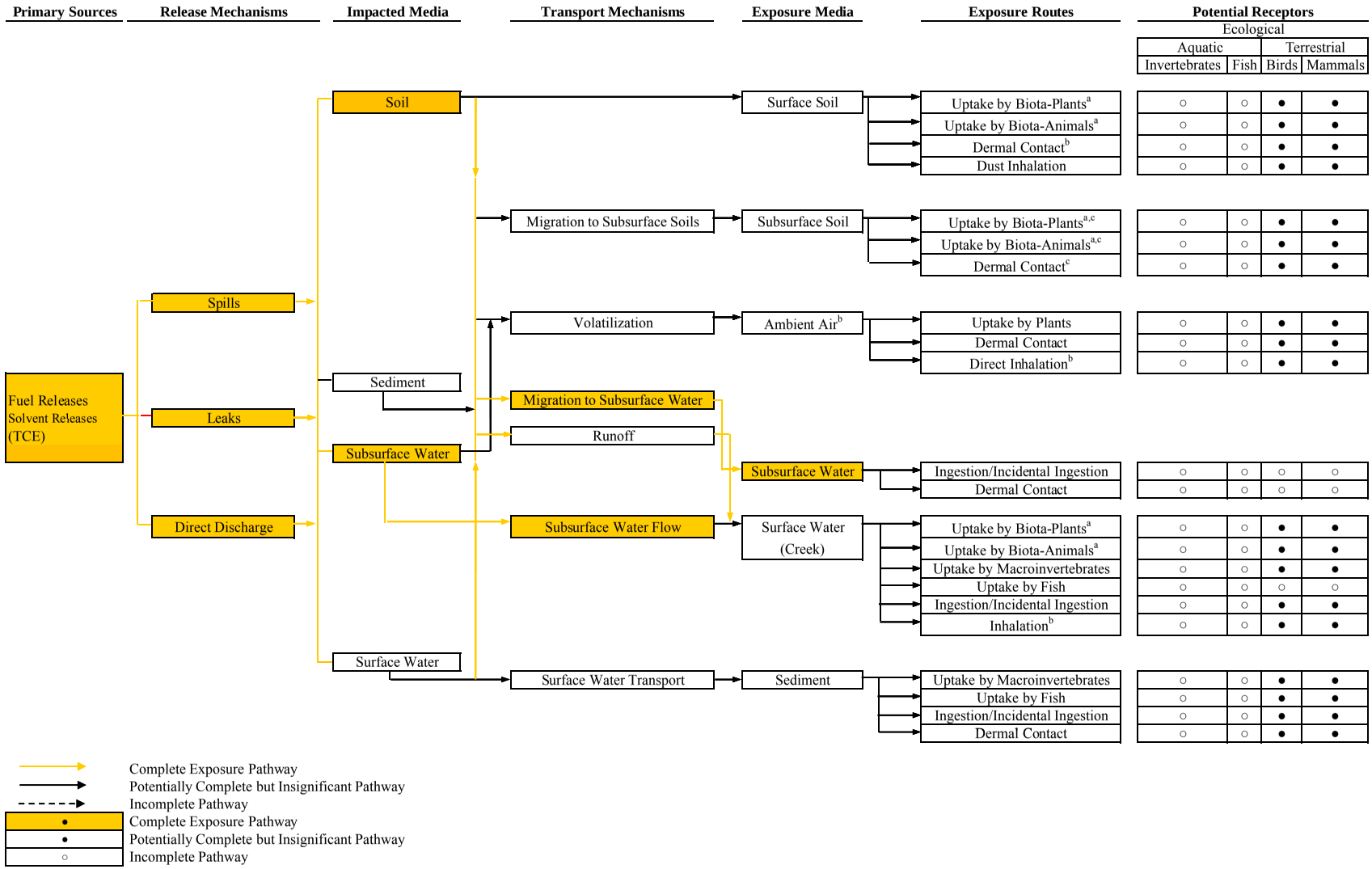
[a] Ambient Air includes both Indoor Air and Outdoor Air

[b] This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

[c] This refers to consumable plants or animals. Subsistence plant collection or subsistence hunting does not currently occur at Site OT048 and is not anticipated in the future given the restricted access to the site.

[d] Direct Contact means exposure through both incidental ingestion and through dermal absorption of the contaminant.

Figure 2-7 Ecological Conceptual Site Model for Site OT048



Notes:

[a] This refers to forage or prey items for the indicated receptor.

[b] This pathway is considered potentially complete but insignificant due to (1) being covered by snow much of the year, and (2) precipitation and cold temperatures minimize volatilization.

[c] Ecological receptors are not likely to come into contact with subsurface water therefore this pathway is considered potentially complete but insignificant.

2.7.2 Ground and Surface Water Uses

The groundwater resources beneath and in the vicinity of ERP Site OT048 are described in Section 2.5.3. Currently, groundwater from the shallow aquifer is being used as the water supply for Eareckson AS. Eareckson AS currently employs a water treatment system to reduce the TCE concentration in the water to meet State of Alaska regulations for a Class "C" Public Water System prior to the water being used as drinking water and for other purposes.

The surface water resources in the vicinity of OT048 are described in Section 2.5.4. There is no evidence of surface water contamination associated with the site addressed in this ROD. Surface water is used for aquatic life and wildlife propagation. The surface water is not currently being used for water supply purposes, and there are no plans to develop surface water as a drinking water source. However, all surface water that has not been otherwise classified is considered a potential water supply source by the State of Alaska (per 18 AAC 70).

2.8 Summary of Site Risks

Risk at ERP Site OT048 was evaluated as part of the RI/FS (USAF, 1995; 1996a, b, c). However, since that time, ADEC regulations and risk assessment guidance have changed and additional sampling has occurred at the site. Therefore, an updated screening-level risk assessment was performed in 2002 and is included as Appendix A. The Tier I cumulative risk screening was conducted on chemicals of potential concern or chemicals of potential ecological concern identified in soil, groundwater, fresh surface water, and fresh sediment. The results are summarized below.

2.8.1 Summary of the Human Health Risk Assessment

The human health risk evaluations did not find unacceptable risk associated with chemicals of potential concern present at ERP Site OT048.

2.8.1.1 Surface Soils

The screening level cancer risk estimate for direct exposures to surface soils slightly exceeded the screening risk criterion. However, the excess risk was entirely due to arsenic, present at a maximum concentration approximately three times the mean 1995 RI/FS background level derived for Shemya Island (USAF, 1995). Arsenic is a naturally occurring metal and the high values are likely due to natural variations in concentrations. Additionally, there are no known or likely anthropogenic sources of arsenic at OT048.

The maximum concentration of zinc in surface soil was approximately three times the mean background level for zinc. Zinc is a naturally occurring metal and the high values are likely due to natural variations in concentrations. Additionally, there are no known or likely anthropogenic sources of zinc at the site. Zinc is an essential nutrient for humans and is only toxic at very high dietary levels.

Maximum concentrations of arsenic, chromium, and methylene chloride in surface soils exceeded the ADEC Table B1 Soil Cleanup Levels for the Migration-to-Groundwater Pathway, suggesting a potential for impacts to groundwater. However, the maximum U.S. Geological Survey (USGS) arsenic concentration in soil only slightly exceeded the mean background level for Shemya Island (USGS, 1988), and is approximately equal to the geometric mean concentration of arsenic in Alaska soils. The maximum chromium concentrations are well below the geometric mean concentration for chromium in Alaska soils (USGS, 1988). Methylene chloride detections are believed to represent laboratory contamination because the compound was also detected in laboratory blanks. Therefore, these metals and methylene chloride are not COCs.

2.8.1.2 Subsurface Soils

The screening level cancer risk estimate for direct exposures to subsurface soils was below the screening criterion, while the total screening level noncancer hazard estimate slightly exceeded the screening criterion. Exceedence of the hazard criterion was due primarily to the maximum concentrations of aluminum, antimony, thallium, and vanadium present. However, these noncarcinogenic chemicals affect different target organs; the highest target organ-specific Hazard Index was calculated for antimony and thallium and is below the acceptable screening criterion. Therefore, direct exposures to subsurface soils are not anticipated to result in impacts to human health.

2.8.1.3 Groundwater

Screening results for groundwater suggest the potential for impacts to human health from the use of ERP Site OT048 groundwater as a potable water supply. However, the excess cancer risk estimate was entirely attributable to the maximum concentration of TCE measured in 1995. Sampling indicates that TCE concentrations in OT048 groundwater have been steadily declining. The cancer risk estimate based on data obtained from the 2000 Basewide Monitoring Program is 9.4×10^{-6}, which is below the screening risk criterion.

A cumulative noncancer hazard estimate of 7.7 was entirely attributable to low concentrations of metals, particularly antimony. However, there is also no known or likely anthropogenic source of antimony at ERP Site OT048. Antimony is most commonly used in flame retardants (primarily in plastics), batteries (alloyed with lead), and is also used to a much lesser extent in ceramic pigments and other lead alloys (munitions). None of these materials were manufactured or disposed of at OT048. Therefore, it is most likely naturally occurring.

2.8.1.4 Fresh Surface Water and Sediment

Only field screening data were available for fresh surface water in the vicinity of ERP Site OT048. Hence, Tier I screening was not performed for this medium. However, non-detect results for chemicals in fresh sediment suggest that potential impacts of OT048 on fresh surface water is not occurring.

2.8.2 Summary of the Ecological Risk Assessment

The ecological risk evaluations did not find unacceptable ecological risk associated with chemicals present at ERP Site OT048, as discussed below.

2.8.2.1 Surface Soils

The ecological hazard estimate for surface soils slightly exceeded the screening criterion, due to aluminum and zinc. The maximum concentration of aluminum (21,300 mg/Kg) was only about two times the 1995 RI/FS background level derived for Shemya Island (USAF, 1995). However, the USGS established a statewide average aluminum concentration in surficial material of 62,000 mg/Kg (USGS, 1988). Aluminum is a naturally occurring metal, the third most common element in the earth's crust, and the higher values are likely due to variations in natural concentrations. Additionally, there are currently no known or likely anthropogenic sources of aluminum at OT048. Therefore, aluminum concentrations present are not considered contamination requiring remedial action.

The maximum concentration of zinc in surface soil (94.3 mg/Kg) was approximately three times the derived mean 1995 RI/FS background level for zinc on Shemya Island (USAF, 1995). However, the USGS found zinc concentrations in surficial material across the state ranging from less than 20 mg/Kg to 2700 mg/Kg, with an average of 70 mg/Kg (USGS, 1988). There are currently no known or likely anthropogenic sources of zinc at the site and since zinc is a naturally occurring metal, the higher values are likely due to variations in natural concentrations. Therefore, zinc concentrations present are not considered contamination requiring remedial action.

2.8.2.2 Subsurface Soils

The ecological hazard estimate for subsurface soils exceeded the screening criterion, due to the presence of aluminum, antimony, cadmium, and zinc. However, maximum concentrations of aluminum and zinc (41,900 and 86.3 mg/Kg, respectively) were only about two times their derived background levels for Shemya Island (USAF, 1995). The aluminum and zinc concentrations are within statewide ranges and close to the statewide averages established by the USGS (USGS, 1988). Therefore, the higher values are likely due to variations in natural concentrations.

Maximum concentrations of antimony and cadmium in subsurface soils also exceeded the derived 1995 RI/FS background levels for Shemya Island (USAF, 1995). However, there is also no known or likely anthropogenic source of antimony or cadmium at ERP Site OT048. Antimony is most commonly used in flame retardants (primarily in plastics), batteries (alloyed with lead), and is also used to a much lesser extent in ceramic pigments and other lead alloys (munitions). None of these materials were manufactured or disposed of at OT048. Cadmium is primarily used in batteries (nickel-cadmium), can be found in pigments (primarily in plastics), and is also used for plating. Again, none of these materials were manufactured or disposed of at OT048. Cadmium can also enter the soil through the use of phosphate fertilizers and both metals can be released to the environment through the incineration of coal or refuse, which did not

occur at or near OT048. Based on this, it does not appear that a historical discharge of antimony or cadmium occurred at OT048 and that the reported concentrations are due to natural variations or laboratory error.

Although not contributing significantly to the ecological hazard estimate, the maximum concentration of arsenic in subsurface soil at OT048 only slightly exceeded the mean background level derived for Shemya Island; however, it is lower than the average concentration of arsenic in Alaska soils (USGS, 1988). Likewise, the maximum chromium concentration exceeded the mean background level derived for Shemya Island, but was less than the average concentrations found for Alaska soils by the USGS. Additionally, both metals are also naturally occurring and the higher values are likely due to natural variations in concentrations.

Based on these results, it does not appear that aluminum, antimony, arsenic, cadmium, chromium, or zinc were discharged to the environment at OT048 and are not considered contaminants requiring remedial action.

2.8.2.3 Fresh Surface Water and Sediment

Only field screening data were available for fresh surface water in the vicinity of ERP Site OT048. Hence, Tier I screening was not performed for this medium. However, non-detect results for chemicals in fresh sediment suggest that potential impacts of OT048 on fresh surface water is not occurring.

2.8.3 Petroleum Hydrocarbon Screening

Consistent with ADEC-approved guidance (USAF, 2001b), petroleum hydrocarbons were not included in the cumulative screening estimates described above. Soil sampling results suggest that low levels of petroleum hydrocarbons might be present in OT048 soils. However, maximum concentrations of hydrocarbons were below ADEC 18 AAC 75.341 Table B2 Soil Cleanup Levels. Maximum concentrations of GRO, DRO, and RRO in groundwater were below ADEC 18 AAC 75.345 Table C Groundwater Cleanup Levels. Similarly, maximum concentrations of GRO and DRO in marine sediment and surface water were below ADEC Table A2 Soil and Table C Groundwater Cleanup Levels.

These results suggest that the low concentrations of petroleum hydrocarbons present in media at ERP Site OT048 do not pose a significant risk to human health or the environment.

2.8.4 Basis for Action

The cumulative risk analysis showed no unacceptable risk to human health or the environment (using conservative default assumptions). However, groundwater sampling conducted in 2008 at Monitoring Well WGW7 indicated TCE levels remain above ADEC Groundwater Cleanup Levels. Therefore the actions (ICs with MNA) selected in this ROD will be implemented to ensure protection of human health and the environment and to meet ADEC groundwater cleanup levels.

2.9 Remedial Action Objectives

The overall objectives of the Eareckson AS ERP 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.

To determine whether site conditions are protective of human health and the environment, site sample results were compared with risk-based levels established in state regulations. For the site discussed in this ROD, the following Remedial Action Objectives (**Table 2-4**) were established:

- Restricting access to groundwater at ERP Site OT048 to ensure that groundwater use is consistent with exposure assumptions in the risk assessment.
- Monitoring the groundwater at OT048 a minimum of every 2 years until the TCE contamination falls below the ADEC's Groundwater Cleanup Level of 0.005 mg/L for two consecutive monitoring periods or years, whichever is longer.

Table 2-4
Remedial Action Objective for OT048

Exposure Pathway	Analyte	Cleanup Level[1]
Groundwater	Trichloroethylene (TCE)	0.005 mg/L

Key:
1 – Groundwater cleanup level for TCE established by the State of Alaska and referenced from Alaska Department of Environmental Conservation regulations at 18 Alaska Administrative Code 75.345, Table C – Groundwater Cleanup Levels
mg/L – milligrams per liter

The applicable state regulations for soil, groundwater, surface water, and sediment samples are discussed in Section 2.6.2.1 of this ROD.

2.10 Description of Alternatives

The remedial actions at ERP Site OT048 comply with applicable regulatory requirements and meet the remedial action objectives for the site. An updated risk assessment was prepared for OT048 in 2002 that indicated there was no unacceptable cumulative risk to human health or the environment. Additionally; groundwater monitoring samples collected at OT048 demonstrate a general decrease in TCE concentrations at the site (see Figure 2-5). Therefore, a separate Feasibility Study comparing various remedial alternatives was not prepared.

The following remedial alternatives were evaluated:

No Action. This response consists of leaving OT048 in its current condition with no further investigation or remedial action. The No Action option provides a baseline from which to judge the other technologies against the nine CERCLA criteria. Pursuant to 40 CFR 300.403.(e)(6) of the revised NCP (8 March 1990) and the EPA's guidance for conducting a RI/FS (USEPA, 1988), a "no-action" option must be developed and examined as a potential remedial action for all sites.

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 not allowing anyone to install a drinking water well 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.

ICs with Monitored Natural Attenuation (MNA). 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. Since contaminant concentrations take time to be reduced by natural attenuation, ICs are implemented in the interim.

2.11 Summary of Comparative Analysis of Alternatives

In accordance with the NCP, the alternatives for OT048 were evaluated using the nine criteria described in Section 121(b) of CERCLA and the NCP §300.430(f)(5)(i). These criteria are classified as threshold criteria, balancing criteria, and modifying criteria.

Threshold criteria are standards that an alternative must meet to be eligible for selection as a remedial action. There is little flexibility in meeting the threshold criteria—the alternative must meet them or it is unacceptable. The following are classified as threshold criteria:

- Overall protection of human health and the environment.
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

Balancing criteria weigh the tradeoffs between alternatives. These criteria represent the standards upon which the detailed evaluation and comparative analysis of alternatives are based. In general, a high rating on one criterion can offset a low rating on another balancing criterion. Five of the nine criteria are considered balancing criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, and volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying criteria are as follows:

- Community acceptance
- State/support agency acceptance

The following contains a summary of the evaluation of groundwater alternatives against the nine criteria. A brief explanation of each of the criteria is provided and is followed by the ranking of each of the alternatives against those criteria.

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

The No Action alternative does not provide protection of human health and the environment. No monitoring would be performed at the facility to assess site conditions over time.

The remaining alternatives fully protect human health and the environment by restricting access to the contamination. ICs would be established to prevent excavation or use of the groundwater for purposes other than treated drinking water.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance. State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or other limitations promulgated under federal or state environmental or facility siting laws that , while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal Requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements.

The No Action alternative does not meet ARARs. TCE concentrations in the groundwater exceed chemical-specific ARARs.

The remaining alternatives fully meet ARARs.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection. This criterion includes the consideration of the residual risk that will remain onsite after remediation and the reliability and adequacy of controls.

The No Action alternative does not provide long term effectiveness and permanence since the groundwater could be used for purposes that may cause unacceptable risks.

The remaining alternatives do provide long term effectiveness and permanence by preventing uncontrolled access to the TCE in the groundwater

Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

The No Action alternative does not reduce toxicity, mobility, or volume through treatment since it does not treat the contaminants.

ICs reduce the potential to spread contaminants by human activity but do not reduce toxicity or volume through treatment. MNA reduces volume and toxicity by relying on processes other than "treatment."

Short Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

The No Action alternative has good short term effectiveness since no work is performed and therefore, there are no risks to workers.

ICs and ICs with MNA both have good short term effectiveness. These can be implemented quickly and risk to workers is minimal.

Implementability

Implementability addresses the technical and administrative aspects of a remedy throughout design, construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

The No Action alternative is easily implemented since no action is performed.

Both ICs and ICs with MNA are easily implemented.

Cost

Cost includes capital expenditures, labor, and materials and supplies as well as future operation and maintenance costs where applicable. All costs are listed as present worth costs.

Estimated costs for the alternatives are shown in **Table 2-5**.

Table 2-5
Features of ERP Site OT048 Remedial Actions

Evaluation Criteria	No Action	ICs	ICs with MNA
Protective of Human Health and the Environment	No	Yes	Yes
Compliant with Applicable or Relevant and Appropriate Requirements	No	Yes	Yes
Long-term Effectiveness and Permanence	No	Yes	Yes
Reduction of Toxicity, Mobility, and Volume Through Treatment	No	No	No
Short-term Effectiveness	Yes	Yes	Yes
Implementability	Yes	Easy	Easy
Cost	$0	$0.3M	$0.8M
State Acceptance	No	No	Yes
Community Acceptance	No	Yes	Yes

Key:
ERP – Environmental Restoration Program
IC – Institutional Control
M – million
MNA – Monitored Natural Attenuation

State Acceptance

State Acceptance reflects the statutory requirement to provide for substantial and meaningful State involvement. It should address whether the alternative is acceptable to the state (ADEC).

Since TCE remains in the groundwater above the ADEC Groundwater cleanup level the No Action alternative does not have state acceptance.

Although ICs alone prevent uncontrolled access to groundwater contaminated with TCE, the state requires monitoring of the contaminant levels and ICs alone do not have state acceptance. ICs in conjunction with MNA is acceptable to the state.

Community Acceptance

The Community Acceptance criterion reflects the community's preferences for, or concerns about, the remedial alternatives. It should address whether the alternative is acceptable to the community members.

Since TCE remains in the groundwater above the ADEC Groundwater cleanup level the No Action alternative does not have community acceptance.

Both ICs and ICs with MNA are acceptable to the community.

A summary of the features of the selected remedial action at OT048 is provided in Table 2-5.

2.12 Principal Threat Wastes

The NCP states that treatment that reduces the toxicity, mobility, or volume of the principal threat wastes will be used to the extent practicable. The principal threat concept refers to the source materials considered to be highly toxic or highly mobile that generally cannot be reliably controlled in place, or that present a significant risk to human health or the environment should exposure occur. A 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 Site OT048.

2.13 Selected Remedy

The selected remedy at ERP Site OT048 is ICs with MNA. ICs are implemented to ensure that exposure to the contaminant does not occur while natural processes attenuate contaminant concentration. ICs and MNA are easily implemented and the most cost-effective remedies that are compliant with ARARs and protective of human health and the environment. The selected remedies are considered to best meet the site Remedial Action Objectives for OT048.

2.13.1 Summary of the Rationale for the Selected Remedy

The USAF and ADEC believe that the selected remedy at ERP Site OT048 meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives, with respect to the following balancing and modifying criteria:

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

- Modifying criteria
  - State agency acceptance
  - Community acceptance

2.13.2 Description of the Selected Remedy

The USAF will implement, monitor, maintain, and enforce the ICs identified below in accordance with State of Alaska regulations at 18 AAC 75.375. The 611th Civil Engineer Squadron will be the point of contact for ICs. The ICs for ERP Site OT048 consist of:

- The Eareckson AS Base General Plan (Plan) will be updated to show the boundaries of OT048 to restrict access to groundwater. The Plan will contain a map indicating the site location, with restrictions on any invasive activities. Dig permits issued by the Base Operating Contractor are required for any excavation at Eareckson AS. The objective of the ICs are to prevent access or use of the Groundwater contaminated with TCE above ADEC cleanup levels. Prior to approving a permit, the Plan will be reviewed to ensure that invasive activities are not taking place within the boundary of the site that could potentially compromise natural processes that lead to attenuation of the contaminant concentration in the groundwater.
- This remedy has been selected under state law and the USAF will obtain concurrence from ADEC prior to terminating the ICs, modifying current land use, or allowing 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 TCE concentration in the groundwater is determined to be less than the ADEC Groundwater Cleanup Level of 0.005 mg/L for three consecutive monitoring periods or years, whichever is longer.
- The USAF will ensure, as appropriate, that any contractor, tenant, or other authorized occupant of land subject to LUCs is informed of the LUCs and is made subject to the requirements of such LUCs.

In addition to ICs, MNA will be implemented at the site. MNA will consist of groundwater monitoring at least once every 3 years by collecting groundwater samples from a site monitoring well and analyzing for TCE concentration. A monitoring report, including an evaluation of ICs will be provided to ADEC following each monitoring event. Groundwater monitoring can be discontinued with ADEC concurrence after contaminant concentration falls below the ADEC Groundwater Cleanup Level of 0.005 mg/L for three consecutive monitoring events or years, whichever is longer.

2.13.3 Summary of Estimated Remedy Costs

The estimated cost for implementing ICs with MNA at ERP Site OT048 is provided in Table 2-5.

2.13.4 Expected Outcomes of Selected Remedy

The expected outcome of the selected remedy for ERP Site OT048 is short-term management of groundwater, while natural processes attenuate contaminant concentrations to acceptable levels.

2.14 Statutory Determinations

Under CERCLA Section 121 (as required by NCP Section 300.430(f)(5)(ii)), the lead agency (USAF) must select a remedy that is protective of human health and the environment, complies with ARARs, is cost-effective, and uses permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes: 1) a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element; and 2) a bias against off-site disposal of untreated wastes.

The sections below provide a brief, site-specific description of how the Selected Remedy satisfies the statutory requirements of CERCLA Section 121 (as required by NCP Section 300.430(f)(5)(ii)) and explains the five-year review requirements.

2.14.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by reducing the contaminant concentrations to the cleanup levels through natural attenuation. In the interim period until these levels are attained, ICs will be implemented to prevent uncontrolled use of the groundwater at Site OT048.

Groundwater monitoring and 5 year reviews will be performed to track the attenuation of groundwater contaminants over time. Once the groundwater cleanup level has been attained, the ICs will be removed.

2.14.2 Compliance with ARARs

The TCE cleanup level for groundwater was established by the State of Alaska regulation 18 AAC 75.345. The selected groundwater remedy will result in groundwater contaminant reduction to attain the cleanup level. The selected remedy will meet State of Alaska groundwater cleanup regulations over time. Until the state groundwater cleanup level is attained, ICs will be implemented to ensure groundwater is not used for unintended purposes.

2.14.3 Cost Effectiveness

In the lead agency's judgment, the selected groundwater remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." This was accomplished by evaluation of the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR compliant). Overall effectiveness was evaluated by assessing three of

the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility and volume through treatment; and short term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the selected remedy was determined to be proportional to their cost and hence this alternative represents a reasonable value for the money to be spent.

2.14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practical

The lead agency has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, it has been determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal.

Although the selected remedy does not utilize alternative treatment technologies, the concentration of contaminants will be reduced over time through natural processes. Given that the contaminant of concern, TCE, is easily removed from groundwater extracted for use as drinking water, that there are no other receptors, and the effectiveness of ICs, it is not practical to implement more costly and complicated treatment technologies in this remote area.

2.14.5 Preference for Treatment as a Principal Element

The selected remedy reduces the concentrations of contaminants through natural attenuation and long term monitoring to ensure attenuation is occurring. Although natural attenuation results in the slow degradation of organic contaminants, it is not considered treatment. Active groundwater treatment is significantly more costly and difficult to implement than the selected remedy and does not provide any greater level of protection to human health or the environment. Due to lack of unprotected receptors, natural attenuation is considered protective and the best remedy for ERP Site OT048 groundwater.

2.14.6 Five Year Review Requirements

Groundwater contaminants which exceed cleanup standards will be left to naturally attenuate. Because this remedy will result in contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review under 42 USC 9621(c) will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

2.15 Documentation of Significant Changes

A Proposed Plan for ERP Site OT048 was developed by the USAF in 2002. Under the Proposed Plan, the USAF selected "No Action" as the preferred remedial alternative for the site because TCE concentrations in the groundwater at that time were below the ADEC Cleanup Level. However, more recent sampling results indicate that TCE concentrations in the groundwater are

variable and can still range above the ADEC Groundwater Cleanup Level. Based on existing TCE concentrations in the groundwater, the USAF is modifying the Preferred Remedial Action for OT048 from "No Action" to implementing "ICs with MNA."

Although TCE concentrations in the groundwater are generally declining and do not pose an unacceptable risk to human health or the environment, the groundwater TCE concentrations at times are above the ADEC Groundwater Cleanup Level. Therefore, the USAF is implementing ICs with MNA at OT048 as the Preferred Remedial Alternative. A comparison of the Preferred Remedial Alternative presented by the USAF Proposed Plan prepared in March 2002 and the modified Preferred Remedial Alternative provided in this ROD for ERP Site OT048 is provided below.

Preferred Remedial Alternative (Proposed Plan, March 2002)	**Preferred Remedial Alternative (Record of Decision, February 2010)**
• No Action	• ICs with MNA MNA will be performed until TCE concentrations are below the ADEC Groundwater Cleanup Levels for three consecutive sampling periods or years, whichever is longer.

3.0 Responsiveness Summary

This section provides a summary of the public comments regarding the Proposed Plan for remedial action at ERP Site OT048, Eareckson AS. At the time of the public review period, the USAF had selected No Further Action for OT048 as the preferred alternative for this ERP site.

No comments were received on the Proposed Plan; therefore, the USAF's Proposed Plan was accepted by the public.

3.1 Stakeholder Comments and Lead Agency Responses

Not Applicable – no comments were received.

3.2 Technical and Legal Issues

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

4.0 References

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APPENDIX A

IRP SITE OT048 (WATER GALLERY)
HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

APPENDIX A

IRP SITE OT048 (WATER GALLERY)

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

1.0 INTRODUCTION

A screening-level risk assessment was conducted for the United States Air Force (Air Force) Installation Restoration Program (IRP) Site OT048 (Water Gallery) to evaluate potential human health and ecological risks associated with chemicals identified at the site. This human health and ecological risk assessment was conducted using highly protective methods and assumptions, in accordance with Alaska regulations (e.g., 18 Alaska Administrative Code [AAC] 75) and the Alaska Department of Environmental Conservation's (ADEC) *Risk Assessment Procedures Manual* (ADEC, 2000b). The screening risk assessment is designed to err on the conservative (i.e., health protective) side, and the resulting risk estimates tend to be overestimated.

Human health and ecological risk assessments were previously prepared for IRP Site OT048, as documented in the *Eareckson Air Station Remedial Investigation/Feasibility Study* (USAF, 1996) and *Eareckson Air Station Basewide Monitoring Report* (USAF, 1999). The Air Force is updating the risk assessments in response to comments received from ADEC on the draft Decision Document for Site OT048 (ADEC, 2000a), and to provide consistency with current Alaska regulations (e.g., 18 AAC 75) and risk assessment methods described in ADEC's *Risk Assessment Procedures Manual* (ADEC, 2000b). The results of the updated screening risk assessment are presented below.

2.0 METHODS

The specific methods and assumptions used in the revised Tier I screening risk assessment for OT048 are described in the *Technical Memorandum – Risk Assessment Assumptions for Decision Documents, Final* (USAF, 2001), hereafter referred to as the Risk Assessment Assumptions Technical Memorandum (RAATM). Briefly, analytes detected in sampled media were compared to one-tenth the ADEC Method Two Criteria, and/or appropriate ecological screening criteria, consistent with procedures described in the RAATM. Analytes detected at concentrations in excess of one-tenth the ADEC Method Two Criteria, and/or appropriate ecological screening criteria, were retained as chemicals of potential concern (COPCs) or chemicals of potential ecological concern (COPECs), respectively. Carcinogenic COPCs were included in Tier I cumulative cancer risk screening and compared to an acceptable risk criterion of 1.0×10^{-5}. Noncarcinogenic COPCs were included in an evaluation of cumulative noncancer hazard and compared to an acceptable hazard index (HI) of 1.0. Where ecological habitats and exposure pathways are present, COPECs were identified and included in an estimate of the total ecological HI. The Tier I ecological HI was compared to a screening HI criterion of 1.0.

3.0 RESULTS

A revised Tier I screening risk assessment was completed for OT048 based on the sampling investigation results described in Section 2 of the Record of Decision. Consistent with ADEC's *Guidance on Calculating Cumulative Risk* (ADEC, 2001), petroleum hydrocarbons were excluded from the calculation of Tier I cumulative cancer risk and noncancer hazard estimates. Tier I cumulative risk estimates for analytes other than petroleum hydrocarbons are summarized in Section 3.1, and screening results for petroleum hydrocarbons are presented in Section 3.2.

3.1 Tier I Cumulative Risk Estimates

Tier I cumulative risk screening was conducted on COPCs or COPECs identified in soil, groundwater, fresh surface water, and fresh sediment. Summary results of the Tier I risk assessment for OT048 are presented in Table A-1. The COPC selection process for analytes detected in each medium sampled at OT048 is presented in Tables A-2 and A-3 (surface soil), A-4 and A-5 (subsurface soil), and A-6 and A-7 (groundwater). The COPEC selection process for analytes detected in each medium sampled at OT048 is presented in Tables A-8 (surface soil), and A-9 (subsurface soil). Cumulative risk screening for identified COPCs and COPECs is presented in Tables A-10 through A-17.

3.1.1 Surface Soils

The screening level cancer risk estimate for direct exposures to surface soils slightly exceeded the screening risk criterion. However, the excess risk was entirely due to arsenic, present at a maximum concentration approximately three times its mean background level. The ecological hazard estimate for surface soils slightly exceeded the screening criterion, due to aluminum and zinc. However, the maximum concentration of aluminum was only about two times its background level. The maximum concentration of zinc in surface soil was approximately three times the mean background level for zinc. Zinc is an essential nutrient for both human and non-human receptors, and is only toxic at very high dietary levels. Therefore, zinc concentrations present are not anticipated to impact human health or the environment.

Maximum concentrations of arsenic, chromium, and methylene chloride in surface soils exceeded the ADEC Table B1 Soil Cleanup Levels for the Migration-to-Groundwater Pathway, suggesting a potential for impacts to groundwater. However, the maximum arsenic concentration in soil only slightly exceeded the mean background level for Shemya Island, and is approximately equal to the geometric mean concentration of arsenic in Alaska soils. This is 6.7 milligrams per kilogram (mg/Kg), as reported in *Element Concentrations in Soil and Other Surficial Materials of Alaska* (USGS, 1988). Methylene chloride detections are believed to represent laboratory contamination.

Based on these results, impacts of surface soil on human health or the environment are not anticipated.

3.1.2 Subsurface Soils

The screening level cancer risk estimate for direct exposures to subsurface soils was below the screening criterion, while the total screening level noncancer hazard estimate slightly exceeded the screening criterion. Exceedence of the hazard criterion was due primarily to the maximum concentrations of aluminum, antimony, thallium, and vanadium present. However, these noncarcinogenic chemicals affect different target organs; the highest target organ-specific HI was calculated for antimony and thallium and is below the acceptable screening criterion. Therefore, direct exposures to subsurface soils are not anticipated to result in impacts to human health.

The ecological hazard estimate for subsurface soils slightly exceeded the screening criterion, due to the presence of aluminum, antimony, cadmium, and zinc. However, maximum concentrations of aluminum and zinc were only about two times their background levels, and there are no known sources of antimony or cadmium at Site OT048. Maximum concentrations of antimony, arsenic, and chromium in subsurface soils also exceeded the ADEC Table B1 Soil Cleanup Levels for the Migration-to-Groundwater Pathway, suggesting the potential for impacts to groundwater. There is no known source of antimony at Site OT048. The maximum concentration of arsenic in subsurface soil only slightly exceeded the mean background level for Shemya Island, and is lower than the geometric mean concentration of arsenic in Alaska soils (i.e., 6.7 mg/Kg), as reported in *Element Concentrations in Soil and Other Surficial Materials of Alaska* (USGS, 1988). The maximum concentration of chromium was less than two times its mean background level.

Based on these results, impacts of subsurface soil on human health or the environment are not anticipated.

3.1.3 Groundwater

Screening results for groundwater suggest the *potential* for impacts to human health from the use of IRP Site OT048 groundwater as a potable water supply. However, the excess cancer risk estimate was entirely attributable to the maximum concentration of trichloroethylene (TCE) measured in 1995. Recent sampling indicates that TCE concentrations in Site OT048 groundwater have declined. The cancer risk estimate based on data obtained from the 2000 Basewide Monitoring Program is 9.4×10^{-6}, which is below the screening risk criterion.

A slight excess noncancer hazard estimate was entirely attributable to low concentrations of metals, particularly antimony. However, there is no known source of antimony at Site OT048. Furthermore, dissolved metals concentrations in groundwater, and associated hazards, are believed overestimated because groundwater samples were not filtered prior to analysis. This assumption will be further validated through future groundwater monitoring based on the analysis of filtered samples.

3.1.4 Fresh Surface Water and Sediment

Only field screening data were available for fresh surface water in the vicinity of the site. Hence, Tier I screening was not performed for this medium. However, non-detect results for chemicals in fresh sediment suggest that potential impacts of Site OT048 on fresh surface water is not occurring.

3.2 Petroleum Hydrocarbon Screening

Consistent with ADEC Guidance (ADEC, 2001), petroleum hydrocarbons were not included in the cumulative screening estimates described above. A summary of screening results for petroleum hydrocarbons at OT048 is presented in Table A-18.

Soil sampling results suggest that low levels of petroleum hydrocarbons might be present in site soils. However, maximum concentrations of hydrocarbons (as measured by United States Environmental Protection Agency [EPA] Method E418.1, which detects both petroleum-derived and natural hydrocarbons) were below ADEC Table B2 Soil Cleanup Levels. Maximum concentrations of gasoline range organics (GRO), diesel range organics (DRO), and residual range organics (as measured by Alaska Methods [AK]101, AK102, and AK103, respectively) in groundwater were below ADEC Table C Groundwater Cleanup Levels. Similarly, maximum concentrations of GRO and DRO (as measured by EPA Solid Waste Methods [SW]8015 and SW8100, respectively) in marine sediment and surface water were below ADEC Table B Soil and Table C Groundwater Cleanup Levels.

These results suggest that the low concentrations of petroleum hydrocarbons present in media at Site OT048 do not pose a significant risk to human health or the environment.

4.0 REFERENCES

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TABLE A-1
SUMMARY OF TIER I CUMULATIVE RISK SCREENING RESULTS FOR SITE OT48
EARECKSON AS, ALASKA

	Human Health Tier I Risk Screening Results					Ecological Tier I Risk Screening Results			
Media	**Cancer Risk[a]**	**HI[b]**	**Risk Drivers[c]**	**Maximum Concentration (mg/kg, mg/L)**	**Background Concentration (mg/kg, mg/L)**	**Ecological HI[d]**	**Risk Drivers[e]**	**Maximum Concentration (mg/kg, mg/L)**	**Background Concentration (mg/kg, mg/L)**
Surface Soil	**1.2 x 10^{-5}**	0.62	**Arsenic** [f]	6.8	2.02	**4.1**	**Aluminum** [g]	21,300	10,678
							Zinc [g]	94.3	30.98
Migration to GW Pathway	na	na	**Arsenic** [h]	6.8	2.02	na	na	na	na
			Chromium [h]	38.7	7.04				
			Methylene chloride [h]	0.017	na				
Subsurface Soil	7.5 x 10^{-6}	0.79	Antimony [i]	24.8	nd	**7.8**	**Aluminum** [j]	41,900	19,114
			Thallium [i]	1.3	na		**Antimony** [j]	24.8	nd
							Cadmium [j]	2.2	0.119
							Zinc [j]	86.3	39.1
Migration to GW Pathway	na	na	**Antimony** [k]	24.8	nd	na	na	na	na
			Arsenic [k]	4.1	2.26				
			Chromium [k]	30.6	16.3				
Fresh Groundwater	**4.8 x 10^{-5}**	**7.7**	**Antimony** [l]	0.0311	nd	na	na	na	na
	(9.4 x 10^{-6})		Cadmium	0.0027	0.0009				
			Chromium	0.0534	0.0162				
			Thallium	0.0016	nd				
			TCE [m]	0.0249	na				
Fresh Sediment	na	na	na	na	na	nd	nd	nd	na

TABLE A-1
SUMMARY OF TIER I CUMULATIVE RISK SCREENING RESULTS FOR SITE OT48
EARECKSON AS, ALASKA

Notes:

[a] Cumulative Tier I cancer risk; includes ingestion and inhalation pathways for chemicals of potential concern (COPCs).

[b] Cumulative Tier I hazard index; includes ingestion and inhalation pathways for COPCs.

[c] Chemicals shown contribute to an exceedence of ADEC cumulative risk or hazard criteria. Bolding indicates the primary risk drivers.

[d] Cumulative Tier I ecological hazard index; calculated for the most protective receptor and exposure route for each chemical of potential ecological concern (COPEC).

[e] COPECs that exceed a chemical-specific HI equal to 1.0.

[f] Arsenic is responsible for 100% of the total cumulative cancer risk.

[g] Inorganics including aluminum and zinc are responsible for 92% of the total ecological HI.

[h] The indicated chemicals exceed the ADEC Table B1 Soil Cleanup Levels for Migration-to-Groundwater Pathway. Methylene chloride was observed in laboratory blanks and is believed to represent laboratory contamination.

[i] Antimony and thallium were responsible for the maximum target organ-specific noncancer HI of 0.79.

[j] Aluminum, antimony, cadmium, and zinc are responsible for 71% of the total ecological HI.

[k] The indicated chemicals exceed the ADEC Table B1 Soil Cleanup Levels for Migration-to-Groundwater Pathway.

[l] Antimony is responsible for 68% of the total cumulative noncancer HI. Groundwater samples were not filtered.

[m] The maximum historical concentration of TCE in fresh groundwater (0.0249) exceeded the Tier I screening risk criterion. However, the maximum TCE concentration was a screening result measured in 1992; the concentration of TCE measured during the 2000 Basewide Monitoring Program (0.0047 mg/L) was below the ADEC Method 2 Groundwater Cleanup Level.

% - Percent
ADEC - Alaska Department of Environmental Conservation
HI - Hazard index.
mg/kg - Milligrams per kilogram.
mg/L - Milligrams per liter.
na - Not applicable.
nd - Not detected.
ns - Not sampled.
TCE - trichloroethene

TABLE A - 2
SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR TIER I HUMAN HEALTH SCREENING - SURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Mean Background (mg/kg)	Benchmark Criteria[a] (mg/kg)	COPC? (Yes/No)
Inorganics								
Aluminum	21300	9830	4	4	100%	10678	10100	Yes
Arsenic	6.8	3.3	4	4	100%	2.0	0.55	Yes
Barium	37	24	4	4	100%	26	710	No
Beryllium	0.36	0.23	4	4	100%	2.2	0.19	No
Cadmium	1.5	1.5	1	1	100%	0.24	10	No
Chromium	39	15	4	4	100%	7.0	51	No
Cobalt	11	4.7	4	4	100%	9.4	203	No
Copper	26	20	4	4	100%	18	406	No
Lead	44	6.4	4	4	100%	5.9	40	Yes
Magnesium	10700	6430	4	4	100%	5078	na	No[b]
Manganese	349	187	4	4	100%	156	1420	No
Nickel	37	14	4	4	100%	16	203	No
Silver	0.58	0.58	1	1	100%	3.0	51	No
Vanadium	129	58	4	4	100%	43	71	Yes
Zinc	94	38	4	4	100%	31	3040	No
VOCs								
Methylene chloride	0.017	0.0080	3	3	100%	na	18	No
SVOCs								
4-Methylphenol	1.0	1.0	1	1	100%	na	na	Yes
bis(2-Ethylhexyl)phthalate	0.30	0.18	4	4	100%	na	59	No
PCBs (Total)	0.036	0.036	1	1	100%	na	1.0	No
Polynuclear Aromatic Hydrocarbons								
Fluoranthene	0.070	0.059	2	2	100%	na	406	No
Phenanthrene	0.060	0.060	1	1	100%	na	3000	No
Pyrene	0.16	0.16	1	1	100%	na	304	No

Notes:

[a]Benchmark Criteria is equal to one-tenth the ADEC Soil Benchmark Criteria, the EPA Soil Screening Levels, or Calculated Cleanup Levels.

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
ADEC - Alaska Department of Environmental Conservation
COPC - Chemical of potential concern.
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.
PCBs - Polychlorinated biphenyls.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

TABLE A - 3
SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR TIER I HUMAN HEALTH SCREENING - MIGRATION-TO-GROUNDWATER PATHWAY FOR SURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg)		Number of		Detection	Mean Background	Benchmark Criteria[a]	COPC?
	Maximum	Minimum	Samples	Detects	Frequency	(mg/kg)	(mg/kg)	(Yes/No)
Inorganics								
Aluminum	21300	9830	4	4	100%	10678	na	Yes
Arsenic	6.8	3.3	4	4	100%	2.0	0.20	Yes
Barium	37	24	4	4	100%	26	110	No
Beryllium	0.36	0.23	4	4	100%	2.2	4.2	No
Cadmium	1.5	1.5	1	1	100%	0.24	0.50	Yes
Chromium	39	15	4	4	100%	7.0	2.6	Yes
Cobalt	11	4.7	4	4	100%	9.4	44	No
Copper	26	20	4	4	100%	18	700	No
Lead	44	6.4	4	4	100%	5.9	na	Yes
Magnesium	10700	6430	4	4	100%	5078	na	No[b]
Manganese	349	187	4	4	100%	156	444	No
Nickel	37	14	4	4	100%	16	8.7	Yes
Silver	0.58	0.58	1	1	100%	3.0	2.1	No
Vanadium	129	58	4	4	100%	43	340	No
Zinc	94	38	4	4	100%	31	910	No
VOCs								
Methylene chloride	0.017	0.0080	3	3	100%	na	0.0015	Yes
SVOCs								
4-Methylphenol	1.0	1.0	1	1	100%	na	na	Yes
bis(2-Ethylhexyl)phthalate	0.30	0.18	4	4	100%	na	120	No
PCBs (Total)	0.036	0.036	1	1	100%	na	1.0	No
Polynuclear Aromatic Hydrocarbons								
Fluoranthene	0.070	0.059	2	2	100%	na	210	No
Phenanthrene	0.060	0.060	1	1	100%	na	430	No

Notes:

[a]Benchmark Criteria is equal to one-tenth the ADEC Soil Benchmark Criteria (Migration-to-Groundwater Pathway), EPA Soil Screening Levels, or Calculated Cleanup Levels.

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
ADEC - Alaska Department of Environmental Conservation
COPC - Chemical of potential concern.
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.
PCBs - Polychlorinated biphenyls.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

TABLE A - 4
SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR TIER I HUMAN HEALTH SCREENING - SUBSURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Mean Background (mg/kg)	Benchmark Criteria[a] (mg/kg)	COPC? (Yes/No)
Inorganics								
Aluminum	41900	9500	5	5	100%	19114	10100	Yes
Antimony	25	7.6	5	5	100%	ND	4.1	Yes
Arsenic	4.1	2.0	5	5	100%	2.3	0.55	Yes
Barium	61	19	5	5	100%	35	710	No
Beryllium	0.40	0.14	5	5	100%	ND	0.19	Yes
Cadmium	2.2	0.66	5	5	100%	0.12	10	No
Chromium	31	11	5	5	100%	16	51	No
Cobalt	9.1	5.2	5	5	100%	8.7	203	No
Copper	122	25	5	5	100%	77	406	No
Cyanide	2.0	0.61	5	5	100%	na	203	No
Lead	29	1.7	5	5	100%	2.3	40	No
Magnesium	11400	4340	5	5	100%	6299	na	No[b]
Manganese	379	147	5	5	100%	241	1420	No
Mercury	0.40	0.11	5	5	100%	na	1.8	No
Nickel	23	15	5	5	100%	80	203	No
Selenium	3.6	0.71	5	5	100%	27	51	No
Silver	1.3	0.42	5	5	100%	3.0	51	No
Thallium	1.3	0.39	5	5	100%	na	0.71	Yes
Vanadium	216	43	5	5	100%	67	71	Yes
Zinc	86	30	5	5	100%	39	3040	No
VOCs								
Methyl Ethyl Ketone	0.20	0.20	1	1	100%	na	6080	No
Acetone	0.92	0.92	1	1	100%	na	1010	No
Toluene	0.011	0.0030	4	4	100%	na	18	No

Notes:

[a]Benchmark Criteria is equal to one-tenth the ADEC Soil Benchmark Criteria, EPA Soil Screening Levels, or Calculated Cleanup Levels. Criteria for subsurface soil is derived from surface soil as they are considered to be the same matrix; there is no difference in regulatory criteria for surface soil and subsurface soil.

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
ADEC - Alaska Department of Environmental Conservation
COPC - Chemical of potential concern.
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.
VOCs - Volatile organic compounds.

TABLE A - 5
SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR TIER I HUMAN HEALTH SCREENING - MIGRATION-TO-GROUNDWATER PATHWAY FOR SUBSURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg)		Number of		Detection Frequency	Mean Background (mg/kg)	Benchmark Criteria[a] (mg/kg)	COPC? (Yes/No)
	Maximum	Minimum	Samples	Detects				
Inorganics								
Aluminum	41900	9500	5	5	100%	19114	na	Yes
Antimony	25	7.6	5	5	100%	ND	0.36	Yes
Arsenic	4.1	2.0	5	5	100%	2.3	0.20	Yes
Barium	61	19	5	5	100%	35	110	No
Beryllium	0.40	0.14	5	5	100%	ND	4.2	No
Cadmium	2.2	0.66	5	5	100%	0.12	0.50	Yes
Chromium	31	11	5	5	100%	16	2.6	Yes
Cobalt	9.1	5.2	5	5	100%	8.7	44	No
Copper	122	25	5	5	100%	77	700	No
Cyanide	2	0.61	5	5	100%	na	2.7	No
Lead	29	1.7	5	5	100%	2.3	na	Yes
Magnesium	11400	4340	5	5	100%	6299	na	No[b]
Manganese	379	147	5	5	100%	241	444	No
Mercury	0.40	0.11	5	5	100%	na	0.14	Yes
Nickel	23	15	5	5	100%	80	8.7	No
Selenium	3.6	0.71	5	5	100%	27	0.35	No
Silver	1.3	0.42	5	5	100%	3.0	2.1	No
Thallium	1.3	0.39	5	5	100%	na	5.1	No
Vanadium	216	43	5	5	100%	67	340	No
Zinc	86	30	5	5	100%	39	910	No
VOCs								
Methyl Ethyl Ketone	0.20	0.20	1	1	100%	na	6.0	No
Acetone	0.92	0.92	1	1	100%	na	1.0	No
Toluene	0.011	0.0030	4	4	100%	na	0.54	No

Notes:

[a]Benchmark Criteria is equal to one-tenth the ADEC Soil Benchmark Criteria (Migration-to-Groundwater Pathway), EPA Soil Screening Levels, or Calculated Cleanup Levels. Criteria for subsurface soil is derived from surface soil as they are considered to be the same matrix; there is no difference in regulatory criteria for surface soil and subsurface soil

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
ADEC - Alaska Department of Environmental Conservation
COPC - Chemical of potential concern.
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.
VOCs - Volatile organic compounds.

TABLE A - 6
SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR TIER I HUMAN HEALTH - GROUNDWATER AT OT48
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Mean Background (mg/L)	Benchmark Criteria[a] (mg/L)	COPC? (Yes/No)
Inorganics								
Aluminum	30	1.4	3	3	100%	11	3.7	Yes
Antimony	0.031	ND	3	2	67%	ND	0.00060	Yes
Arsenic	0.0020	ND	3	2	67%	0.0061	0.0050	No
Barium	0.14	0.018	3	3	100%	0.13	0.20	No
Beryllium	0.00080	ND	3	2	67%	0.00078	0.00040	Yes
Cadmium	0.0027	ND	3	2	67%	0.00090	0.00050	Yes
Chromium	0.053	ND	2	1	50%	0.016	0.010	Yes
Cobalt	0.020	0.0013	3	3	100%	0.015	0.073	No
Copper	0.20	0.021	3	3	100%	0.049	0.13	Yes
Lead	0.0088	ND	3	2	67%	0.0079	0.0015	Yes
Magnesium	21	12	5	5	100%	26	na	No[b]
Manganese	2.2	0.30	4	4	100%	1.2	0.17	Yes
Mercury	0.00020	0.00020	2	2	100%	ND	0.00020	Yes
Nickel	0.032	ND	3	2	67%	0.033	0.010	No
Selenium	0.0029	ND	3	2	67%	0.0016	0.0050	No
Silver	0.0020	ND	3	2	67%	0.00061	0.018	No
Thallium	0.0016	ND	3	2	67%	ND	0.00020	Yes
Vanadium	0.056	ND	3	2	67%	0.057	0.026	No
Zinc	0.15	ND	3	2	67%	0.12	1.1	No
VOCs								
1,1-Dichloroethene	0.00053	ND	3	1	33%	na	0.00070	No
1,2-Dichloroethene (Total)	0.0010	0.0010	1	1	100%	na	na	Yes
Cis-1,2-Dichloroethene	0.0019	ND	4	2	50%	na	0.010	No
Benzene	0.00010	ND	4	1	25%	na	0.00050	No
Carbon Disulfide	0.00016	ND	2	1	50%	na	0.37	No
Total Xylenes	0.00081	ND	7	1	14%	na	1.0	No
Trichloroethene	0.024	0.0030	8	8	100%	na	0.00050	Yes
SVOCs								
bis(2-Ethylhexyl)phthalate	0.0010	0.0010	1	1	100%	na	0.00060	Yes
Petroleum Hydrocarbons								
GRO (AK101)	0.028	0.028	1	1	100%	na	0.13	No
DRO (AK102)	0.090	0.090	1	1	100%	na	0.15	No
RRO (AK103)	0.15	0.15	1	1	100%	na	0.11	Yes

Notes:

[a]Benchmark Criteria is equal to one-tenth the ADEC Table C Groundwater Cleanup Level, the EPA Maximum Contaminant Level, or Calculated Cleanup Levels.

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
ADEC - Alaska Department of Environmental Conservation
AK - Alaska Method.
COPC - Chemical of potential concern.
DRO - Diesel range organics.
EPA - U. S. Environmental Protection Agency
GRO - Gasoline range organics.
RRO - Residual range organics.
mg/L - Milligrams per liter.
na - Not available.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

TABLE A - 7
SELECTION OF CHEMICALS OF POTENTIAL CONCERN FOR TIER I HUMAN HEALTH - GROUNDWATER (2001 Samples) AT OT48
EARECKSON AS, ALASKA

Constituent	Groundwater Concentration (mg/L) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Mean Background (mg/L)	Benchmark Criteria[a] (mg/L)	COPC? (Yes/No)
VOCs								
Trichloroethene	0.0047	0.0047	1	1	100%	na	0.0005	Yes

Notes:

[a]Benchmark Criteria is equal to one-tenth the ADEC Table C Groundwater Cleanup Level or the EPA Maximum Contaminant Level.

% - Percent.
ADEC - Alaska Department of Environmental Conservation
COPC - Chemical of potential concern.
EPA - U. S. Environmental Protection Agency
mg/L - Milligrams per liter.
na - Not available.
VOCs - Volatile organic compounds.

TABLE A - 8
SELECTION OF CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN FOR TIER I ECOLOGICAL SCREENING - SURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Surface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Mean Background (mg/kg)	Benchmark Criteria[a] (mg/kg)	COPEC? (Yes/No)
Inorganics								
Aluminum	21300	9830	4	4	100%	10678	1950	Yes
Arsenic	6.8	3.3	4	4	100%	2.02	5.6	Yes
Barium	37	24	4	4	100%	25.71	25	Yes
Beryllium	0.36	0.23	4	4	100%	2.19	1.5	No
Cadmium	1.5	1.5	1	1	100%	0.235	0.41	Yes
Chromium	39	15	4	4	100%	7.04	7.1	Yes
Cobalt	11	4.7	4	4	100%	9.36	4.4	Yes
Copper	26	20	4	4	100%	17.92	31	No
Lead	44	6.4	4	4	100%	5.9	19	Yes
Magnesium	10700	6430	4	4	100%	5078	na	No[b]
Manganese	349	187	4	4	100%	156	na	Yes
Nickel	37	14	4	4	100%	15.96	430	No
Silver	0.58	0.58	1	1	100%	3.037	118	No
Vanadium	129	58	4	4	100%	43.44	na	Yes
Zinc	94	38	4	4	100%	30.98	6.9	Yes
VOCs								
Methylene chloride	0.017	0.0080	3	3	100%	na	0.29	No
SVOCs								
4-Methylphenol	1.0	1.0	1	1	100%	na	na	Yes
bis(2-Ethylhexyl)phthalate	0.30	0.18	4	4	100%	na	0.59	No
PCBs (Total)	0.036	0.036	1	1	100%	na	0.059	No
Polynuclear Aromatic Hydrocarbons								
Fluoranthene	0.070	0.059	2	2	100%	na	1.5	No
Phenanthrene	0.060	0.060	1	1	100%	na	1.2	No
Pyrene	0.16	0.16	1	1	100%	na	1.5	No

Notes:

[a]Benchmark Criteria is equal to one-tenth the ecological risk-based screening concentration (ERBSC).

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
COPEC - Chemical of potential ecological concern.
mg/kg - Milligrams per kilogram.
na - Not available.
PCBs - Polychlorinated biphenyls.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

TABLE A - 9
SELECTION OF CHEMICALS OF POTENTIAL ECOLOGICAL CONCERN FOR TIER I ECOLOGICAL SCREENING - SUBSURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Subsurface Soils Concentration (mg/kg) Maximum	Minimum	Number of Samples	Detects	Detection Frequency	Mean Background (mg/kg)	Benchmark Criteria[a] (mg/kg)	COPEC? (Yes/No)
Inorganics								
Aluminum	41900	9500	5	5	100%	19114	1950	Yes
Antimony	25	7.6	5	5	100%	ND	1.4	Yes
Arsenic	4.1	2.0	5	5	100%	2.3	5.6	No
Barium	61	19	5	5	100%	35	25	Yes
Beryllium	0.40	0.14	5	5	100%	ND	1.5	No
Cadmium	2.2	0.66	5	5	100%	0.12	0.41	Yes
Chromium	31	11	5	5	100%	16	7.1	Yes
Cobalt	9.1	5.2	5	5	100%	8.7	4.4	Yes
Copper	122	25	5	5	100%	77	31	Yes
Cyanide	2	0.61	5	5	100%	na	na	Yes
Lead	29	1.7	5	5	100%	2.3	19	Yes
Magnesium	11400	4340	5	5	100%	6299	na	No[b]
Manganese	379	147	5	5	100%	241	na	Yes
Mercury	0.40	0.11	5	5	100%	na	17	No
Nickel	23	15	5	5	100%	80	430	No
Selenium	3.6	0.71	5	5	100%	27	0.59	No
Silver	1.3	0.42	5	5	100%	3.0	118	No
Thallium	1.3	0.39	5	5	100%	na	0.42	Yes
Vanadium	216	43	5	5	100%	67	na	Yes
Zinc	86	30	5	5	100%	39	6.9	Yes
VOCs								
Methyl Ethyl Ketone	0.20	0.20	1	1	100%	na	25	No
Acetone	0.92	0.92	1	1	100%	na	0.27	Yes
Toluene	0.011	0.0030	4	4	100%	na	4.7	No

Notes:

[a]Benchmark Criteria is equal to one-tenth the ecological risk-based screening concentration (ERBSC). Criteria for subsurface soil is derived from surface soil as they are considered to be the same matrix; there is no difference in regulatory criteria for surface soil and subsurface soil.

[b]Magnesium eliminated as a COPC based on its status as a common essential nutrient.

% - Percent.
COPEC - Chemical of potential ecological concern.
mg/kg - Milligrams per kilogram.
na - Not available.
VOCs - Volatile organic compounds.

TABLE A - 10
TIER I HUMAN HEALTH CUMULATIVE RISK CALCULATION - SURFACE SOILS AT OT48
EARECKSON AS, ALASKA

			Inhalation				Ingestion				Cumulative Risk	
	Maximum	Benchmark	Tier I Benchmark		Cancer	Non Cancer	Tier I Benchmark		Cancer	Non Cancer	Cancer	Non Cancer
Constituent	Concentration (mg/kg)	Criteria[a] (mg/kg)	Carcinogen	Noncarcinogen	Risk	Hazard	Carcinogen	Noncarcinogen	Risk	Hazard	Risk	Hazard
Inorganics												
Aluminum	21300	101000	na	na	-	-	na	101000	-	0.21	-	**0.21**
Arsenic	6.8	5.5	na	na	-	-	5.5	30	1.2E-05	0.22	**1.2E-05**	**0.22**
Lead[b]	44	400	na	na	-	-	na	na	-	-	-	-
Vanadium	129	710	na	na	-	-	na	710	-	0.18	-	**0.18**
SVOCs												
4-Methylphenol	1.0	na	na	na	-	-	na	na	-	-	-	-
		Cumulative Risk/Hazard Index (HI):			-	-			**1.2E-05**	**0.62**	**1.2E-05**	**0.62**

Notes:

[a]Benchmark Criteria is equal to the ADEC Soil Benchmark Criteria, the EPA Soil Screening Levels, or Calculated Cleanup Levels.

[b]Lead is not included in the cumulative risk calculation for human receptors, as per ADECs Guidance on Calculating Cumulative Risk, Final Draft (December 15, 2000).

ADEC - Alaska Department of Environmental Conservation
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.
SVOCs - Semivolatile organic compounds.

TABLE A - 11
TIER I RISK SCREENING - SURFACE SOILS MIGRATION-TO-GROUNDWATER PATHWAY AT OT48
EARECKSON AS, ALASKA

Constituent	Maximum Concentration (mg/kg)	Benchmark Criteria[a] (mg/kg)	Migration to Groundwater Cleanup Level (mg/kg) Carcinogen	Migration to Groundwater Cleanup Level (mg/kg) Noncarcinogen	Criteria Exceedance (Yes/No)
Inorganics					
Aluminum	21300	na	na	na	-
Arsenic	6.8	2.0	2.0	na	Yes
Cadmium	1.5	5.0	na	5.0	No
Chromium	39	26	na	26	Yes
Lead	44	na	na	na	-
Nickel	37	87	na	87	No
VOCs					
Methylene chloride	0.017	0.015	0.015	na	Yes
SVOCs					
4-Methylphenol	1.0	na	na	na	-

Notes:

[a]Benchmark Criteria is equal to the ADEC Soil Benchmark Criteria (migration to groundwater pathway), EPA Soil Screening Levels, or Calculated Cleanup Levles.

ADEC - Alaska Department of Environmental Conservation
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

TABLE A - 12
TIER I HUMAN HEALTH CUMULATIVE RISK CALCULATION - SUBSURFACE SOILS AT OT48
EARECKSON AS, ALASKA

			Inhalation				Ingestion				Cumulative Risk	
	Maximum	Benchmark	Tier I Benchmark		Cancer	Non Cancer	Tier I Benchmark		Cancer	Non Cancer	Cancer	Non Cancer
Constituent	Concentration (mg/kg)	Criteria[a] (mg/kg)	Carcinogen	Noncarcinogen	Risk	Hazard	Carcinogen	Noncarcinogen	Risk	Hazard	Risk	Hazard
Inorganics												
Aluminum	41900	101000	na	na	-	-	na	101000	-	0.41	-	0.41
Antimony	25	41	na	na	-	-	na	41	-	0.61	-	**0.61**
Arsenic	4.1	5.5	na	na	-	-	5.5	30	7.5E-06	0.13	**7.5E-06**	0.13
Thallium	1.3	7.1	na	na	-	-	na	7.1	-	0.18	-	**0.18**
Vanadium	216	710	na	na	-	-	na	710	-	0.30	-	0.30
		Cumulative Risk/Hazard Index (HI):			**-**	**-**			**7.5E-06**	**1.6**	**7.5E-06**	**0.79** [b]

Notes:

[a]Benchmark Criteria is equal to the ADEC Soil Benchmark Criteria, the EPA Soil Screening Levels, or Calculated Cleanup Levels. Criteria for subsurface soil is derived from surface soil as they are considered to be the same matrix; there is no difference in regulatory criteria for surface soil and subsurface soil.

[b] The total HI for all noncarcinogenic effects of COPCs was 1.6. Consequently, the HI was recalculated based on COPCs with similar target organ effects. Only antimony and thallium share similar target organ responses (i.e., changes in blood chemistry). The resulting target organ-specific HI is 0.79.

ADEC - Alaska Department of Environmental Conservation
COPC - Chemical of potential concern.
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.

TABLE A - 13
TIER I RISK SCREENING - SUBSURFACE SOILS MIGRATION-TO-GROUNDWATER PATHWAY
AT OT48
EARECKSON AS, ALASKA

Constituent	Maximum Concentration (mg/kg)	Benchmark Criteria[a] (mg/kg)	Migration to Groundwater Cleanup Level (mg/kg) Carcinogen	Migration to Groundwater Cleanup Level (mg/kg) Noncarcinogen	Criteria Exceedance (Yes/No)
Inorganics					
Aluminum	41900	na	na	na	-
Antimony	25	3.6	na	3.6	Yes
Arsenic	4.1	2.0	2.0	na	Yes
Cadmium	2.2	5.0	na	5.0	No
Chromium	31	26	na	26	Yes
Lead	29	na	na	na	-
Mercury	0.40	1.4	na	1.4	No
Thallium	1.3	51.00	na	51	No

Notes:

[a]Benchmark Criteria is equal to the ADEC Soil Benchmark Criteria (migration to groundwater pathway), EPA Soil Screening Levels, or Calculated Cleanup Levels. Criteria for subsurface soil is derived from surface soil as they are considered to be the same matrix; there is no difference in regulatory criteria for surface soil and subsurface soil.

ADEC - Alaska Department of Environmental Conservation
EPA - U. S. Environmental Protection Agency
mg/kg - Milligrams per kilogram.
na - Not available.

TABLE A - 14
TIER I HUMAN HEALTH CUMULATIVE RISK CALCULATION - GROUNDWATER AT OT48
EARECKSON AS, ALASKA

Constituent	Maximum Concentration (mg/L)	Benchmark Criteria[a] (mg/L)	Ingestion			
			Cleanup Level		Cancer Risk	Non Cancer Hazard
			Carcinogen	Noncarcinogen		
Inorganics						
Aluminum	30.4	0.050	na	na	-	-
Antimony	0.031	0.0060	na	0.0060	-	5.2
Beryllium	0.00080	0.0040	0.20	0.0040	4.0E-08	0.20
Cadmium	0.0027	0.0050	na	0.0050	-	0.54
Chromium	0.053	0.10	na	0.10	-	0.53
Copper	0.20	1.3	na	1.3	-	0.15
Lead[b]	0.0088	0.015	na	na	-	-
Manganese	2.2	0.050	na	na	-	-
Mercury	0.00020	0.0020	na	0.0020	-	0.10
Thallium	0.0016	0.0020	na	0.0020	-	0.80
VOCs						
1,2-Dichloroethene (Total)	0.0010	na	na	na	-	-
Trichloroethene	0.024	0.0050	0.0050	na	4.8E-05	-
SVOCs						
bis(2-Ethylhexyl)phthalate	0.0010	0.0060	0.60	0.0060	1.7E-08	0.17
Petroleum Hydrocarbons[c]						
RRO (AK103)	0.15	1.1	na	na	-	-
			Cumulative Risk/Hazard Index (HI):		**4.8E-05**	**7.7**

Notes:

[a]Groundwater Benchmark Criteria is equal to the ADEC Table C Groundwater Cleanup level, the EPA Maximum Contaminant Level, or Calculated Cleanup Levels.

[b]Lead is not included in the cumulative risk calculation, as per ADEC's *Guidance on Calculating Cumulative Risk* , Final Draft (December 15, 2000).

[c]Petroleum hydrocarbons as DRO, GRO, or RRO are not included in cumulative risk calculations, as per ADEC's *Guidance on Calculating Cumulative Risk* , Final Draft (December 15, 2000).

ADEC - Alaska Department of Environmental Conservation
AK - Alaska Method.
EPA - U. S. Environmental Protection Agency
mg/L - Milligrams per liter.
na - Not available.
RRO - Residual range organics.
SVOCs - Semivolatile organic compounds.
VOCs - Volatile organic compounds.

TABLE A - 15
TIER I HUMAN HEALTH CUMULATIVE RISK CALCULATION -
GROUNDWATER (TCE 2001 Data) AT OT48
EARECKSON AS, ALASKA

Constituent	Maximum Concentration (mg/L)	Benchmark Criteria[a] (mg/L)	Ingestion			
			Cleanup Level		Cancer Risk	Non Cancer Hazard
			Carcinogen	Noncarcinogen		
VOCs						
Trichloroethene	0.0047	0.0050	0.0050	na	9.4E-06	-
			Cumulative Risk/Hazard Index (HI):		**9.4E-06**	**0.0**

Notes:

[a]Groundwater Benchmark Criteria is equal to the ADEC Table C Groundwater Cleanup level, the EPA Maximum Contaminant Level, or Calculated Cleanup Levels.

ADEC - Alaska Department of Environmental Conservation
EPA - U. S. Environmental Protection Agency
mg/L - Milligrams per liter.
na - Not available.
VOCs - Volatile organic compounds.

TABLE A - 16
TIER I ECOLOGICAL CUMULATIVE RISK CALCULATION - SURFACE SOILS AT OT48
EARECKSON AS, ALASKA

Constituent	Maximum Concentration (mg/kg)	Benchmark Criteria[a] (mg/kg)	Ecological Hazard
Inorganics			
Aluminum	21300	19500	1.1
Arsenic	6.8	55.9	0.12
Barium	36.9	247	0.15
Cadmium	1.5	4.08	0.37
Chromium	38.7	71.1	0.54
Cobalt	11.3	44.4	0.25
Lead	44.1	191	0.23
Manganese	349	na	-
Vanadium	129	na	-
Zinc	94.3	69.4	1.4
SVOCs			
4-Methylphenol	1	na	-
		Hazard Index (HI):	**4.1**

Notes:

[a]Benchmark Criteria is equal to the ecological risk-based screening concentration (ERBSC).

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

TABLE A - 17
TIER I ECOLOGICAL CUMULATIVE RISK CALCULATION - SUBSURFACE SOILS
AT OT48
EARECKSON AS, ALASKA

Constituent	Maximum Concentration (mg/kg)	Benchmark Criteria[a] (mg/kg)	Ecological Hazard
Inorganics			
Aluminum	41900	19500	2.1
Antimony	24.8	14.2	1.7
Barium	60.5	247	0.2
Cadmium	2.2	4.08	0.5
Chromium	30.6	71.1	0.4
Cobalt	9.1	44.4	0.2
Copper	122	313	0.4
Cyanide	2	na	-
Lead	29	191	0.2
Manganese	379	na	-
Thallium	1.3	4.15	0.3
Vanadium	216	na	-
Zinc	86.3	69.4	1.2
VOCs			
Acetone	0.92	2.73	0.3
		Hazard Index (HI):	**7.8**

Notes:

[a]Benchmark Criteria is equal to the ecological risk-based screening concentration (ERBSC). Criteria for subsurface soil is derived from surface soil as they are considered to be the same matrix; there is no difference in regulatory criteria for surface soil and subsurface soil.

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

APPENDIX B

REGULATORY COMMENTS AND CORRESPONDENCE

STATE OF ALASKA

SARAH PALIN, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

555 Cordova Street
Anchorage, AK 99501
PHONE: (907) 269-3077
FAX: (907) 269-7649
www.dec.state.ak.us

File # 2649.38.001

March 4, 2008

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

Re: Draft Records of Decision (RODs) for SS007, ST039, and OT048 dated January 2008, Eareckson Air Station, Shemya Island, Alaska

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the Draft version of the Record of Decision for the West End Oil/Water Separator Ponds (SS007), Underground Storage Tanks at Building 110 (ST039), and the Water Gallery (OT048) at Eareckson Air Station in our office via email on January 30, 2008. We have completed our review of the Draft RODs and have provided comments on three Review Comments Forms that are attached to this letter, one form for each document.

One main concern of the state is that the ROD for SS007 should be associated with the ROD for ST046 which is still in the Remedial Investigation stage. It would be more appropriate to collect more information about ST046, the source of contamination for SS007 before a ROD is signed for SS007. More information about the extent of contamination and exposure pathways will be available once more data is collected from the source area.

It may not be necessary to create separate documents for CERCLA and Non-CERCLA decisions for SS007 and ST039. These two documents could be combined to reflect that no further action is required under CERCLA, but under the Alaska State Regulations, further action is required.

Thank you for providing a copy of the January 2008 version of the Draft RODs for SS007, ST039, and OT048. I look forward to a response to comments. If you have any questions regarding this letter, please contact me at 907-269-3077.

Sincerely,

Jonathan Schick
Environmental Program Specialist

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Record of Decision OT048 (Water Gallery)

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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	1-2	The last sentence in section 1.5: Please add the word, Water, so that the text reads, "State of Alaska Drinking *Water* regulations"			
2	1-3	Please rephrase the first bullet item on Page 1-3 to make it read more clearly that site specific cleanup levels established for COC's…			
3	1-3	Please revise the last bullet in section 1.6 so that it reads, "…do not exceed ADEC 18 AAC 75.341 Method Two soil cleanup levels, *or 18 AAC 75.345 Table C groundwater cleanup levels*"			
3	2-13	In the section regarding Groundwater, the Table C values are considered protective for most uses but does not include aquaculture. Please correct this statement.			
4	2-15	On Table 2-3 please expand the table so that all of the references to the key are legible. Some of the references displayed as exponents are difficult to see because of the tight frame of the table, specifically in the VOCs and SVOCs column from 1989 groundwater sampling.			
5	2-19	Please describe the Air Stripping Technology used to treat the TCE within section 2.6.			
6	2-19	The TCE concentration in 2000 at one sample location was 0.0047 mg/L which is only 0.3 parts per billion below the cleanup level. Is there additional data collected since 2000 to support the assertion that all of the groundwater at this site is below cleanup level. Is there more contemporary data from the water collection gallery? Please include information on compliance monitoring under the drinking water program.			
7	2-19	Please include a conceptual site model within this ROD and include groundwater ingestion as a complete pathway.			
8	2-20	In section 2.7.2 please supply additional supporting data for the statement, "there is no evidence of groundwater			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Record of Decision OT048 (Water Gallery)

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
		contamination associated with the site addressed in this ROD." In the previous section there are many citations of contamination in the groundwater upgradient and in the vicinity of the water collection facility, and only one sample result that shows TCE slightly below the cleanup level.			
9	2-21	Please reword the sentence that begins, "A slight excess noncancer hazard estimate" so that it is more clear that the hazard estimate exceeded the risk criteria.			
10	2-22	The surface soils and subsurface soils sections state that Zinc and Aluminum exceeded the background concentrations by two to three times. Also cadmium, arsenic, and antimony were detected in excess of the ADEC Table B-1 Soil Cleanup levels. The text indicates that there are no known sources of cadmium or antimony at the OT048 site. Please indicate if there are any possible sources for Aluminum, Arsenic, and Zinc at the site, and expand the text in this section to further describe the possible causes of the high levels of these metals.			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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	The state does not think that this duplicate ROD is necessary and the CERCLA ROD and Non-CERCLA Decision Document could be combined to address the CERCLA requirements as well as the Assessment under Alaska State Regulations.			
2	General	One main concern of the state is that the ROD for SS007 should be associated with the ROD for ST046 which is still in the Remedial Investigation stage. It would be more appropriate to collect more information about ST046, the source of contamination for SS007, before a ROD is signed for SS007. More information about the extent of contamination and exposure pathways will be available once more data is collected from the source area.			
3	1-2	Please expand the section 1.3.2 to describe long-term management in this section as the typical language is long-term monitoring and the difference should be defined at the beginning of the document as it is later referenced with the acronym LTM.			
4	2-4	Please elaborate on the abandonment of tank 110-1 and 110-4. The ROD states that 110-1 was abandoned in place. Please indicate the year that it was abandoned and if it was cleaned out and filled with inert material. If these USTs were not properly closed in place then additional work may be warranted to locate and close the USTs in accordance with state regulations (18 AAC 78.085).			
5	Figure 2-2	The outline of the site extends to the west to the shoreline. The state recommends that the site outline encompass the marshy area that the SS007 drainage discharges into as this surface water body is a point of compliance.			
6	Figure 2-3	Please include additional subsurface soil sample results in this figure specifically the sample locations closest to UST110-2, UST110-4, and AST-3. If any of the borings in			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
		this figure were completed as a groundwater sample location, please indicate that on the figure with an alternate symbol and include groundwater data. Also, if a surface water sample was collected from Grace Lake, please mark the sample location and any pertinent results.			
7	2-4	Please revise the text in the second paragraph on this page as the Air Force is not the lead agency in this instance because this is not a CERCLA document. Please revise this section to read, "The Air Force has conducted environmental restoration…" and remove the reference to the lead agency. Also in the last sentence, please revise text to remove reference to the ADEC as the support agency so that it reads, "The ADEC provides *regulatory* oversight of the environmental restoration actions."			
8	2-8	In the second paragraph the document states that one of the well points was completed into a perched aquifer of peat water. Groundwater is defined in 18 AAC 75.990 as: "water in the saturated zone, for purposes of evaluating whether the groundwater is a drinking water source under 18 AAC 75.350; or water beneath the surface of the soil, for purposes of evaluating whether the water will act as a transport medium for hazardous substance migration" Please present the results of the groundwater sample that was collected as it may act as a transport medium for hazardous substance migration to the surrounding soil, groundwater in the saturated zone, or nearby surface water in the case of Grace Lake. The characterization of the groundwater at ST039 is important to create a model to predict possible leaching.			
9	2-8	In the section describing the "Eareckson AS, Remove/Replace Ponds 1 and 2 West End Oil/Water			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
		Separator, Final Report" Please include soil sample results collected from the material beneath the liner as there was contamination left in place at the floor of the excavation prior to laying down the liner. These results are important for understanding the extent of contamination at the site and analyzing the exposure pathways.			
10	2-13	Please rephrase the statement at the end of the second paragraph in the Hydrogeology section that states, that the perched water deposits are not considered to be true groundwater so that it reflects the definition of groundwater in 18 AAC 75.990(46).			
11	2-14	Please further discuss the hydrology at site SS007. Do the ponds collect only surface water, or do they intercept the water table and collect groundwater in the lower ponds as well?			
12	2-19	In section 2.6.2.4, were the surface soil samples that were collected in 1988 and 1992 associated with another source at the site? Was there contamination present from a source other than the USTs?			
13	2-20	Because Eareckson AS is in the zone of less than 40" of annual precipitation, the GRO cleanup level is 300 mg/Kg, not 50 mg/Kg as stated in the text. Please revise the text in this section.			
14	2-20	Section 2.6.3.1 states that ST046 is a likely source of groundwater and subsurface contamination beneath SS007 and that an evaluation of risks associated with these exposure pathways. The state recommends that the Decision Document for SS007 be combined with the Decision Document for ST046 once more information is gathered concerning migrating contamination at site ST046.			
15	2-20	Please reference in section 2.6.3.1 that ecological exposure pathways are discussed further in section 2.8.2			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
16	2-21	Section 2.7.2 states that groundwater conditions at SS007 will be evaluated with future work at site ST046. Based on this, the state recommends that the Decision Document for SS007 be combined with the Decision Document for ST046 once more information is gathered concerning migrating contamination from site ST046.			
17	2-22	In the text in the 1994 Tier I Results for SS007, please clarify by stating subsurface soil instead of soil to differentiate the surface soil from subsurface soil.			
18	2-22	Table 2-3: In Table 2-3 were the 2 subsurface soil samples collected prior to the removal of the pond from material left in place? Please elaborate on the location of these samples in the text.			
19	2-23	In the sub-section entitled 1996 Tier I Results for ST039, please change the references to SS007 to ST039 in the third and tenth line.			
20	2-24	The section entitled ST039 – Groundwater states that potentially contaminated groundwater represents an incomplete exposure pathway for the human health risk assessment. Is the groundwater beneath ST039 contaminated? If there is evidence that groundwater is contaminated or if there is potential that it is contaminated and no data to support that it has not been effected, then Institutional Controls (ICs) should be implemented to restrict access to the groundwater at this site.			
21	2-25	Table 2-5: Please elaborate in the Key about which criteria the risk based screening is based on.			
22	2-25	In section 2.8.2.2, please elaborate on what the appropriate ecological screening criteria is and where it was derived from.			
23	2-28	Please revise section 2.9.1 as the regulations have been modified since the 1996 RI and new Remedial Action Objectives should include Institutional Controls for			

REVIEW COMMENTS **PROJECT: Eareckson Air Station**

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
		residual contamination in the soil and groundwater.			
24	2-28	In section 2.9.1, it states that Surface water sampling for DRO and sediment sampling for DRO and RRO at the inlet and outlet of pond 3 will be conducted every other year. The state requests that additional surface water and sediment samples be collected upgradient of pond 3 closer to tank 123 as well as downgradient of pond 3 closer to the outlet into the marsh land on the coast. This additional sampling is requested because of the unknown sources from ST046 that could be contributing to groundwater and surface water contamination throughout the entire drainage.			
25	2-29	In section 2.10.1 please rephrase the second bullet to read, "Institutional controls (ICs) and long-term *monitoring* and management" and include a schedule for the long-term monitoring and associated reporting.			
26	2-30	Please change the last sentence in the first paragraph to include land transfer documents and the state land records.			
27	2-30	In the third paragraph on the page please indicate the levels of contaminants that were left in place beneath the cap and identify the institutional controls that would be implemented to protect humans from exposure to the residual contamination.			
28	2-30	Please elaborate on the definition of Long-Term Management and discuss how it is different than Long-Term Monitoring which is often referred to by the same acronym, LTM. Are additional management tasks required for site SS007? Please elaborate.			
29	2-31	In Table 2-8 Please explain the basis for the cost estimates used in the table. If the estimates are based on the Feasibility Study , please include a reference to that here.			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
30	2-31	The time frame for ICs and LTM should be expanded to greater than 5 years as the on-site contamination will probably not attenuate to levels below the cleanup levels within 5 years. Also please explain why the time frame for excavation and removal/disposal is 5-15 years.			
31	2-31	In Table 2-9 please explain the reason for comparing industrial use for the ICs and LTM with unlimited use for the other alternatives. Also in the Key, it states that groundwater was not considered in this decision document. Groundwater should be considered as it may have been impacted by leaching contamination from ST046 as well as from the material beneath the liners at the ponds/wetland. The state requires that groundwater be considered as a potentially affected media.			
32	2-33	In section 2.12.2, please elaborate on the process by which the dig permits are issued by the Base Operating Contractor. Also under the first bullet item please add a sentence that states that excavation and off-site transport of contaminated soil is not permitted without prior DEC approval per 18 AAC 75.325(i).			
33	2-33	In section 2.12.1.2 please change SS007 to ST039 on the first line.			
34	2-33	In section 2.12.2 please include the long-term monitoring and management tasks as part of the selected remedy.			
35	2-34	In section 2.12.3 it states that the selected remedies are administrative in nature and that the expected costs are minimal. However, per Table 2-8, the cost of monitoring the ground water, surface water and sediment at SS007 are estimated to be 1.5 million dollars for 5 years. Please amend the text to reflect this and consider adjusting the time estimate to reflect a more reasonable time frame for			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Non-CERCLA Decision Document SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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)
		achieving the RAOs.			
36	2-34	In the first paragraph, please add that any action that may interfere with the protectiveness of the ICs *will be reported to the DEC* and will be addressed by the USAF…			
37	2-34	In the last bullet in section 2.12.2, please add that periodic reports of ICs monitoring *and Long-term monitoring of the contaminant levels* will be provided to ADEC.			

REVIEW COMMENTS

PROJECT: Eareckson Air Station

DOCUMENT: Record of Decision SS007 and ST039

DATE: 3/4/2008 **REVIEWER:** Jonathan Schick **PHONE:** 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	The state does not think that this duplicate ROD is necessary and the CERCLA ROD and Non-CERCLA Decision Document could be combined to address the CERCLA requirements as well as the Assessment under Alaska State Regulations. Comments associated with this document are included in the Non-CERCLA review form.			
2	1-2	Please change the text of the third sentence of the second paragraph to read, "The State of Alaska Department of Environmental Conservation concurs with the determination *that no further action is required under CERCLA.*"			
3	1-2	In section 1.4 please change the text of the second sentence to read, "…therefore, there is no *further action required under CERCLA.*"			
4	1-3	Please change the text in the first sentence in section 1.6 to read, "This signature sheet documents the USAF and ADEC's approval of the determination of no *further action under* CERCLA for ERP sites SS007 and ST039 at Eareckson AS, Alaska."			

"Barnack Keith Civ 611 CES/CEVR" <Keith.Barnack@ELMENDORF.af.mil>
06/25/2008 08:05 AM

To "Schick, Jonathan S (DEC)" <jonathan.schick@alaska.gov>
cc "Richard Girouard" <Richard.Girouard@us.mwhglobal.com>
bcc
Subject FW: EAS OT08, SS007, ST039 ROD RTCs

Jonathan:

Attached.

// signed //

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

OT048 ROD Response to ADEC Comments.doc

SS007 ST039 ROD Response to ADEC Comments.doc

SS007 ST039 DD Response to ADEC Comments V2.doc

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Record of Decision OT08 (Water Gallery)
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: 5/29/08 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
1	1-2	The last sentence in Section 1.5: Please add the word Water so that the text reads, "State of Alaska Drinking Water regulations."	The comment will be incorporated.
2	1-3	Please rephrase the first bullet item on Page 1-3 to make it read more clearly that site specific cleanup levels established for COC's…	The comment will be incorporated.
3	1-3	Please revise the last bullet in Section 1.6 so that it reads, "…do not exceed ADEC 18 AAC 75.341 Method Two soil cleanup levels, *or 18 AAC 75.345 Table C groundwater cleanup levels."*	The comment will be incorporated.
4	2-13	In the section regarding Groundwater, the Table C values are considered protective for most uses but does not include aquaculture. Please correct this statement.	The comment will be incorporated.
5	2-15	On Table 2-3 please expand the table so that all of the references to the key are legible. Some of the references displayed as exponents are difficult to see because of the tight frame of the table, specifically in the VOCs and SVOCs column from 1989 groundwater sampling.	The comment will be incorporated.
6	2-19	Please describe the Air Stripping Technology used to treat the TCE within section 2.6.	The section will be revised to include a description of the air stripper.
7	2-19	The TCE concentration in 2000 at one sample location was 0.0047 mg/L which is only 0.3 parts per billion below the cleanup level. Is there additional data collected since 2000 to support the assertion that all of the groundwater at this site is below the cleanup level? Is there more contemporary data from the water collection gallery? Please include information on compliance monitoring under the drinking water program.	More recent data will be included.
8	2-19	Please include a conceptual site model within this ROD and include groundwater ingestion as a complete pathway.	A CSM will be added to the ROD.
9	2-20	In section 2.7.2 please supply additional supporting data for the statement, "there is no evidence of groundwater contamination associated with the site addressed in this ROD." In the previous section there are many citations of contamination in the groundwater upgradient and in the vicinity of the water collection facility, and only one sample result that shows TCE slightly below the cleanup level.	The section will be revised to clarify that there is no remaining groundwater contamination that exceeds ADEC's cleanup levels at the site.
10	2-21	Please reword the sentence that begins, "A slight excess noncancer hazard estimate so	The actual hazard estimate value will be added so that it is more clear what is meant by "slight excess."

REVIEW COMMENTS **PROJECT: Eareckson Air Station Decision Documents**
DOCUMENT: Record of Decision OT08 (Water Gallery)
LOCATION: Eareckson Air Station, Shemya Island, Alaska

		DATE: 5/29/08 **REVIEWER:** Jonathan Schick (ADEC)	
Item/ Code.	**Page/Para**	**ADEC COMMENTS**	**RESPONSE**
		that it is more clear that the hazard estimate exceeded the risk criteria.	
11	2-22	The surface soils and subsurface soils sections state that zinc and aluminum exceeded the background concentrations by two to three times. Also cadmium, arsenic, and antimony were detected in excess of the ADEC Table B-1 Soil Cleanup levels. The text indicates that there are no known sources of cadmium or antimony at the OT08 site. Please indicate if there are any possible sources of aluminum, arsenic, and zinc at the site, and expand the text in this section to further describe the possible causes of the high levels of these metals.	The text will be revised to state that there are no known or likely anthropogenic sources of these metals at the site. Additional text will be added to clarify that all three are naturally occurring and that the higher values are likely due to natural variations in concentrations.

"Barnack Keith Civ 611 CES/CEVR" <Keith.Barnack@ELMENDORF.af.mil>

06/20/2008 09:08 AM

To "Richard Girouard" <Richard.Girouard@us.mwhglobal.com>
cc
bcc
Subject RE: Water Gallery Wells

Just sample the well WGW7 plus the raw water from the water gallery. Do the same analytical as in 2000. Thanks.

// signed //

Keith J. Barnack
Remedial Project Manager
611 CES/CEVR
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: Richard Girouard [mailto:Richard.Girouard@us.mwhglobal.com]
Sent: Friday, June 20, 2008 9:04 AM
To: Barnack Keith Civ 611 CES/CEVR
Subject: Water Gallery Wells

Keith,

Attached is a figure of OT048 from the 1995 supplemental RI Tech Memo. Out of all the wells, it appears they only ran fixed laboratory samples on 3 wells WGW3, WGW4, and WGW7. It also appears that WGW3 is now gone. In 1998, 1999, and 2000 only 1 well was sampled - WGW7. The proposed plan doesn't say which wells were to be sampled in 2002.

Do you want to sample any other wells in addition to WGW7 this time?

Rick Girouard
MWH
907-266-1145

"Barnack Keith Civ 611 CES/CEVR" <Keith.Barnack@ELMENDORF.af.mil>

08/22/2008 02:41 PM

To "Richard Girouard" <Richard.Girouard@us.mwhglobal.com>
cc
bcc
Subject RE: Shemya water gallery

I'm imagining our NFRAP will now go MNA. We'll see. Thanks.

// signed //

Keith J. Barnack
Remedial Project Manager
611 CES/CEVR
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: Richard Girouard [mailto:Richard.Girouard@us.mwhglobal.com]
Sent: Friday, August 22, 2008 2:25 PM
To: Barnack Keith Civ 611 CES/CEVR
Cc: Aseem Telang
Subject: Shemya water gallery

Keith,

Shemya results started trickling in today. In these, were results for monitoring well WG07 (minus PAH) which is the well near the water collection gallery. Unfortunately, the TCE result came back as 6.25 ug/L, above the drinking water limit of 5. The sample from the influent into the drinking water treatment system was collected several days later so we won't have those results until sometime next week.

Sorry to be the bearer of bad news,

Rick Girouard
MWH
907-266-1145

"Barnack , Keith Civ USAF PACAF 611 CES/CEVR" <Keith.Barnack@ELMENDORF.af.mil>

11/20/2008 10:20 AM

To "Schick, Jonathan S (DEC)" <jonathan.schick@alaska.gov>

cc "Richard Girouard" <Richard.Girouard@us.mwhglobal.com>

bcc

Subject RE: Eareckson OT048

Yes we will. Long before your time we agreed (ADEC and AF) to sampling every other year for all post ROD sites to save money because of the logistics involved. For a little leeway, I would say the frequency would be once between one and two years. Based on the classification of the drinking water system, I do not think the island contractor is required to sample the watery gallery and only samples the potable water after treatment. They are still running the strippers for the TCE. Never the less, these samples will be taken and analysiszed to ERP QA/QC standards which are higher. A draft ROD will be available for your review sometime in the future.

// signed //

Keith J. Barnack
Remedial Project Manager
611 CES/CEVR
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: Thursday, November 20, 2008 9:57 AM
To: Barnack, Keith Civ USAF PACAF 611 CES/CEVR
Subject: RE: Eareckson OT048

That looks good, but will you propose a frequency of sampling in the DD? Do you have an idea now what the sampling schedule will look like? I would assume that the gallery is sampled relatively frequently....
Please let me know what your thoughts are.
Thanks,

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

-----Original Message-----
From: Barnack, Keith Civ USAF PACAF 611 CES/CEVR
[mailto:Keith.Barnack@ELMENDORF.af.mil]
Sent: Thursday, November 20, 2008 8:32 AM
To: Schick, Jonathan S (DEC)
Cc: Richard Girouard
Subject: Eareckson OT048

Jonathan:

Just to recap our telephone conversation of 18 Nov 2008. Base on the recent sample results of the GW monitoring well upgradient of the water gallery we are changing from a no further remediation action planned (NFRAP) decision document (DD) to a monitored natural attenuation (MNA) DD. The MNA will be in effect until two consecutive sample results for TCE are under ADEC's cleanup level of 5 ug/l at the well and gallery. If I stated anything erroneous, please respond with correction. Thanks:

Keith

// signed //

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

Richard Girouard

From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [Keith.Barnack@ELMENDORF.af.mil]
Sent: Wednesday, August 05, 2009 9:54 AM
To: Richard Girouard
Subject: RE: Eareckson AS OT048 draft ROD

Rick: Looks good. Let's make three hard copies with cds. I would like to personally drop off ADEC's copy (on this one) so just deliver all copies to me. Any estimate on the additional funds to complete the FT, LF, and OT ROD Project yet? 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: Richard Girouard [mailto:Richard.Girouard@us.mwhglobal.com]
Sent: Monday, August 03, 2009 4:43 PM
To: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR
Subject: Eareckson AS OT048 draft ROD

Keith,

Attached is the draft Eareckson AS OT048 ROD with yours and Jim's changes incorporated. Let me know if you need any additional changes before it goes to ADEC.

Thanks,

Rick Girouard

MWH

266-1145

MWH

BUILDING A BETTER WORLD

06 August 2009

Mr. Glen Verplancke
AFCEE Project Manager
AFCEE/EXHP
10471 20th Street, Suite 316
Elmendorf AFB, AK 99506-2200

1851213.10010402/3.1.2

Subject: CERCLA Record of Decision OT048 (Water Gallery) – Draft
Contract F41624-03-D-8608, Task Order 0210
Decision Documents for Nine Sites
Eareckson Air Station, Alaska

Dear Mr. Verplancke:

Enclosed please find one CD for the subject document for Contract F41624-03-D-8608, Task Order 0210, Decision Documents for Nine Sites at Eareckson Air Station, Alaska. This document is being submitted to fulfill the requirements of Contract Data Requirements List A001B (Decision Document).

Should you have any questions, please do not hesitate to contact me by phone at (907) 266-1145 or by e-mail at richard.girouard@mwhglobal.com.

MWH is pleased to be of continued service to AFCEE.

Sincerely,
MWH Americas, Inc.

Richard Girouard
Project Manager

cc: 611th CES/CEAR (Keith Barnack) – 3 hard copies, 3 CDs

1835 S. Bragaw Street
Suite 350
Anchorage, Alaska 99508

TEL 907.248.8883
FAX 907.248.8884
www.mwhglobal.com

Richard Girouard

From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [Keith.Barnack@ELMENDORF.af.mil]
Sent: Wednesday, September 30, 2009 6:22 AM
To: Richard Girouard; Klasen, James F Civ USAF 11 AF 11AF/JACE
Subject: FW: OT048 ROD comments
Attachments: 29 Sept 2009 Draft CERCLA ROD for OT048 comment response form.doc

FYI.

// 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: Tuesday, September 29, 2009 3:30 PM
To: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR
Subject: OT048 ROD comments

Keith,

I have no0t had a chance to review these comments with John yet but I thought that I would send you this word version of the comments so that we can potentially discuss some of the issues at tomorrow's meeting.

See you tomorrow afternoon,

Jonathan Schick

Environmental Program Specialist

ADEC Contaminated Sites Program

(907) 269-3077

Alaska Department of Environmental Conservation
Comments on the CERCLA Draft Record of Decision OT048 (Water Gallery)
Eareckson Air Station, Alaska
Document Date: July, 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: September 23, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1-2	1.2	Please amend the wording in the first paragraph on the page so that it states, "The State of Alaska Department of Environmental Conservation (ADEC) concurs that the selected remedy complies with State law."	
2.	1-2	1.4	The State is concerned about the limited amount of recent data and the fluctuation in the concentration of TCE in the groundwater at the site. No data trend is discernable from the limited amount of available recent data. We recommend that groundwater monitoring can be discontinued with the ADEC's concurrence after contaminant concentrations fall below ADEC's groundwater cleanup level for three consecutive sampling events or years, whichever is longer. This change would need to be incorporated in Section 2.13.2 in the Description of the Selected Remedy.	
3.	1-2	1.4	Please amend the first sentence in the second bullet under Section 1.4 so that it reads, "This remedy has been selected under state law and the USAF will obtain concurrence from ADEC prior to terminating the ICs, *modifying* current land use, or *allowing* anticipated actions that might disrupt protectiveness of ICs." This same comment is applicable in the second bullet in Section 2.13.2 on page 2-35.	
4.	1-3	1.4	In the second paragraph on this page please insert the words "with ADEC concurrence" in the last sentence so that it reads, "Groundwater monitoring can be discontinued *with ADEC concurrence* after contaminant concentration falls below the ADEC groundwater cleanup level of 0.005 mg/L for two consecutive monitoring events or years, whichever is longer"	
5.	1-4	1.7	Please amend the wording of the second line of this section so that it reads, "By signing this declaration, the ADEC concurs that the Air Force's selected remedies comply with State law."	
6.	2-14	2.6.2.2	Please differentiate which of the metal's concentrations exceed the cleanup level versus which ones exceed the background level at the site.	

Alaska Department of Environmental Conservation
Comments on the CERCLA Draft Record of Decision OT048 (Water Gallery)
Eareckson Air Station, Alaska
Document Date: July, 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: September 23, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
7.	2-17	2.6.2.4	Please include the cleanup level for TCE in the discussion at the top of the page for comparison purposes.	
8.	2-21	2.6.2.5	In the second paragraph on this page the text states that Groundwater was sampled again at *WG107* in 2000…" Is this a typo intended to be *WGW7* or is this paragraph referring to a different sample location?	
9.	2-21	2.7.1	Please clearly state what the current land use status is for the site as the text only states that the anticipated land use will not change.	
10.	2-21	2.7.1	This section should include mention that there are part time residents working at the facility and to a certain extent recreating at the facility.	
11.	2-26	2.8.1.1	Please elaborate on why the Methylene chloride detections are believed to represent laboratory contamination.	
12.	2-26	2.8.1.3	Why is the word potential in italics in the first line of this section?	
13.	2-29	2.10	Please delete the last two sentences on page 2-29. No other alternatives address when they are typically justified and this is not relevant to the discussion.	
14.	2-32	2.11	In the subsection Reduction of Toxicity, Mobility, or Volume Through Treatment, the text states that ICs reduce the mobility of contaminants by preventing their removal from the subsurface… This is not what is meant by mobility in the CERCLA regulations. Please consider amending the text.	

Alaska Department of Environmental Conservation
Comments on the CERCLA Draft Record of Decision OT048 (Water Gallery)
Eareckson Air Station, Alaska
Document Date: July, 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: September 23, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
15.	2-35	2.13.2	Please remove the specific reference to collecting groundwater samples from monitoring well WGW7. If for some reason in the future, this well can no longer be sampled or a replacement well in required, then it should be more flexible in this ROD as to which well will be sampled.	
16.				
17.				
18.				
19.				
20.				
21.				

Richard Girouard

From: Richard Girouard
Sent: Tuesday, November 17, 2009 10:31 AM
To: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR
Subject: RE: OT048 RTCs

Keith,

The RTCs look good to me. We sent in our funding request to AFCEE on Nov. 3rd.

Rick

From: Barnack, Keith Civ USAF 611 ASG 611 CES/CEAR [mailto:Keith.Barnack@ELMENDORF.af.mil]
Sent: Tuesday, November 17, 2009 8:36 AM
To: Richard Girouard
Subject: OT048 RTCs

Rick: Last week Jim Klasen and I went over ADEC's comments to the draft OT048 ROD. Attached are our responses. Please look over and see if you agree or not and if so let me know and I'll forward to Jonathan. They were I think pretty straight forward. Did you , MWH, get the additional cost into AFCEE 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

Alaska Department of Environmental Conservation
Comments on the CERCLA Draft Record of Decision OT048 (Water Gallery)
Eareckson Air Station, Alaska
Document Date: July, 2009
Commenter: Jonathan Schick; ADEC
Comments Developed: September 23, 2009

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	1-2	1.2	Please amend the wording in the first paragraph on the page so that it states, "The State of Alaska Department of Environmental Conservation (ADEC) concurs that the selected remedy complies with State law."	Concur
2.	1-2	1.4	The State is concerned about the limited amount of recent data and the fluctuation in the concentration of TCE in the groundwater at the site. No data trend is discernable from the limited amount of available recent data. We recommend that groundwater monitoring can be discontinued with the ADEC's concurrence after contaminant concentrations fall below ADEC's groundwater cleanup level for three consecutive sampling events or years, whichever is longer. This change would need to be incorporated in Section 2.13.2 in the Description of the Selected Remedy.	Concur
3.	1-2	1.4	Please amend the first sentence in the second bullet under Section 1.4 so that it reads, "This remedy has been selected under state law and the USAF will obtain concurrence from ADEC prior to terminating the ICs, *modifying* current land use, or *allowing* anticipated actions that might disrupt protectiveness of ICs." This same comment is applicable in the second bullet in Section 2.13.2 on page 2-35.	Concur
4.	1-3	1.4	In the second paragraph on this page please insert the words "with ADEC concurrence" in the last sentence so that it reads, "Groundwater monitoring can be discontinued *with ADEC concurrence* after contaminant concentration falls below the ADEC groundwater cleanup level of 0.005 mg/L for two consecutive monitoring events or years, whichever is longer"	Concur
5.	1-4	1.7	Please amend the wording of the second line of this section so that it reads, "By signing this declaration, the ADEC concurs that the Air Force's selected remedies comply with State law."	Concur
6.	2-14	2.6.2.2	Please differentiate which of the metal's concentrations exceed the cleanup level versus which ones exceed the background level at the site.	Concur

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7.	2-17	2.6.2.4	Please include the cleanup level for TCE in the discussion at the top of the page for comparison purposes.	Concur
8.	2-21	2.6.2.5	In the second paragraph on this page the text states that Groundwater was sampled again at *WG107* in 2000…" Is this a typo intended to be *WGW7* or is this paragraph referring to a different sample location?	Concur, it is a typo
9.	2-21	2.7.1	Please clearly state what the current land use status is for the site as the text only states that the anticipated land use will not change.	Concur
10.	2-21	2.7.1	This section should include mention that there are part time residents working at the facility and to a certain extent recreating at the facility.	Concur, but the part time residents are for the island and not site OT048.
11.	2-26	2.8.1.1	Please elaborate on why the Methylene chloride detections are believed to represent laboratory contamination.	Concur
12.	2-26	2.8.1.3	Why is the word potential in italics in the first line of this section?	Will change to normal font
13.	2-29	2.10	Please delete the last two sentences on page 2-29. No other alternatives address when they are typically justified and this is not relevant to the discussion.	Concur
14.	2-32	2.11	In the subsection Reduction of Toxicity, Mobility, or Volume Through Treatment, the text states that ICs reduce the mobility of contaminants by preventing their removal from the subsurface… This is not what is meant by mobility in the CERCLA regulations. Please consider amending the text.	Concur partially, change to "reduce the potential to spread contaminants by human activity"

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15.	2-35	2.13.2	Please remove the specific reference to collecting groundwater samples from monitoring well WGW7. If for some reason in the future, this well can no longer be sampled or a replacement well in required, then it should be more flexible in this ROD as to which well will be sampled.	Concur
16.				
17.				
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19.				
20.				
21.				

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

SEAN PARNELL, GOVERNOR

555 Cordova Street
Anchorage, AK 99501
PHONE: (907) 269-3077
FAX: (907) 269-7649
www.dec.state.ak.us

File # 2649.38.032

November 19, 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: Draft Record of Decision (ROD) for OT048 dated July, 2009
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 Record of Decision for the Water Gallery (OT048) at Eareckson Air Station in our office on August 11, 2009. We have completed our review of the Draft ROD and have provided comments on September 29, 2009; and received your response to comments on November 17, 2009. We have reviewed your response to comments and concur with the contents. We plan to review a Final version to confirm that the agreed upon changes have been included and then sign the Final document.

Thank you for providing response to our comments on the July 2009 version of the Draft ROD for OT048. I look forward to seeing the Final version. 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

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STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

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CONTAMINATED SITES PROGRAM

SEAN PARNELL, GOVERNOR

555 Cordova Street
Anchorage, AK 99501
PHONE: (907) 269-3077
FAX: (907) 269-7649
www.dec.state.ak.us

File # 2649.38.032

March 10, 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: Prefinal Record of Decision (ROD) for OT048 dated February 2010,
Eareckson Air Station, Alaska

Dear Mr. Barnack:

The Alaska Department of Environmental Conservation (ADEC) Federal Facilities Oversight group received a copy of the Prefinal version of the Record of Decision for the Water Gallery (OT048) at Eareckson Air Station in our office on March 2, 2010. We have completed our review of the Prefinal ROD. We have reviewed your response to comments and concur with the contents as well as the comments provided by the Air Force as an addendum to this version of the ROD. With one exception, all of the agreed upon changes have been made in the document. With the inclusion of the additional comments from the Air Force and correction of the error described below, the ADEC is prepared to sign the final version of this ROD.

One error was noted in this Prefinal version that will need to be addressed before a Final version will be signed. On Page 2-38 in the documentation of Significant Changes section in the bullets at the bottom of the page, please change the text so that it reads, "MNA will be performed until TCE concentrations are below the ADEC Groundwater Cleanup Levels for *three* consecutive sampling periods..." to match the rest of the document.

Thank you for providing a copy of the Prefinal version of the ROD for OT048. I look forward to seeing the Final version. 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

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