RECORD OF DECISION

For

PORT HEIDEN RADIO RELAY STATION

PORT HEIDEN, ALASKA

Prepared By

United States Air Force
611th Civil Engineer Squadron
Pacific Air Forces
Elmendorf Air Force Base, Alaska

February 2009

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LIST OF ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AKDOT	Alaska Department of Transportation
AR	Administrative Record
ARARS	Applicable or Relevant and Appropriate Requirements
AT&T	American Telephone and Telegraph
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CES	Civil Engineer Squadron
CFR	Code of Federal Regulations
COC	Contaminants of Concern
CRP	Community Relations Plan
cy	Cubic Yards
DERP	Defense Environmental Restoration Program
DEW	Distant Early Warning
DoD	Department of Defense
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
FAA	Federal Aviation Administration
FS	Feasibility Study
HVOC	Halogenated Volatile Organic Compound
LOAEL	Lowest Observed Adverse Effects Level
MOGAS	Motor Gasoline
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substances Contingency Plan
NOAEL	No Observed Adverse Effects Level

LIST OF ACRONYMS (CONTINUED)

PACAF	Pacific Air Forces
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
POC	Point of Contact
POL	Petroleum Oil Lubricants
ppm	parts per million
RAOs	Remedial Action Objectives
RCA	Radio Corporation of America
RI	Remedial Investigation
ROD	Record of Decision
RRO	Residual Range Organics
RRS	Radio Relay Station
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SVOC	Semivolatile Organic Compound
TCE	Trichloroethylene
TRV	Toxicity Reference Values
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
UST	Underground Storage Tank
UTL	Upper Tolerance Level
WRCC	Western Regional Climate Center

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1.0 DECLARATION

1.1 SITE NAMES AND LOCATION

Facility Name: Port Heiden Radio Relay Station (Port Heiden RRS), Alaska

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) ID Number: AK8570028698

The Port Heiden Radio Relay Station Site includes the following CERCLA Source Areas as depicted on Figure 1-1 (Indicated Numbers Correspond to those numbers used in the 2006 Port Heiden Remedial Investigation (RI) Report [USAF, 2006]):

- Former Composite Building (OT001),
- Septic Tank and Septic System Outfall (SS004),
- Landfill and Debris Burial Areas Including LF07 (Radio Relay Station Landfill)
- Other Areas (Non-Numbered) Identified in the RI Report
    - Antenna Pads
    - Contaminated Soil Removal Areas
    - Drum Storage Area
    - Focus Area

Please refer to the summary in Section 2.8 of this Record of Decision (ROD) for further descriptions of the source areas.

Site Location: Port Heiden, Alaska. The RRS is located in Section 27, Township 37 South, Range 59 West, Seward Meridian.

Latitude and Longitude: 56^{o} 58’ 38.31” North, 158^{o} 39’ 15.38” West

The former Port Heiden RRS site is located on the north side of the Alaska Peninsula, approximately 400 air miles southwest of Anchorage. The former site was constructed during 1955-1960 as a Distant Early Warning (DEW) line radar station, and was active until 1981. The Former RRS is located about 6 miles north of the village of Port Heiden. Besides buildings, it contained a drum storage area, a landfill, underground storage tanks, lagoons (where contaminants were disposed), a septic system, and debris burial areas. From 1990 through 1992, the United States Army Corps of Engineers (USACE) demolished all buildings and structures at the facility and buried them in a landfill just east of the former Port Heiden RRS gravel pad.

Several dirt roads connect the installation to the Village of Port Heiden. Access to the area is by air or barge. The former Port Heiden RRS site is approximately 3,000 feet from the air strip which is serviced by small commercial carriers. The gravel air strip is approximately 6,000 feet long. Gravel roads connect the air strip, Village of Port Heiden, barge landing area, the landfill, and the Port Heiden RRS. The roads are in moderately good condition.

Approximately 80 people live in the Village of Port Heiden. Landowners within the Port Heiden RRS include the Alaska Peninsula Corporation, the Alaska Department of Transportation (AKDOT), and the United States Air Force (USAF).

Groundwater beneath the former RRS site is about 50 feet deep and generally flows to the west and northwest away from the village of Port Heiden. No major rivers or creeks flow through the former RRS but the smaller Reindeer Creek (locally known as North River) is located approximately 1 mile north of the RRS area. The residents of Port Heiden obtain drinking water from wells near the village; surface water is not used for drinking. The closest drinking water well is located approximately 2.5 miles from the site, near the village of Port Heiden.

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision presents the Final Selected Remedy for the source areas listed above at Port Heiden RRS, located in Port Heiden, Alaska.

There are some areas contaminated with Petroleum, Oil and Lubricants (POL) at the RRS. The remedies for POL contaminants are not selected in this ROD, but will be addressed in a subsequent work plan submitted in accordance with Alaska Department of Environmental Conservation (ADEC) regulations.

The selected remedy was chosen in accordance with Alaska State Laws and Regulations and in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

1.2.1 CERCLA Statement of Basis and Purpose

There are several CERCLA hazardous substances identified as contaminants of concern (COCs) at the Port Heiden RRS. The soil COCs at this site consist of Polychlorinated biphenyls (PCBs), pesticides (Dieldrin, Heptachlor Epoxide), and Polycyclic Aromatic Hydrocarbons (benzo(a)pyrene, benzo(a)anthracene, dibenzo(a,h)anthracene). Groundwater COCs consist of Trichloroethylene (TCE) and benzene.

This decision document presents the selected remedy for the Port Heiden RRS in Port Heiden Alaska in accordance with CERCLA as amended by SARA, and the NCP.

This ROD is issued by the USAF in accordance with and satisfying the requirements of the Defense Environmental Restoration Program (DERP), 10 *United States Code* (USC) 2701 et seq.; CERCLA 42 USC 9601 et seq.; Executive Order 12580, 52 *Federal Register* 2923 (23 January 1987); and NCP, 40 *Code of Federal Regulations (CFR)* 300.

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 Port Heiden RRS.

The State of Alaska concurs with the selected soil remedy (Excavation, Soil Washing and Offsite Disposal in a Permitted Landfill) and the selected groundwater remedy (Monitored Natural Attenuation and Long Term Monitoring).

1.2.2 Statement of Basis and Purpose Under State of Alaska Regulations

Because PCBs, Pesticides, Polycyclic Aromatic Hydrocarbons (PAHs), TCE and benzene are COCs under State of Alaska laws and regulations, the subject sites are being addressed consistent with those applicable laws and regulations, including but not limited to Title 46 of the Alaska Statutes and regulations promulgated there under.

This ROD is issued by the USAF in accordance with and satisfying the requirements of the Alaska Oil and Hazardous Substance Pollution Control Act, 18 Alaska Administrative Code (AAC) 75, revised as of October 9th, 2008.

The State of Alaska concurs with the selected soil remedy (Excavation, Soil Washing and Offsite Disposal in a Permitted Landfill) and the selected groundwater remedy (Monitored Natural Attenuation and Long Term Monitoring).

1.3 ASSESSMENT OF SITES

1.3.1 Assessment Under CERCLA

Response actions at the subject site selected in this ROD are necessary under CERCLA 42 U.S.C Sections 9601 – 9628, to protect public health or welfare or the environment.

The response actions were selected according CERCLA, Section 120(f) and the NCP, Section 300.430(f)(4). These federal laws regulate the cleanup of old hazardous waste sites that contain substances covered under CERCLA.

1.3.2 Assessment Under Alaska State Regulations

Response action at the site is necessary to meet 18 AAC 75 cleanup levels at the Port Heiden RRS sites. Past activities at Port Heiden RRS that may have generated hazardous substances during facility operation included chemical storage, building and mechanical equipment maintenance, use of transformers, landfill disposal, sewage disposal, and application of herbicides and pesticides.

The past practices have led to contamination of the soil with PCBs, PAHs, and pesticides above State of Alaska cleanup levels protective of unrestricted use. The response actions selected in this ROD are necessary under Alaska State authority to meet soil cleanup levels promulgated in ADEC regulation 18 AAC 75.341(c) Table B1, Method 2.

Groundwater is contaminated with TCE and benzene above unrestricted use concentrations. The response actions selected in this ROD are necessary under Alaska State authority to meet groundwater cleanup levels promulgated in ADEC regulation 18 AAC 75.345(b)(1) Table C.

1.4 DESCRIPTION OF SELECTED REMEDY

1.4.1 Soil

Under the selected soil remedy, contaminated surface and subsurface soil will be excavated to the depth necessary to meet the cleanup concentrations shown in Table 1-1.

Table 1-1
Soil Cleanup Levels

Compound	Cleanup Level (mg/kg)
Polychlorinated biphenyls	1
Dieldrin	0.015
Heptachlor epoxide	0.2
Benzo(a)pyrene	0.49
Benzo(a)anthracene	3.6
Dibenzo(a,h)anthracene	0.49

The soil cleanup levels to be attained by the selected remedy are shown in Table 1-1. These cleanup levels, once they are attained, will allow the current use of the site. Pesticides may remain at the site after cleanup at concentrations above migration to groundwater standards (per 18 AAC 75.341 Table B1, October 2008). See Section 2.17 of this ROD pertaining to determination of pesticide cleanup levels for further information.

The cleanup will be accomplished by first excavating the portion of soil that contains PCBs greater than or equal to 10 mg/kg (soil may include incidental pesticides and PAHs). This portion of the contaminated soil will be washed in an alcohol-based solvent to extract PCBs and reduce the PCB concentration in the treated soil to less than 10 mg/kg. Sampling of the treated soil will be performed to confirm PCB concentrations are below 10 mg/kg. Recalcitrant soil that cannot be treated using soil washing to meet required PCB concentration (<10 mg/kg) will be barged offsite for proper disposal. Upon confirmation that the treated soil contains PCBs less than 10 mg/kg, the soil will be loaded into trucks and taken to the local permitted Class III landfill for disposal.

The remaining soil containing PCBs greater than 1 mg/kg will be excavated. This soil which contains PCBs greater than 1 mg/kg but less than 10 mg/kg will also be loaded into trucks and taken to the offsite Class III Landfill for disposal.

Soil containing concentrations of PCBs less than 10 mg/kg but with concentrations of pesticides and PAHs above their cleanup levels (see Table 1-1) will be excavated and taken to the local Class III landfill for disposal.

Tundra will only be excavated to remove dieldrin in soil where concentrations exceed the 18 AAC 75.341(c) Method 2 human health risk direct contact value of 0.32 mg/kg. At the existing Port Heiden RRS Landfill, excavation of contaminated soil will stop upon encountering landfill solid waste and the cap will be restored with clean soil.

After all soil washing is complete, the PCB, pesticide, and PAH enriched residue generated during the soil washing process will be handled and disposed in accordance with state and federal regulations.

Upon completing the excavation, confirmation samples will be collected and analyzed to ensure the remaining soil meets the cleanup levels for PCBs, PAHs and/or pesticides listed in Table 1-1. Any soil not meeting cleanup levels will be further excavated and resampled.

The new Class III landfill will be constructed with separate cells identified for disposal of soil containing only PCBs and other cells for disposal of soil containing mixtures of PCBs/pesticides/PAHs. Cells containing PCB/pesticide/PAH contaminated soil will be covered with an impermeable liner as an enhancement to the Class III landfill to prevent rainwater from leaching pesticides/PAHs from these soils.

Approximately 6,000 to 7,500 cy of soil is contaminated with PCBs, PAHs and pesticides at concentrations above cleanup levels. It is also estimated that approximately 1,500 cy of soil contain PCBs greater than or equal to 10 mg/kg and will undergo soil washing.

A notice type of institutional control will be implemented (with the land owners consent) to control the use of soil containing residual concentrations of dieldrin above 0.0076 mg/kg. The location of the institutional control area is depicted on Figure 1-2. This notice will make the Land Owner aware that ADEC approval is required for any disturbance of soil (the goal of this institutional control is to prevent the constant contact of this media with water which could impact groundwater or surface water quality).

At the RRS landfill, institutional controls (IC) will be established to provide notice that the remaining buried wastes may contain contaminants of concern, that the cover should be maintained, and excavation into or development over the Port Heiden RRS Landfill should be restricted to maintain the integrity of cap and to prevent migration of contaminants.

If future property use includes disturbance of the institutional control area (see Figure 1-2) such that the remaining pesticide contaminated soil comes in constant contact with water, or other information becomes available which indicates that the site may pose an unacceptable risk to human health, safety, welfare or the environment, the land owner and/or operator are required under 18 AAC 75.300 to notify ADEC and evaluate the environmental status of the contamination in accordance with applicable laws and regulations. Further site characterizations and cleanup may be necessary under 18 AAC 75.325-.390.

In the future, if soil is removed from the site it must be characterized and managed following regulations applicable at that time. Pursuant to 18 AAC 75.325(i)(1) and (2), ADEC approval is required *prior* to moving or disposing of soil that is, or has been, subject to the cleanup rules found at 18 AAC 75.325-.370.

The Air Force will submit an Institutional Control Performance Report to the ADEC on an annual basis for the first five years post-remedial action in-place. The frequency of the Institutional Control Performance Report will be evaluated with the five-year review under 42 USC 9621(c). This report shall include information pertaining to any breaches to IC's, corrective actions taken, and any property transfer.

1.4.2 Groundwater

The selected remedy for groundwater is Monitored Natural Attenuation (MNA). Groundwater monitoring will be conducted in accordance with a plan approved by ADEC and the Air Force to monitor natural attenuation of the plume. As other contaminants (i.e., fuels) in the groundwater breakdown over time, their by-products will help to break down the TCE and benzene.

Natural attenuation of TCE and benzene in groundwater will meet the concentrations listed below:

Table 1-2
Groundwater Cleanup Levels

Compound	Cleanup Level (mg/L)
Trichloroethylene	0.005
Benzene	0.005

Since groundwater contaminants will be left onsite for many years until cleanup goals are met, institutional controls will be necessary to control human exposure to groundwater.

Periodic groundwater monitoring and subsequent data evaluation will be conducted to verify the effectiveness of natural attenuation and that cleanup goals are achieved as discussed below.

Evaluation/Compilation of Groundwater Data

After the first five years of groundwater monitoring (performed at a frequency no less than annually during the summer period), the Air Force and ADEC will evaluate the progress of natural attenuation. Wells to be monitored will be determined as part of a Groundwater Monitoring Plan to be submitted to ADEC for coordination and approval. The five-year evaluation will compile, analyze, and review all groundwater data collected, to determine the effectiveness of natural attenuation. If during this evaluation, the data indicates contaminant concentrations in groundwater are not declining as estimated, the Air Force and ADEC may reconsider the remedy decision.

One or more of the following observations could lead to reconsideration of the remedy:

- Increase in parent contaminant concentrations indicating that other sources may be present;

- Concentrations of parent contaminants and/or daughter products may indicate that the estimated cleanup time frames may not be reached; and

- Plume of primary contaminants and/or daughter products increases significantly in aerial or vertical extent and/or volume from previous estimates.

Duration/Termination of Monitored Natural Attenuation

Under the selected remedy, natural attenuation will continue until groundwater contamination is no longer a threat to human health and the environment as verified by a minimum of two (2) years of consecutive sampling events where analytical results show that the contaminants of concern (benzene and TCE) are less than the chemical-specific concentrations shown in Table 1-2. In addition, the expected daughter products (cis-1,2-DCE, trans-1,2-DCE and vinyl chloride) derived from the COCs will be monitored and compared to chemical specific Federal MCLs and State groundwater cleanup levels. Sampling for individual groundwater COCs and their associated daughter products may be discontinued at any time after a minimum of two years of consecutive sampling events show concentrations are below chemical-specific Federal MCLs and State groundwater cleanup levels.

Institutional groundwater controls shall include limitations on groundwater use as approved by ADEC, and notices to the land owner and Village Council of site status. The location of the groundwater institutional control area is depicted on Figure 1-3. These ICs will remain in place until groundwater cleanup levels are achieved through natural attenuation. The objectives of the groundwater ICs are to prevent the drinking of TCE and benzene contaminated water and to prevent its extraction and surface use without treatment.

Any planned use of groundwater at the site must be approved by ADEC. In the event information becomes available which indicates that site groundwater may pose an unacceptable risk to human health, safety, welfare or the environment, the land owner and/or operator are required under 18 AAC 75.300 to notify ADEC and evaluate the environmental status of the contamination in accordance with applicable laws and regulations. Further site characterizations and cleanup may be necessary under 18 AAC 75.325-.390. Any contaminated groundwater that is encountered must be managed in accordance with applicable regulations, for example any dewatering must be done following ADEC approved plans that include any necessary treatment to meet discharge standards.

In the future, if groundwater is removed from the site it must be characterized and managed following regulations applicable at that time. Pursuant to 18 AAC 75.325(i)(1) and (2), ADEC approval is required *prior* to moving or disposing of groundwater that is, or has been, subject to the cleanup rules found at 18 AAC 75.325-.370.

The Air Force will submit an Institutional Control Performance Report to the ADEC on an annual basis for the first five years post-remedial action in-place. The frequency of the Institutional Control Performance Report will be evaluated with the five-year review under 42 USC 9621(c). This report shall include information pertaining to any breaches to IC's, corrective actions taken, and any property transfer. The Air Force will, with landowners consent, implement, monitor, maintain, and enforce the onsite remedies selected in this ROD.

1.4.3 Remedies Required Under CERCLA

The selected remedy meets the requirements for cleanup under CERCLA 42 U.S.C Section 9621 Cleanup Standards. 42 U.S.C Section 9621 dictates preference for remedies which provide treatment to reduce the toxicity, mobility and volume over remedies which offer no treatment.

1.4.4 Remedies Required Under State of Alaska Regulations

Remedial action is necessary under State of Alaska Regulations to address hazardous and toxic compounds in site soil above Method 2 Standards and groundwater above Table C Standards.

The selected remedy meets the State of Alaska Regulations as set forth in 18 AAC 75.325 and 18 AAC 75.340 thru 345. 18 AAC 75.325(f) dictates to the maximum extent practicable, use of permanent remedies over partial cleanup through interim removal actions pursuant to 18 AAC 75.330.

1.5 STATUTORY DETERMINATIONS

1.5.1 Remedies Required Under CERCLA

The selected remedy for the Port Heiden RRS site under CERCLA is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The soil remedy satisfies the statutory preference for treatment as a principal element of the remedy. The remedy utilizes soil washing to reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment. Reduction of groundwater contaminant concentrations will occur through natural attenuation and degradation rather than active treatment due to the low concentrations of contaminants involved and the practicality of implementing groundwater treatment at this remote site.

Because there will be soil and groundwater with CERCLA hazardous substances above levels that allow for unrestricted use at the end of the onsite active cleanup process, there will be a statutory requirement for a five-year review under 42 USC 9621(c) after commencement of the remedial action to ensure the remedy continues to provide adequate protection of human health and the environment. Five-year reviews will continue as required by CERCLA .

1.5.2 Remedies Required Under State of Alaska Regulations

The selected soil remedy for the Port Heiden RRS consists of excavation, soil washing, offsite disposal in a permitted landfill, and an indefinite notice type institutional control on residual pesticide contaminated soil. This remedy complies with State of Alaska Regulation requirements under 18 AAC 75.325 through 365.

Groundwater exceeds Alaska State standards. The reduction of groundwater contaminant concentrations will occur through monitored natural attenuation and degradation. This remedy complies with State of Alaska Regulation requirements under 18 AAC 75.325 through 365.

1.6 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this site.

Table 1-3
Decision Summary Information

Decision Summary Information	Decision Summary Page Where Found
Chemicals of concern and their respective concentrations.	Page 27, Section 2.10.1 Table 2-1
Baseline risk represented by the chemicals of concern.	Page 30, 31 & 32, Section 2.10.1, 2.10.2, Table 2-2.
Cleanup levels established for chemicals of concern and the basis for these levels.	Page 50, Section 2.15.5
How source materials constituting principal threats are addressed.	Page 44, Section 2.14 and; Page 45, Section 2.15.3
Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the baseline risk assessment and ROD.	Page 26 & 27, Sections 2.9.1 and 2.9.2
Potential land and ground-water use that will be available at the site as a result of the selected remedy.	Page 50, Section 2.15.5
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected.	Page 49, Section 2.15.4
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).	Page 45, Section 2.15.2

1.7 AUTHORIZING SIGNATURES

This signature sheet documents the decision made for the Port Heiden RRS.

By signing this declaration, the ADEC concurs with the Air Force's selected remedies.

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.

Brent A. Johnson 19 MAR 09

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

3/27/09

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

2.0 DECISION SUMMARY

Note: All tables referenced in this section are located in the back of this document.

The Decision Summary identifies the Final Remedy selected for the Port Heiden RRS source areas addressed in this ROD, 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.

There are some areas contaminated with POL at the RRS. POL contaminants will be addressed in accordance with ADEC regulations.

2.1 SITE NAME, LOCATION, AND DESCRIPTION

2.1.1 Site Names and Locations

Facility: Port Heiden RRS, Alaska.

The Port Heiden Radio Relay Station Site includes the following CERCLA Source Areas as depicted on Figure 1-1 (Indicated Numbers Correspond to those numbers used in the 2006 Port Heiden Remedial Investigation Report [USAF, 2006]):

- Former Composite Building (OT001),
- Septic Tank and Septic System Outfall (SS004),
- Landfill and Debris Burial Areas Including LF07 (Radio Relay Station Landfill)
- Other Areas (Non-Numbered) Identified in the RI Report
    - Antenna Pads
    - Contaminated Soil Removal Areas
    - Drum Storage Area
    - Focus Area

Site Location: Port Heiden, Alaska

Latitude and Longitude: 56^{o} 58’ 38.31” North, 158^{o} 39’ 15.38” West

Point of Contact (POC): Mr. Pat Roth – Project Manager

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The lead agency under CERCLA for the Port Heiden RRS cleanup is the United States Air Force. Support agencies include the Alaska Department of Environmental Conservation and the United States Environmental Protection Agency.

The former Port Heiden RRS is located 400 air miles southwest of Anchorage and approximately 6 miles from the Village of Port Heiden (Figure 2-1; note that all figures are located at the end of Section 2).

Port Heiden RRS is situated atop a low glacial moraine at an elevation of 95 feet above mean sea level (MSL). The RRS is located in Section 27, Township 37 South, Range 59 West, Seward Meridian. The topography of the site slopes gently to the west and southwest. Figure 1-1 illustrates the location of the contaminated source areas addressed by this ROD.

All of the buildings and facilities have been removed from Port Heiden RRS. Gravel roads connect the former Port Heiden RRS site to the surrounding communities. Access to the installation is by commercial air carrier to the airstrip nearby or by barge to the barge landing area approximately 3 miles southwest.

No residences exist nearby. The closest residential population is approximately 2.5 miles from the site.

Groundwater beneath the former RRS site is about 50 feet deep and generally flows to the west and northwest. The groundwater thus flows away from the residential populations of Port Heiden. No major rivers or creeks flow through the former RRS but the smaller Reindeer Creek (locally known as North River) is located approximately 1 mile north of this area. The residents of Port Heiden obtain drinking water from wells near the village; surface water is not used for drinking. The closest drinking water well is located approximately 2.5 miles from the site.

2.1.2 Site Descriptions

The seven Port Heiden RRS source areas addressed in this ROD are shown on Figure 1-1 and described briefly below:

<u>Former Composite Building Foundation</u>: The former composite building is located near the center of the former Port Heiden RSS. The structure was constructed on reinforced concrete slabs and included offices, dormitories, storage space, a generator room, and a garage.

<u>Antenna Pads</u>: Four former RRS antennas and feed horns were constructed on four separate concrete pads situated around the former composite building. The antennas were previously removed, but the concrete pads are in place. Three of the four pads were covered with soil following removal of the antennas and feed horns. See Figure 6.2-6 of the Remedial Investigation (USAF, 2006) for location of the antenna pads.

It is suspected that liquids containing PCBs may have been used as coolants for the antennas, and solvents, such as TCE, may have been used to periodically clean the antennas.

Focus Area: In order to ensure that all sources of contamination within the RRS Pad were located, reconnaissance was performed over the entire pad to locate any areas of stained soil or stressed vegetation during the 2004 remedial investigation field work. One area of stressed vegetation in the northwestern portion of the Port Heiden RSS located approximately 200 feet west of the Former Composite Building Foundation was identified and labeled as the Focus Area.

Contaminated Soil Removal Areas: There were eight contaminated soil removal areas identified. These areas are located across the Port Heiden RSS and correspond to locations where contaminants exceeded screening criteria in soil based on data obtained during previous studies.

Several hundred drums of PCB-contaminated soil were excavated from several areas within the Port Heiden RSS and shipped off site in the late 1980s and early 1990s. These areas include soil on the north and east side of the former composite building, an area to the west of former Antenna No. 3, and two large areas south of the former composite building between Antenna Nos. 1 and 2.

Drum Storage Area: The Drum Storage Area is located in the northwestern portion of the Port Heiden RSS. An aerial photo taken in 1965 (USAF, 2006) clearly shows the Drum Storage Area to the northwest of the former composite building. As suggested by the name, drums of various liquids were likely stored in this area. As-built drawings indicate that a 1,450 gallon truck-filled motor gasoline (MOGAS) tank and pump were located in the southeastern portion of the Drum Storage Area. During the 2004 remedial investigation field work, no Underground Storage Tank (UST) could be found.

Septic Tank and Septic System Outfall: The septic system was generally located in the southwestern portion of the Port Heiden RSS. Piping from the former composite building ran west to the septic tank, which was approximately 200 feet in length. Piping from the septic tank branched off to the northwest, continued under a manmade dirt ridge for approximately 250 feet, and turned west into an outfall area. The septic tank may have been abandoned in place during DERP activities conducted in 1990.

Radio Relay Station Landfill: The RRS Landfill is located to the north of the Former Port Heiden RSS. No previous investigations were conducted on the Radio Relay Station Landfill prior to the 2004 remedial investigation work.

The RRS landfill covers an area of approximately 350 feet long by 300 feet wide. Several feet of fill have been placed over the landfill contents as a cover.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section provides background information about Port Heiden RRS. Historical environmental investigations at Port Heiden RRS that led to the ROD are summarized in previous studies performed to date.

Port Heiden RRS was built over the former location of Fort Morrow, which housed as many as 5,000 personnel during World War II. The former fort consisted of several hundred buildings and had a footprint covering several square miles.

From 1950 through 1959, 18 Aircraft Control and Warning and 12 Distant Early Warning (DEW) line radar stations were constructed throughout Alaska. These numbers include an Aleutian segment of DEW line stations consisting of the main station at Cold Bay and auxiliary stations at Port Heiden, Port Moller, Cape Sarichef, Driftwood Bay, and Nikolski.

The Air Force Alaskan Air Command commissioned American Telephone and Telegraph (AT&T) to develop a reliable communications system for all of Alaska (including the Aleutian Islands) that would "tie into" the DEW line and Aircraft Control and Warning radar systems. AT&T developed a tropospheric scatter system "which bounced radio signals off the troposphere." Western Electric Company was commissioned to begin construction of the system in 1955 and completed it in the early 1960s. In 1969, the Air Force site was designated as an RRS. The Air Force managed the communications system until January 1971, when management responsibilities were transferred to Radio Corporation of America (RCA), which became RCA Alascom. RCA Alascom operated the sites until they were replaced by satellite communications in 1981, rendering the DEW line and Aircraft Control and Warning systems obsolete. At that time, the sites were returned to the Alaskan Air Command for disposal. The Aleutian segment of RRS was operational from 1961 until deactivated in 1978.

Activities such as contaminant storage, water purification, building and mechanical equipment maintenance, power generation, use of transformers, landfill disposal, sewage disposal, application of herbicides and pesticides, fire protection, and use of heat recovery and circulation systems may have caused contamination at the Port Heiden RRS.

As the lead agency for remedial activities, the USAF has conducted environmental restoration activities at the Port Heiden RRS. Soil contaminated with PCBs and hazardous materials and wastes were removed. Site inspections were performed and a Remedial Investigation (RI) and Feasibility Study (FS) were completed. See Section 2.6 for a more detailed discussion of site investigations.

This work was done in accordance with CERCLA under DERP which was established by Section 211 of the SARA of 1986.

As the support agency, ADEC provides primary oversight of the environmental restoration actions. Funding is provided by the Defense Environmental Restoration Account; a funding source approved by Congress to clean up contaminated sites on U.S. Department of Defense (DoD) installations.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

2.3.1 Community Participation

NCP Section 300.430(f)(3) establishes a number of public participation activities that the lead agency (USAF) must conduct following preparation of the Proposed Plan and review by the support agency (ADEC).

In accordance with the NCP requirements, USAF distributed the *Proposed Plan For Cleanup Action at the Former Facility Area, Port Heiden RRS* (Appendix A) to the local communities and the public to solicit public input. The Proposed Plan was distributed on 15 February 2008. As a result of community feedback, the selected remedy was revised. The Proposed Plan was changed, republished and submitted for public review again on 10 October 2008. A public meeting was held, and numerous questions were asked. No written comments were submitted on the Proposed Plan.

Responses to comments received during the public comment period are included in the Responsiveness Summary, which is provided as Section 2.18.

2.3.2 Port Heiden RRS Community Relations Activities

A Community Relations Plan (CRP) was prepared for Port Heiden RRS in 1998 (USAF, 1998). A CRP is prepared to promote communication between the USAF and the general public during environmental restoration activities at Port Heiden RRS.

As required by CERCLA, an Administrative Record (AR) has been established for the Port Heiden RRS by the 611th Civil Engineer Squadron (CES) Environmental Restoration Section, The AR is the legal record for the Environmental Restoration Program (ERP) process at USAF installations and includes copies of all technical reports, regulatory correspondence, meeting minutes, and other documents relied upon for restoration decisions. The AR is located at 10471 20th Street, Suite 302 at Elmendorf AFB, Alaska. The USAF Community Relations Coordinator, Mr. Tommie Baker, is the point of contact for the Administrative Record. He can be reached at (907) 552-4506 or 1-(800) 222- 4137, and by email at tommie.baker@elmendorf.af.mil.

The Administrative Record is also available on the internet at www.adminrec.com (select DOD, then Pacific Air Forces [PACAF], then Alaska, then Port Heiden), although the most recent documents may not be available yet on the internet. The Administrative Record contains the information that has been used to support USAF decision-making and is accessible to the public.

A mailing list of interested parties in the community is maintained and updated regularly by the USAF Remedial Project Manager or the Community Relations Coordinator. The mailing list is used to provide interested parties copies of the newsletters, fact sheets, and public meeting notices pertaining to the environmental issues at Port Heiden RRS.

A statewide toll-free telephone number (800-222-4137) is available throughout Alaska to enable interested individuals to contact the Air Force 611 CES Community Relations Coordinator at

Elmendorf AFB. Interested individuals are encouraged to use this toll-free number to obtain information about the activities at the Port Heiden RRS or the ERP process.

2.4 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

Soil at the Port Heiden RRS is contaminated with PCBs, PAHs and pesticides. Groundwater is contaminated with TCE and benzene as two small plumes.

The USAF, with concurrence from ADEC, has organized the environmental restoration work at Port Heiden RRS into the seven source areas described earlier. Remediation of these seven source areas (including a notice type institutional control) and completing groundwater remediation will result in the Port Heiden RRS being acceptable for unrestricted use (with the exception of a restriction on placing soil containing residual pesticides in water). Cleanup of the soil and groundwater under this action will constitute the final action at this site.

2.5 PORT HEIDEN RRS ENVIRONMENTAL CHARACTERISTICS

2.5.1 Physiography and Climate

Port Heiden has a cold maritime climate characterized by high humidity, considerable cloudiness, frequent fog, and light rain or snow. Mean annual precipitation is 15.22 inches, with the majority of precipitation falling between July and October. Average snowfall is 53.8 inches. Summer temperatures between June and August average 50.6°F, while winter temperatures between November and February average 22.8°F. Extreme temperatures of 87°F and -26°F have been recorded (Western Regional Climate Center [WRCC], 2004). According to the Federal Aviation Administration (FAA), average annual wind speed at the Port Heiden site is 14.6 miles per hour, with the prevailing wind direction from the south-southeast.

2.5.2 Geology

Port Heiden RRS is located on the north side of the Alaska Peninsula on the coastal plain of Bristol Bay. The Alaska Peninsula is composed mainly of volcanic rocks, volcanoclastic sedimentary rocks and occasional plutons. Aniakchak Crater is located approximately 20 miles east of the site. The most recent ash-producing eruption from Aniakchak took place in 1931. Mount Veniaminof is located approximately 60 miles southwest of the site, but is not known to produce large ash eruptions.

The major geologic deposits in the area include volcanic, glacial, lake and swamp, and marine terrace deposits (Hogan, 1995). The Port Heiden RRS was constructed on a glacial moraine at an elevation of approximately 95 feet above MSL. Near the Port Heiden RRS, soils appear to be composed of glacial till. Little was known about subsurface soil conditions at the RRS prior to the 2004 investigation. Previous work indicated that there was a regional clay layer of unknown thickness that starts approximately 12 feet below ground surface (bgs) in the vicinity of the Port Heiden RRS (USAF, 1994). Well drilling data from the community of Port Heiden indicate that surface soil is comprised of sand and pumice deposits that extend to approximately 15 to 25 feet bgs. This is apparently underlain by a layer of silty clay to silty gravel, which extends to a depth of approximately 50 to 90 feet. Beneath these strata is a layer of saturated coarse sand and gravel (USACE, 2003). Similar strata were described during trenching at the Port Heiden RRS (USAF, 1996).

2.5.3 Hydrogeology and Surface Water Hydrology

Wetlands are abundant in the southern third of the site. Water from the wetlands may flow into Bristol Bay through multiple pathways, including local creeks and groundwater. No major rivers or creeks flow through any of the areas included in this investigation; however, approximately 3/4 of a mile north of the site is a tributary of Reindeer Creek (locally referred to as the North River), a subsistence use area for Port Heiden residents.

Little data was available concerning groundwater conditions at the Port Heiden RRS. Previous studies of residential wells to the south of the site determined that groundwater existed in a confined aquifer at a depth of approximately 60 feet.

2.5.4 Ecology

The Port Heiden RRS is located on a coastal plain adjacent to a large shallow bay and contains several different habitats: beach, low-shrub and ericaceous tundra, and low, wet areas and bogs. The area is considered good wildlife habitat, and is used seasonally by caribou, waterfowl, bear, seabirds, and marine mammals. Brown bear use of the area varies depending on the availability of food sources. Predators, including red fox, wolves, wolverine, river otter, mink, least weasel, ermine, and, occasionally, lynx, and Arctic Fox inhabit the area. Herbivores in the area include muskrat, beaver, lemmings, porcupines and Arctic ground squirrel. Cockles are found in the intertidal zone along some areas of the coast.

The terrestrial environment of the Alaska Peninsula is very diverse. Habitats include the open, low-shrub, and ericaceous tundra found on the tops and windward sides of the small hills, ridges, and exposed areas.

2.6 SUMMARY OF CHARACTERIZATION AND REMEDIATION ACTIVITIES AT THE PORT HEIDEN RRS

Investigation and remediation activities have occurred in several phases at the Port Heiden RRS to determine if former installation operations caused environmental impacts. This section provides details of past activities, which include site characterization and remedial activities. Historical site characterization events are summarized in Section 2.6.1, and historical remediation activities are discussed in Section 2.6.2**.**

2.6.1 Site Characterization Activities

- In 1986, soil samples were collected throughout the Port Heiden RRS Area. Selected samples were tested for PCBs, metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), semivolatile organic compounds (SVOCs), and halogenated volatile organic compounds.

- In 1986, 1987, and 1988, the USACE conducted site investigations and prepared bid documents for the demolition and restoration of the site (USAF, 1994).
- During 1987 and 1988, 80 soil samples were collected on the north end of the Former Composite Building and analyzed for PCBs. PCB-impacted soil was found along the entire northern wall of the composite building. The north end of the Former Composite Building was the focus of soil excavation and removal during the 1990 investigation and restoration activities.
- In 1989, a Site Investigation (SI) was completed at the Port Heiden RRS. Five soil samples were collected at the septic tank location and analyzed for VOCs, SVOCs, priority pollutant metals, PCBs, diesel range organics (DRO), and residual range organics (RRO).
- In 1995, a preliminary assessment and site inspection, including the collection of soil samples was performed, by the 611th Air Support Group (USAF, 1996).
- In 2000, an additional site investigation was performed. The site investigation included the collection of soil samples at locations identified as needing further investigation (USAF, 2000).
- In 2003, all private drinking water supply wells in the community of Port Heiden were sampled under the ADEC Village Safe Water Program (ADEC, 2003).
- In 2004, RI field work was completed at the Port Heiden RRS. The objective of the RI was to delineate the nature and extent of any contamination present, determine the remedial alternatives that would best address risks to human health and the environment associated with any site contamination, and prepare a Record of Decision for the former facility.

2.6.2 Remedial Activities Performed

- In 1981, the Air Force removed asbestos-containing pipe insulation, scrap metal, wood, water and fish-oil based paints, and 20 empty petroleum oil lubricants (POL) barrels from the Port Heiden RRS. These materials were disposed of in Landfill A (asbestos-containing material and building debris) and at BS I, northwest of the composite building. More than 100 empty POL barrels were buried at landfills designated BS II-VIII; however, the locations of the burial sites were unknown. Assorted oil-based paints, PCB-contaminated transformers, capacitors, unknown fluids, waste oil barrels, and toluene liquid were removed by the 5099th (currently 611 Civil Engineer Squadron [CES]) for shipment to Elmendorf Air Force Base.
- In 1984, the 5099th CES shipped transformer oil containing PCBs, 372 drums of PCB-impacted soil, 5 waste oil drums, herbicides (Esteron 2,4-D), and approximately 6 drums of solvents and cleaning compounds from the RRS.
- In 1985 and 1986, the 5099th CES shipped 54 and 395 drums, respectively, of PCB-impacted soil to Elmendorf Air Force Base. A total of 320 drums of PCB-impacted soil was removed from an area on the southeast side of Antenna No. 2; 57 drums of PCB-

contaminated soil were removed from an area which had been excavated to a depth of 3 feet, near a doorway on the southeast corner of the composite building; and 33 drums of PCB-impacted soil were removed from an area on the west side of Antenna No. 3 (USAF, 1996).

- From 1990 to 1992, contractors demolished the site, and removed hazardous wastes and PCB- and petroleum-impacted soil (USAF, 1994).
- In 1990, a grid in the area north of the composite building was surveyed and sampled. If field or confirmation laboratory analysis indicated that the soil concentration was above the target cleanup level, approximately 6 inches bgs of soil was removed in those areas and another sample was tested.

  Excavation work progressed in this fashion until field testing showed PCB concentrations were below 10 milligrams per kilogram (mg/kg). Confirmation samples were then collected and sent to a laboratory for analysis. When the confirmation sample results exceeded the cleanup level, more soil was removed from the vicinity of that sample until all laboratory-analyzed concentrations were below the 25 mg/kg cleanup level.

  PCB-impacted soil was also found in a diamond-shaped area northwest of the northwest corner of the composite building. Originally, soil from this location was collected as a representative background sample, however, PCBs were detected in the sample and additional sampling and excavation work was conducted. Approximately 170 cubic yards (cy) of PCB-impacted soil removed from the Port Heiden RRS and from an FAA site.
- In October 1995, a SI was conducted at the Port Heiden RRS. Soil was excavated along the north wall of the former composite building. Analytical results indicated that PCB soil concentrations above the cleanup levels were removed. Two onsite diesel underground storage tanks were also removed.

2.7 REGULATORY FRAMEWORK

This section of the ROD discusses the regulatory framework for establishing applicable cleanup levels. The state of Alaska has promulgated soil and groundwater cleanup levels in 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations. These regulations are discussed below.

2.7.1 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; and Method Four allows development of risk-based cleanup levels (RBCLs) from a site-specific risk assessment. Method Two cleanup levels were used at the Port Heiden RRS sites and are discussed further below.

Method Two tabulated soil cleanup levels for PCBs, pesticides, and PAHs are provided in ADEC 18 AAC 75.341 Table B1 and B2 (Under 40-inch precipitation zone) (hereinafter referred to as ADEC Method Two cleanup levels) for protection of three exposure pathways: migration to groundwater, inhalation, and ingestion. The Method Two cleanup levels are protective of unlimited use and unrestricted exposure[1]. The ADEC Method Two soil cleanup level (for a residential use scenario) for PCBs is 1 mg/kg, which is consistent with the Toxic Substances Control Act (TSCA; 40 CFR 761). TSCA allows cleanup of surface soil PCBs to 1 mg/Kg in high occupancy areas (which includes a residential scenario) for no further restrictions on the site.

Soil cleanup levels for the Port Heiden RRS source areas are:

- The applicable ADEC Method Two soil cleanup levels. These concentrations were based on the inhalation, direct contact, and migration to groundwater pathway (groundwater is present at the Port Heiden RRS). See Section 2.17 for a discussion of cleanup level selection.

If contamination remains at the site after cleanup and exceeds the appropriate ADEC Method Two soil cleanup level, the Institutional Control requirements in 18 AAC 75.375 must be met to restrict the site from unprotected uses.

2.7.2 Groundwater

Groundwater standards are provided in 18 AAC 75.345(b)(1) Table C. Groundwater standards are based the reasonably expected future use of groundwater as a drinking water source. ADEC can require a more stringent cleanup level than the applicable levels in Table C, if it is determined that a more stringent cleanup level is necessary to ensure protection of human health, safety, or welfare, or of the environment.

If groundwater contamination remains at the site after cleanup and exceeds the ADEC Table C groundwater cleanup level, the Institutional Control requirements in 18 AAC 75.375 must be met to restrict the site from unprotected uses.

2.8 NATURE AND EXTENT OF CONTAMINATION

The following sections discuss the nature and extent of contamination for each of the seven source areas. Overall, it is estimated that approximately 7,000 cy of soil exceed cleanup levels.

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[1] 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 performed in the Remedial Investigation indicated that contamination from the subject sites has not adversely affected the environment, nor would it be expected to do so in the future.

2.8.1 Former Composite Building Foundation

2.8.1.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.1.2 Contamination Extent

Previous work in this area detected PCBs and chlorinated solvent-contaminated soil around the perimeter of the former concrete foundations. Much of this soil was reportedly excavated and shipped off-site in earlier remedial efforts.

2.8.1.3 Investigation Summary

In 1986, soil samples were collected throughout the Port Heiden RRS. Selected samples were tested for PCBs, metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), SVOCs, and halogenated volatile organic compounds. At the composite building, results indicated the presence of PCBs up to 15 parts per million (ppm) in the vicinity of the auto shop, and halogenated volatile organic compounds (HVOCs) (trichlorofluoromethane) up to 84.2 parts per billion outside the generator room.

During 1987 and 1988, 80 soil samples were collected on the north end of the composite building and analyzed for PCBs. PCB-impacted soil was found along the entire northern wall of the composite building at concentrations up to 190 milligrams per kilogram (mg/kg). The highest concentrations were found generally at the east edge of the concrete slab in front of the large garage doors. The north end of the composite building was the focus for soil excavation and removal during the 1990 investigation and restoration activities (USAF, 1996).

As part of the 2004 RI field work, Aroclor 1260 (PCB) was detected in excess of the screening criteria (1 mg/Kg) in four of the initial nine surface soil samples. A PAH compound, benzo(a)pyrene was also found slightly above the screening criteria (1 mg/Kg) in one sample and its duplicate. Based on initial analytical data, an additional six "step-out" samples were collected for PCBs. Of these, 8 had PCBs above the screening criteria.

Figure 6.2-41 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.2 Antenna Pads

2.8.2.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.2.2 Contamination Extent

Based on chemical data from the 2004 RI work, it appears unlikely that operation of the former antennas caused any large release of PCBs or solvents based on analytical results. PCBs detected slightly above the screening criteria in samples obtained from two borings around the perimeter of Antenna Pads 1 and 2 may occur due to the adjacent contaminated soil removal areas. Native soil around the perimeter of Pads 3 and 4 appears to be uncontaminated.

2.8.2.3 Investigation Summary

Chemical analytical results indicate that the antenna pads and former antennas were not sources of large releases or sources of contamination based on the following:

- Small quantities of PCBs were detected at concentrations slightly greater than the soil screening criteria in concrete samples collected from the antenna pads.

- It appears unlikely that operation of the former antennas caused any large release of PCBs or solvents based on analytical results. PCBs detected slightly above the screening criteria in samples obtained from two borings around the perimeter of Antenna Pads 1 and 2 may occur due to the adjacent contaminated soil removal areas. The maximum PCB concentration found was 15 mg/kg. Native soil around the perimeter of Pads 3 and 4 appears to be uncontaminated.

Figure 6.2-6 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.3 Focus Area

2.8.3.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.3.2 Contamination Extent

In order to ensure that all sources of contamination within the Port Heiden RRS Pad were located, reconnaissance was performed over the entire pad to locate any areas of stained soil or stressed vegetation during the 2004 RI field work. One area of stressed vegetation in the northwestern portion of the RRS Facility Area was identified through this exercise. The area appeared to be relatively small in size (approximately 35 feet in diameter) and possibly the result of a surface release.

2.8.3.3 Investigation Summary

Chemical analytical results of the 2004 RI samples indicated that soil was impacted with PCBs. This area is relatively small in size and is likely due to the result of surface spills. The maximum PCB concentration found was 5.4 mg/kg.

Figure 6.2-38 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.4 Contaminated Soil Removal Areas

2.8.4.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.4.2 Contamination Extent

The extent of contamination associated with this area spans across the Former Port Heiden RRS.

2.8.4.3 Investigation Summary

Pesticides and PCBs constituted the majority of the contaminants found at this source area. The maximum pesticide and PCB concentrations found were 5 mg/kg and 930 mg/kg respectively.

Figure 6.2-23 and 6.2-24 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.5 Drum Storage Area

2.8.5.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.5.2 Contamination Extent

Approximately 200 feet by 150 feet of PCB and pesticide contaminated surface soil are present at the Drum Storage Area.

2.8.5.3 Investigation Summary

During a previous investigation, PCBs were detected up to 9.9 mg/kg in surface soil in the southern portion of the Drum Storage Area called the “Diamond Area.” During the RI, PCBs were detected at a maximum concentration of 19 mg/kg in an area of close proximity and north of the Drum Storage Area.

Figure 6.2-33 and 6.2-34 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.6 Septic Tank and Septic System Outfall

2.8.6.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.6.2 Contamination Extent

An area approximately 100 feet by 100 feet with PCBs above the screening criteria in surface soil is present in the vicinity of the septic tank. PCBs were found in surface soil directly below the outfall discharge point during the 2004 RI.

2.8.6.3 Investigation Summary

In 1999, five soil samples were collected as part of a site inspection at the septic tank location and analyzed for VOCs, SVOCs, priority pollutant metals, PCBs, and pesticides. One sample collected at the southwest corner of the septic tank area reportedly contained Aroclor 1260 at a concentration of 13,100 mg/kg. During the RI, PCBs were detected in several samples with a maximum concentration of 440 mg/kg.

Figure 6.2-17, 6.2-18 and 6.2-50 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.7 Radio Relay Station Landfill

2.8.7.1 Cleanup Levels

ADEC Method Two cleanup levels (protective of inhalation, direct contact, and migration to groundwater pathways) were used as soil cleanup levels.

2.8.7.2 Contamination Extent

The Radio Relay Station Landfill is located approximately 1,000 feet to the north of the Port Heiden RRS. The following is a summary of findings at the Radio Relay Station Landfill:

- The thickness of the cover soil averages approximately 3.5 feet.
- PCBs, PAHs, and pesticides are present in the soil cover material over the landfill.
- There were no detections of contaminants above screening criteria in surface or subsurface soil around the perimeter of the landfill.
- The aerial extent of buried debris in the landfill is approximately 300 feet by 400 feet.

2.8.7.3 Investigation Summary

No previous investigations were conducted on the Radio Relay Station Landfill prior to the 2004 RI. During the RI numerous surface and subsurface soil samples were collected. PCBs were generally not detected above cleanup levels (only three soil samples obtained at 2 feet bgs during the 2004 RI detected the presence of PCBs). PAHs and pesticides were also detected in one sample above cleanup levels.

The maximum concentration of PCBs detected was 360 mg/kg.

Figure 6.2-48 in the Remedial Investigation Report (USAF, 2006) shows the nature and extent of contamination.

2.8.8 Naturally-Occurring Metals

Background metals concentrations were calculated through statistical analysis for the Port Heiden RRS area. A total of 315 normal samples of soil were collected for metals analysis. In almost all cases, metals results were either detected at concentrations below the background upper tolerance levels (UTLs) for a given metal or the metals were found below the project screening criteria.

Three metals, arsenic, cadmium and selenium, were detected at concentrations which exceeded both UTLs and screening criteria. Cadmium was detected in one sample (of 315 total) at a concentration above both its UTL and screening criteria. Because this single result appears to be anomalous, and there is no known source for cadmium contamination at the former Port Heiden RRS, cadmium was not considered a constituent of concern.

Arsenic results also exceed both UTLs and screening criteria. Arsenic was identified in such a large percentage of the samples at concentrations modestly above the screening criteria that the results appear to be clearly representative of background concentrations. Arsenic concentrations at Port Heiden are not considered to represent anthropogenic contamination for the following reasons: 1) arsenic appears to be uniformly distributed across over 90% of the normal metals samples, 2) only 3 results were found above the average background UTL for arsenic; 3) 100% of the arsenic results are below the maximum UTL calculated in background soil horizons; and 4) there is no known source for arsenic contamination at the former Port Heiden RRS.

Selenium was also detected in lowland surface soil samples above the UTL for lowland surface soils as well as the screening criteria for selenium. This result is considered anomalous and not representative of anthropogenic contamination for the following reasons: 1) few results exceeded both the screening criteria and media-specific UTL for lowland surface soils; 2) the UTL for lowland surface soils was the lowest of the 4 soil UTLs calculated for soils at Port Heiden; 3) all selenium results were below the average UTL for selenium in soil; and 4) there is no known source for selenium contamination at the former Port Heiden RRS.

There is no apparent evidence of metals contamination present at the Port Heiden RRS based on the results of the chemical analysis of inorganic constituents.

2.8.9 Groundwater

2.8.9.1 Investigation Summary

Groundwater samples were obtained from all soil borings where groundwater or fully saturated soil was encountered. A total of 33 monitoring wells were installed during the 2004 RI at the Port Heiden RRS. The decision to install a groundwater monitoring well was based on four factors: 1) the presence of groundwater at the location 2) the occurrence of contaminated soil down to the water table, 3) whether the groundwater grab sample appeared contaminated, or 4) the suitability of boring location for providing water level information.

2.8.9.2 Investigation Results

Based on the results of the 2004 RI data, two plumes have been identified in the aquifer underlying the Former Port Heiden RRS. These include a TCE plume (approximately 700 feet long, 400 feet wide, and at a depth of 50 feet bgs) underlying the Port Heiden RRS pad and a smaller benzene, and TCE plume (approximately 100 feet long, 100 feet wide, and at a depth of 50-60 feet bgs) underlying the Black Lagoon Outfall (see Figure 1-3). The maximum TCE concentration (0.69 mg/l) was found in Well DSA-MW-02 in the Drum Storage Area.

2.8.10 Conceptual Site Model

A Conceptual Site Model (CSM) has been developed for the Port Heiden RRS which documents current and potential future site conditions, receptors and exposure routes. Potentially complete exposure pathways involve multiple media (soil and groundwater) to which human and ecological receptors are exposed. Leaks/Spills, dust, infiltration, runoff, and leaching to ground water are considered primary mechanisms of release. The contaminants present at the site can make contact with human and ecological receptors through several exposure pathways. Viable exposure routes consist of ingestion, inhalation, and dermal contact with soil and groundwater.

Figure 2-2 presents the human health and ecological conceptual site model (CSM) depicting the release mechanisms and exposure routes.

2.9 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

2.9.1 Current and Future Land Use

Land use in the Port Heiden community is primarily residential. One school with approximately 34 students is also located in the community. Commercial land use includes a grocery store, several bed and breakfast establishments, and a health clinic. Drinking water is provided by individual supply wells.

Subsistence activities are carried out in many areas within and around the Port Heiden community. Residents collect terrestrial plants and animals as well as marine animals for subsistence.

Future land use around the Port Heiden RRS is anticipated to be primarily residential.

2.9.2 Groundwater and Surface Water Uses

Little data was available concerning groundwater conditions at the Port Heiden RRS until monitoring wells for the remedial investigation were completed. Previous studies of residential wells to the south of the site determined that groundwater existed in a confined aquifer at a depth of approximately 60 feet (USACE, 2003). Based on data from the RI, it is now known that the depth to groundwater varies from approximately 40 to 60 feet bgs in the RRS vicinity.

The is no current use of groundwater in the proximity of the Port Heiden RRS nor is there any planned future use of groundwater at this location. However, for purposes of the ROD, it was assumed future beneficial use includes groundwater in this area being used as a source of drinking water.

Ponds, lakes, and wetlands are abundant in vicinity of the site. Approximately 3/4 of a mile north of the site is a tributary of Reindeer Creek. The wetlands may drain into local creeks that flow westerly into Bristol Bay or through groundwater movement into Bristol Bay.

2.10 SUMMARY OF SITE RISKS

This section summarizes the human health and ecological risk assessments that have been performed at the Port Heiden RRS sites addressed in this ROD. The overall conclusion from the risk assessments is that the individual risk posed by each chemical, and cumulative risk posed by all chemicals detected at each site, are greater than acceptable risk levels and cleanup is required at the subject sites.

In accordance with the NCP's requirement for baseline risk assessment (40 CFR § 300.400 (d)) to characterize current and potential threats to human health and the environment, risk due to contamination at the Port Heiden RRS was evaluated in the RI/FS report (USAF, 2006).

The risk evaluation methodology is discussed below, followed by site-specific risk evaluation results.

2.10.1 Summary of Human Health Risk Assessment

The baseline risk assessment estimates the risks posed by the sites if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the approaches used and the results of the baseline risk assessment for the seven subject sites.

There are many uncertainties in assessing risks to people from chemicals occurring in the environment. Uncertainty reflects limitations in knowledge and assumptions that must be made in order to quantify health risks. Risk assessments involve several components, including analysis of toxicity and exposure, each with inherent uncertainty.

Chemicals of Concern: Chemicals associated with unacceptable risk at a site are considered COCs. To determine whether there are any COCs at the seven subject sites, COCs were identified in accordance with ADEC Cumulative Risk Guidance (ADEC, 2002). Per the guidance, all analytes detected at concentrations greater than 1/10 of the ADEC 18 AAC 75.341

Method Two Tables B1 and B2 (Under 40-inch zone) inhalation or ingestion pathway soil cleanup levels are considered chemicals of potential concern and must be included in cumulative risk calculations.

COCs for the Port Heiden RRS source areas and their maximum concentrations are listed in Table 2-1**.**

Exposure Assessment: The objectives of the exposure assessment are to characterize potentially exposed human populations in the area associated with the former Port Heiden RRS site, to identify actual or potential exposure pathways, and to determine the extent of exposure.

The exposure assessment involves several key elements including the following: definition of local land use; definition of local water use; identification of the potential receptors/exposure scenarios; identification of exposure routes; estimation of exposure point concentrations; and estimation of daily doses.

As part of the exposure assessment, conceptual site models were developed separately for the RRS site showing the potential human exposure pathways. Complete exposure pathways included inhalation and ingestion of chemicals in soil, dermal contact, and inhalation of vapors by hypothetical residents.

Toxicity Assessment: Human health criteria (cancer slope factors [CSFs] and reference doses [RfD]) developed by the USEPA were obtained preferentially from IRIS (IRIS; USEPA, 2001a) or the 1997 Health Effects Assessment Summary Tables (HEAST; USEPA, 1997b). In some cases, the National Center for Environmental Assessment toxicity values found in the Region III Risk-Based Concentration Table (USEPA, 2001a) were used when neither IRIS or HEAST had data.

The purpose of the toxicity assessment is to select toxicity values (criteria) for each chemical evaluated in the human health risk assessment. The toxicity values are used in combination with the estimated doses to which a human could be exposed to evaluate the potential human health risks associated with each chemical.

For each COC, carcinogenic and noncarcinogenic effects (where applicable) were considered for the inhalation, dermal contact and ingestion exposure routes. Risk characterization methodology and results are discussed below.

Risk Characterization: This section of the risk assessment combines the results of the exposure assessment with the toxicity criteria identified for the COCs.

The risk characterization is an evaluation of the nature and degree of potential carcinogenic and noncarcinogenic health risks posed to current and hypothetical future receptors at the Port Heiden RRS site. Human health risks for carcinogenic and noncarcinogenic effects are discussed independently because of the different toxicological endpoints, relevant exposure durations, and methods employed in characterizing risk. The potential for carcinogenic effects is limited to exposure to only those chemicals classified as carcinogens, while both carcinogenic and noncarcinogenic chemicals are evaluated for potential noncarcinogenic effects.

Carcinogenic and noncarcinogenic risks were evaluated for each exposure pathway and scenario by integrating the exposure doses with the toxicity criteria for the COCs. The general approaches to evaluating risk are summarized below.

Carcinogenic Risk : Carcinogenic risk is calculated by multiplying the estimated daily dose that is averaged over a lifetime (lifetime-averaged doses) by a compound and exposure route-specific CSF. The calculation of carcinogenic risk is illustrated by the following equation:

Lifetime Excess Carcinogenic Risk = LADD x CSF

Where:

LADD = Lifetime average daily intake (dose) of the carcinogen, averaged over a 70-year lifetime (mg/Kg-day).

CSF = Chemical- and route-specific cancer slope factor $(mg/Kg\text{-}day)^{-1}$.

Cancer risk is expressed in terms of lifetime excess cancer risk. This concept assumes that the risk of cancer from a given chemical is in "excess" of the background risk of developing cancer (i.e., approximately 1 in 3 chances during a lifetime according to the American Cancer Society). For example, a risk of 1E-04 equates to approximately one excess cancer case in a population of 10,000 individuals due to exposure to the cancer-causing substance over a 70-year lifetime.

In assessing the carcinogenic risks posed by a site, the NCP establishes an excess cancer risk of 1E-06 as a "point of departure" for establishing remediation goals. Excess cancer risks lower than 1E-06 are not addressed by the NCP. Excess cancer risks in the range of 1E-06 to 1E-04 may or may not be considered acceptable, depending on site-specific factors such as the potential for exposure, technical limitations to remediation, and data uncertainties.

The State of Alaska has established their own carcinogenic risk management levels as described in ADEC's *Cumulative Risk Guidance* (ADEC, 2002b). Under 18 AAC 75.325(h), acceptable risk levels are considered to be those that do not exceed a cumulative carcinogenic risk standard of 1 in 100,000 (1E-05) across all exposure pathways.

Noncarcinogenic Risk: Noncarcinogenic health effects can range from rashes, eye irritation, and breathing difficulties to organ damage, birth defects, and death. Noncarcinogenic health effects are evaluated by comparing the estimated daily intake of the COC, which is averaged over the period of exposure, to its respective RfD. This is accomplished by the calculation of Hazard Quotients (HQs) and hazard indices (HIs). The HQ for a particular chemical of concern is the ratio of the estimated daily intake through a given exposure route and the applicable RfD.

The HQ-RfD relationship is illustrated by the following equation:

Hazard Quotient =	ADD/RfD		
Where:			
	ADD	=	Chronic average daily dose for the chemical averaged over the appropriate exposure period (mg/Kg-day).
	RfD	=	Chemical- and route-specific reference dose (mg/Kg-day) for a similar exposure period.

The HQ determined for each chemical of potential concern by exposure pathway and age group are summed within an exposure scenario to obtain a Hazard Index (HI). The HI is an expression of the additivity of noncarcinogenic health effects.

If an HQ or HI exceeds unity (one), there might be a potential for noncarcinogenic health effects occurring under the defined exposure conditions. Note, however, that the calculation of an individual RfD assumes a margin of safety; therefore, an HQ or HI of greater than 1.0 does not necessarily indicate that a noncarcinogenic adverse effect is likely to occur.

Under 18 AAC 75.325(h), acceptable noncancer effects are considered to be those that do not exceed an HI of 1.0 for all exposure pathways.

Human Health Risk Results

Table 2-2 provides the results of the risk assessment.

Carcinogenic Risks: Cancer risks were found to exceed $1x10^{-4}$ for both future and current scenarios. For almost all scenarios, carcinogenic risks were primarily due to soil ingestion and to a lesser extent dermal contact. Aroclor 1260 and benzo(a)pyrene contributed over 92% of the total cancer risk across all medium. Several PAHs, and pesticides also slightly exceeded the carcinogenic point of departure of 1E-06.

Groundwater risks exceeded 1E-04. Groundwater cancer risks were primarily due to TCE and arsenic.

Non-cancer Risks: Hazard Indices also exceeded 1.0 for future and current scenarios. Noncancer risks from soil were primarily due to soil ingestion and to a lesser extent dermal contact. Aroclor 1260 concentrations in soil contributed the vast majority (up to 85%) of the total non-cancer risk.

Groundwater Hazard Indices exceeded 1.0. Groundwater risks were primarily due to TCE via groundwater ingestion. More than 76% of the total noncancer HI for the child subsistence resident was from TCE.

Uncertainties: As previously mentioned, there are many uncertainties in assessing risks to people from chemicals occurring in the environment. These uncertainties are described in more detail in the original human health risk assessment in the RI report. Uncertainty reflects limitations in knowledge and simplifying assumptions that must be made in order to quantify health risks. Risk assessments involve several components, including analysis of toxicity and exposure, each with inherent uncertainty. The major uncertainties include representing chemical concentrations in environmental media, quantifying how people come in contact with chemicals, interpreting the toxicological significance of the exposure, and predicting how conditions may change in the future.

One area of uncertainty in this assessment is the assumption of future land use. The pathway of exposure contributing the greatest to total risks and hazards is the use of groundwater as a drinking water source. Groundwater at these sites are not currently being used as a drinking water source, and is not likely to be so used in the future.

2.10.2 Summary of Ecological Risk Assessment

Surface soil contamination by PCBs exceeds ecological risk target levels. The ecological toxicity of PCBs is high. Essentially, any detection of PCBs equates to potential ecological risk. Consequently, all areas with PCB contamination pose a potential risk to wildlife. In addition, dieldrin is a pesticide with a very high toxicity to wildlife, specifically birds. The accumulation of this COCs in the food chain increases the potential for risk to upper trophic-level species.

This Ecological Risk Assessment (ERA) assessed the potential for adverse impact to the ecological receptors at the Port Heiden RRS. The ERA focused on the potential link between mammalian and avian wildlife, food sources, and soil at the source areas of the site.

- The screening level evaluation identified PCBs, pesticides, and carcinogenic polycyclic aromatic hydrocarbons (PAHs) as COCs in soil in the varying source areas to be carried forward in the quantitative ERA.
- A total of six target wildlife receptors within the terrestrial food-chain were evaluated in the quantitative ERA; Tundra Vole; Masked Shrew; Least weasel; Dark-eyed Junco; American Robin; and Northern Shrike
- The target wildlife receptors listed above were evaluated based on exposure to soil and tissue through ingestion. Potential risks posed to target wildlife receptors were assessed by comparing the daily intakes calculated for soil and tissue ingestion to the toxicity reference values (TRVs) derived for birds and mammals. Chronic no observed adverse effects level (NOAEL)-based, and lowest observed adverse effects level (LOAEL)-based TRVs used in this ERA for the characterization of risk were derived using allometric methods.

<u>Ecological Risk Results</u>

Initial HQ calculations for risk from soil using exposure parameters with a large factor of safety (site use factor, aerial use factor, dietary composition factor, NOAEL-based TRV) indicated the potential for risk from PCBs, pesticides, and PAHs to at least one of the representative target receptors in at least one of the source areas. The HQs were recalculated using the LOAEL-based TRVs. After application of the LOAEL-based TRVs, the potential for risk only remained for PCBs, pesticides, and one SVOC in two of the exposure areas. A qualitative assessment of the conservative factors applied to the risk analyses found that is was unlikely that significant risk is present for wildlife species.

Uncertainties: Uncertainty in the ecological risk characterization has two primary components: uncertainty and variability. True uncertainty is indicative of an area where risk assessors have a lack or absence of knowledge of an environmental parameter. Variability refers to observed differences attributable to heterogeneity or diversity in a population or exposure parameter.

2.10.3 Basis for Action

Based on the human health and ecological risk assessments completed, it was determined that action was needed to protect human health as a result of exposure to groundwater and soil contamination at the Port Heiden RRS.

2.11 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) define what the remedial actions should accomplish to protect potential receptors. Consistent with EPA guidance and the NCP [40 CFR§ 300.430(e)(2)(i)], these objectives consider COCs, exposure routes and receptors; and cleanup goals.

The overall objectives of the Port Heiden RRS environmental site restoration are to ensure that conditions at each site are protective of human health and the environment and to comply with state and federal regulations. RAOs are the specific goals that the remedial action is designed to achieve.

Port Heiden RAOs have been developed which meet the requirements of both CERCLA and State of Alaska Regulations. Since both soil and groundwater have been impacted by COCs, RAOs are needed for both media. The RAOs were developed based on unrestricted future land use. These RAOs will eliminate site risks through either isolation of the COCs or their removal from the environment.

The RAOs are listed below:

2.11.1 Human Health RAOs

The RAOs for the source areas at Port Heiden addressed in this ROD are as follows:

- Reduce PAH (benzo(a)pyrene, benzo(a)anthracene, dibenzo(a,h)anthracene), PCB and pesticide (dieldrin, heptachlor epoxide) concentrations in soil to chemical specific ARARs identified in Section 2.15.5;

- Reduce TCE* and benzene in groundwater to chemical specific ARARs identified in Section 2.15.5;

- Prevent exposure (via ingestion, inhalation, and/or dermal contact) to contaminated groundwater until such time as the Federal drinking water standards and State cleanup levels (i.e. 18 AAC 75 Table C) are met;

- Restrict excavations and the installation of water wells (except for the purposes of monitoring) where contamination levels exceed cleanup levels to reduce the possibility of exposure to contaminants in the contaminated aquifer; and

- Prevent excavation into or development over buried solid waste and potentially hazardous materials in the former RRS landfill, and maintain that current land use designation.

*When the Air Force addresses TCE in groundwater through natural attenuation, the expected daughter or breakdown products of TCE, (cis and trans-1,2-DCE and vinyl chloride) will also be monitored until they have met the required Federal maximum contaminant levels and State cleanup levels (i.e. 18 AAC 75 Table C).

2.11.2 Environmental Protection RAOs

For Environmental Protection:

- Prevent ecological receptor ingestion of, dermal contact with, and inhalation of dust and/or vapors from soil containing PCBs, pesticides, and PAHs presenting a Hazard Index greater than one.
- Prevent the possible migration of groundwater containing TCE and benzene to the tributary stream to Reindeer Creek resulting in surface water concentrations in excess of Alaska fresh surface water criteria for aquatic organisms (18 AAC 70).

2.12 DESCRIPTION OF ALTERNATIVES

The following section provide a summary description of both the soil and groundwater alternatives considered for meeting the RAOs and eliminating or reducing site risks. Detailed description of the alternatives can be found in the Feasibility Study (USAF, 2006).

Revised soil cleanup levels were promulgated in October 2008 after the Feasibility Study and Proposed Plan were published. Use of the revised soil cleanup levels for pesticides is discussed in Section 2.17. Since the revised pesticide cleanup levels (based on protection of groundwater) are lower than the cleanup levels to be used for the remedial action, a notice type institutional control is required restricting the use of soil contaminated with residual pesticides. Therefore, soil Alternatives 2 through 10 below, by definition, will contain an institutional control (with the land owners consent) consisting of a notice restricting the placement of pesticide contaminated soil in a location where it will be in constant contact with water. This restriction is required to prevent leaching of pesticides to groundwater.

2.12.1 Soil Alternatives

Approximately 7,000 cubic yards of soil exceed the cleanup levels.

Soil Alternative 1 – No Action

In this alternative, no action is taken to remediate surface soil at the Port Heiden RRS contaminated with PCB, PAHs and Pesticides at concentrations above cleanup levels. Soil contaminated with PCBs would likely remain a risk for the foreseeable future. No monitoring would be performed at the facility to assess site conditions over time.

The No Action Alternative is required to be evaluated under the NCP as a baseline condition.

Soil Alternative 2– Institutional Controls, Impervious Capping, and Long-Term Monitoring

This alternative consists of:

- An impermeable asphalt cap placed over surface soil contaminated with PCBs, pesticides and PAHs at cleanup levels protective of human health;
- Signs placed at the property to provide notification of the presence of contamination and to warn against intrusive activities;
- Fences erected around the capped areas;
- A notice placed on the property records to notify current and potential future owners of the presence of contaminants in the soil.
- Restrictive covenants enacted that prevent intrusive activities at the property;
- Periodic site inspections to check the condition of the cap and needed maintenance would be completed.

Soil Alternative 3 – Institutional Controls; PCB Soil Hot Spot Excavation [> 20 mg/Kg], Off-site Incineration, and Disposal; and Soil Capping

This alternative consists of:

- Excavation of soil contaminated with PCBs greater than 20 mg/Kg (hot spots) and offsite incineration. Incinerated soil would be disposed appropriately;
- Placement of a soil cap over all remaining PCB-contaminated soil above a cleanup level of 1 mg/Kg, and pesticides and PAHs over their respective cleanup levels;
- Signs erected at the property to provide notification of the contamination and warn against intrusive activities;
- Fences erected around the areas that were capped to isolate contaminants;
- A notice placed on the property records to notify current and potential future owners of the presence of contaminants in soil;
- Restrictive covenants employed that prevent intrusive activities at the property;

- Periodic site inspections would occur to check the condition of the soil cap and fencing. Maintenance would be completed on an as-needed basis.

Soil Alternative 4 – Institutional Controls; PCB Soil Excavation (> 1 mg/Kg), Solidification, and On-site Disposal; DRO Soil Excavation, Off-site Thermal Treatment, and Disposal (Unrestricted Use)

This alternative consists of:

- Excavation of contaminated soil with PCBs greater than 1 mg/Kg and pesticides/PAHs over their respective cleanup levels;
- Solidification of excavated soil containing PCBs greater than 1 mg/Kg and pesticides/PAHs over their respective cleanup levels;
- Disposal of solidified soil on-site in a constructed landfill located on Air Force property;
- A notice placed on the property records for the area of the constructed landfill on Air Force property;
- Restrictive covenants employed that prevent residential use of the landfill property.

Soil Alternative 5 – PCB Soil Excavation (> 1 mg/Kg), Off-Site Incineration through a DRMO Facility and Disposal

This alternative consists of:

- Excavation of contaminated soil containing PCBs greater than 1 mg/Kg and pesticides/PAHs over their respective cleanup levels;
- Shipment of excavated contaminated soil offsite to a Defense Reutilization & Marketing Office (DRMO) facility for incineration;
- Final disposal of the incinerated soil at an appropriate disposal facility.

Soil Alternative 6 – PCB Excavation (> 1 mg/Kg) and Off-Site Disposal in a Permitted Landfill

This alternative consists of:

- Excavation of contaminated soil containing PCBs greater than 1 mg/Kg and pesticides/PAHs over their respective cleanup levels;
- Offsite shipment of excavated contaminated soil,
- Disposal of contaminated soil in a permitted landfill.

Soil Alternative 7 – In-Situ PCB Treatment, Off-site Thermal Treatment, and Disposal

This alternative consists of:

- In-situ treatment of soil containing PCBs greater than 1 mg/Kg (and pesticides/PAHs over their respective cleanup levels) using thermal blankets to heat the soil to elevated temperatures that result in the contaminants being desorbed or destroyed in situ.
- Removal of desorbed contaminants from the exhaust stream and collection;
- Shipment of the desorbed contaminants offsite for destruction by incineration.

Soil Alternative 8 – PCB Contaminated Soil In-Situ Treatment

This alternative is the same as Alternative 7 for PCB treatment. The only difference with this alternative is the approach taken for petroleum products which are not covered under CERCLA nor discussed herein.

Soil Alternative 9 – Bioremediation of PCB-Contaminated Soil

This alternative consists of:

- Excavation of contaminated soil containing PCBs greater than 1 mg/Kg and pesticides/PAHs over their respective cleanup levels;
- Construction of onsite lined cells and placement of the contaminated soil in biocells;
- Onsite treatment of biocell soil containing the contaminated soil through bioaugmentation by addition of materials to the soil to promote dechlorination and/or degradation of the contaminants.

Soil Alternative 10 - PCB Excavation (> 1 mg/Kg), Soil Washing to Reduce PCBs to < 10 mg/Kg, and Disposal in Class III Landfill

This alternative consists of:

- Excavation of soil containing PCBs greater than or equal to 10 mg/Kg (soil may contain incidental pesticides and PAHs);
- Alcohol based washing of the excavated soil containing PCBs greater than or equal to 10 mg/kg to reduce the PCB concentration to less than 10 mg/Kg;
- Excavation of soil containing greater than 1 mg/Kg of PCBs but less than 10 mg/Kg and pesticides/PAHs over their respective cleanup levels;
- Offsite disposal of washed or unwashed soil in a permitted Class III landfill in the vicinity of the Village of Port Heiden.

- Residuals from the soil washing process will be disposed of off-site in accordance with the appropriate State and Federal regulations.

2.12.2 Groundwater Alternatives

Two plumes of groundwater contamination are present at the RRS Area. One plume contains TCE and is approximately 700 feet long and 400 feet wide (depth about 50 feet below ground surface). The second plume contains benzene and TCE and is approximately 100 feet long and 100 feet wide (depth about 50-60 feet below ground surface).

Groundwater Alternative 1 – No Action

In this alternative, no action is taken to remediate groundwater at the Port Heiden RRS. Groundwater contaminated with TCE and benzene would be allowed to naturally degrade. No monitoring would be performed at the property to assess the changes in groundwater contaminant concentrations over time.

The No Action Alternative is required to be evaluated under the NCP as a baseline condition.

Groundwater Alternative 2 – Institutional Controls, Natural Attenuation, and Long-term Monitoring

This alternative consists of:

- Natural attenuation of groundwater contaminated with TCE and benzene.
- Periodic groundwater monitoring would be performed at the facility to assess changes in groundwater contaminant concentrations over time;
- A notice placed on the property records to inform current and future property owners of the presence of the groundwater contamination. These institutional controls would remain in-place until groundwater cleanup levels were achieved through natural attenuation.

Groundwater Alternative 3 – Institutional Controls, Enhanced Bioremediation, and Long-term Monitoring

This alternative consists of:

- Treatment of groundwater contaminated with TCE and benzene by injection of hydrogen releasing compounds to enhance natural biodegradation of the contaminants. These treatments stimulate the naturally occurring bacteria within the groundwater/soil matrix, increase the bacterial rate of contaminant degradation, and result in a decrease of the contaminant concentrations.
- Contaminated soil within the smear zone would also be treated by the enhanced biodegradation.

- Periodic groundwater monitoring would be performed to assess changes in groundwater concentrations over time.

- A notice placed on the property records to inform current and future property owners of the presence of the groundwater contamination. These institutional controls would remain in-place until groundwater cleanup levels were achieved.

Groundwater Alternative 4– In-situ Treatment

This alternative consists of:

- Treatment of groundwater contaminated with TCE and benzene by injection of chemical oxidants into the contaminated groundwater plume. Reaction with the oxidant would degrade the contaminants in the groundwater to concentrations below cleanup levels.

- Contaminated soil within the smear zone would be degraded by the chemical oxidant.

- Groundwater samples would be collected to ensure the TCE and benzene contamination in the groundwater was reduced to below the cleanup levels.

2.13 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Due to revisions in the soil cleanup levels (see Section 2.17), soil alternatives 2 through 10 will each contain a notice type institutional control (with the landowners consent) restricting the use of soil contaminated with residual pesticides.

The following section contains a summary of the detailed evaluation of the soil and groundwater alternatives against the nine criteria. In the section that follows, a brief explanation of each of the criteria is provided and is followed by the ranking of each of the alternatives against those criteria. Implicit in the discussion of PCB impacted soil is that pesticides and PAHs may also be present.

2.13.1 Soil Alternatives

<u>Overall Protection of Human Health and the Environment</u>

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 (Alternative 1) does not provide protection of human health and the environment. Soil contaminated with PCBs would likely remain a risk for the foreseeable future. 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 physically restricting access to the contamination (e.g., fence and cap), removing the contamination, restricting the use of soil containing residual pesticides, or treating the contamination either in-situ or ex-situ.

The alternatives that reduce the toxicity, mobility, and volume of contamination in soil either excavate the PCB-contaminated soil for off-site incineration (Alternative 3 and Alternative 5), thermally treat the PCB contamination in-situ with thermal blankets (Alternative 7 and Alternative 8), or excavate the PCB soil and perform ex-situ bioremediation or soil washing on site (Alternative 9 and Alternative 10). The remaining alternatives only reduce the mobility of the PCB contaminated soil by placing an impervious cap on top of the soil (Alternative 2), solidifying the soil on-site and placing it on-site in a landfill cell (Alternative 4), or excavating the soil and placing it in an off-site permitted landfill (Alternative 6). All of these alternatives, though different in approach, protect human health and the environment.

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 (Alternative 1) does not meet ARARs. Contaminants in surface soil currently exceed chemical-specific ARARs.

The remaining alternatives fully meet ARARs. If implementation is effective, all the other alternatives will comply with ARARs either by capping, implementing institutional controls, on-site solidification, off-site disposal in a permitted landfill, off-site thermal treatment or incineration, in-situ thermal treatment of the contamination, ex-situ bioremediation, or ex-situ soil washing of the contamination.

However, some uncertainty exists for Alternative 7, Alternative 8, and Alternative 9 about the completeness of in-situ and ex-situ treatment.

<u>Long-Term Effectiveness and Permanence</u>

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 (Alternative 1) does not provide long term effectiveness and permanence since all residual risk associated with the PCBs will remain over a long period of time.

Alternative 4 provides less long term effectiveness and permanence than the other alternatives due to likely damage caused by weathering of the solidified PCB soil and to the difficulties associated with performing operation and maintenance activities for an indefinite period of time at the landfill cell that contains the solidified PCBs. Due to the proximity of where the landfill cell would be located to the Village of Port Heiden, and the fact that the area is used by locals for subsistence purposes, the effectiveness of the controls placed on the site would be questionable.

Alternative 2 only partially provides long term effectiveness and permanence because the contaminant mass in soil at the RRS is not reduced. Therefore, the residual risk would remain at current levels. Although institutional controls would be implemented to eliminate residual risk, monitoring and maintenance of the fence, signs, and cap would be required indefinitely.

Alternative 6 and Alternative 10 also partially provide long term effectiveness and permanence. These alternatives would remove from the site all soil above risk levels under the subsistence use scenario. However in Alternative 6, the PCB soil would not be treated but would be disposed of off-site in a permitted landfill and in Alternative 10 contaminated soil containing less than 10 mg/kg PCBs would be disposed in a local Class III landfill. Although the PCB-contaminated soil would be immobilized at the permitted landfills and the risk for exposure would be minimal, these alternatives require significant long-term management of the PCB soils at the permitted landfill and may be a continuing liability. Leaching of contaminants to groundwater could occur if the membrane cover over the cells containing pesticides and PAHs fails.

The remaining alternatives fully provide long term effectiveness and permanence. If effectively implemented, Alternative 3, Alternative 5, Alternative 7, Alternative 8, and Alternative 9 restrict use of pesticide/PAH contaminated soil and either destroy, remove, or cap all other soil above risk levels.

<u>Reduction of Toxicity, Mobility, or Volume Through Treatment</u>

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 (Alternative 1) does not reduce toxicity, mobility, or volume through treatment since it does not treat the contaminants.

Eight alternatives partially reduce toxicity, mobility, or volume through treatment. They are discussed below:

- Alternative 3, Alternative 4 and Alternative 6 partially meet the criterion due to the alternatives relying on processes other than "treatment" to meet the RAOs. For Alternative 3 the institutional controls and soil capping are not considered treatment. For Alternative 4 and Alternative 6 only the mobility of the PCB-contaminated soil is reduced.
- Alternative 2 relies on institutional controls, capping, and long term monitoring which are not considered a "treatment." These options do not actively treat the toxicity and volume of the soils.
- Alternative 7, Alternative 8, and Alternative 9 partially meet the criterion due to the uncertainties of the various treatment processes associated with the alternatives.
- Alternative 10 partially meets the criteria since only a portion of the PCB contaminated soil above cleanup goals is treated. Soil containing PCBs less than 10 mg/kg is directly disposed in a local Class III landfill without treatment.

Only Alternative 5 fully reduces toxicity, mobility, or volume through treatment. The alternative would completely reduce the toxicity, mobility, and volume of contamination through incineration; the expected reductions of contaminants are good; and the process is irreversible.

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 (Alternative 1) has good short term effectiveness since no work is performed and therefore, there are no risks to workers.

Alternative 2 also has good short term effectiveness. Due to the non-invasive aspect of this alternative, risk to the community in the short term would be limited and risk to the environment would be low. Risk to workers could be easily mitigated and the time to meet RAOs would be very short.

All eight of the other alternatives have moderately good short term effectiveness, the rationale are included below:

- Alternative 3, Alternative 4, Alternative 5, Alternative 6, and Alternative 7 all have moderately good short term effectiveness; however, there are risks associated with excavating the contaminated soil and then subsequent transportation of the soil via road through Port Heiden then via barge to off-site treatment facilities. In addition, the time to set up the required facilities and remediate the PCB soil for Alternative 7 may be excessive.
- Alternative 8 has moderately good short term effectiveness; however, there are risks due to the strong oxidants used which are corrosive. Therefore the large amounts of hydrogen peroxide necessary to accomplish this alternative pose a significant threat to the

health and safety of the site workers and the community during the transportation, storage, and actual usage of the oxidants. In addition, as with Alternative 7, the time to set up the required facilities and remediate the PCB soils may be extremely long.

- Alternative 9 and Alternative 10 also have moderately good short term effectiveness due to the shorter haul route required to transport excavated soil to a treatment area onsite and to the landfill for disposal after treatment. These alternatives have short term risks associated with truck traffic, excavation, dust, and operation of the treatment equipment.

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 (Alternative 1) is easily implemented since no action is performed.

Alternative 4 has poor implementability due to the difficulties with obtaining solidification services in this remote area and constructing and maintaining the landfill cell which would have to isolate solidified soil containing high levels of PCBs. Regulatory and land owner approval of a landfill cell for disposal of soil containing high levels of PCBs is unlikely.

Alternative 9 has poor implementability due to the great uncertainty surrounding the bioremediation of PCB-contaminated soil. Potential community and regulatory reluctance to accept this alternative also make its implementability questionable.

Both Alternative 2 and Alternative 3 have fair implementability. Although both alternatives require construction tasks, the tasks are simple to perform. The reliability of the alternatives is acceptable and both would easily allow additional remedial activities if required.

Alternative 5 and Alternative 6 have fair implementability due to the difficulty with screening PCB-contaminated soil in the field prior to excavation.

Alternative 8 and Alternative 7 has fair implementability due to the difficulty associated with constructing and providing electrical power for the in-situ thermal blankets.

Alternative 10 has fair to good implementability. The alternative is readily implementable and available through a local construction company with knowledge of Port Heiden. Permitting and construction of a Class III landfill which could accept soil containing PCBs less than 10 mg/kg and pesticides/PAHs is likely attainable.

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.

Costs for the various alternatives range from a low of $2.08 million for Alternative 2 to a high of $20.4 million for Alternative 4. The alternatives with the highest costs have the highest degree of treatment. Mid-range cost alternatives rely on offsite disposal with no treatment, use insitu treatment, or treat only the highest levels of contaminated soil.

The costs for the various alternatives are provided in Table 2-3.

2.13.2 Groundwater Alternatives

Overall Protection of Human Health and the Environment

The no action alternative (Alternative 1) does not provide protection of human health and the environment and therefore does not meet the criterion.

Alternative 2, Alternative 3 and Alternative 4 provide good protection of human health and the environment. Alternatives Alternative 3 and Alternative 4 would meet chemical-specific ARARs faster than Alternative 2.

Compliance with ARARs

Alternative 1 does not meet ARARs. Contaminants in groundwater currently exceed chemical-specific ARARs. Although contaminants will degrade over time, compliance with ARARs could not be verified due to the lack of monitoring.

Alternative 2, Alternative 3, and Alternative 4 meet ARARs. Under Alternative 3, special requirements may be applicable to comply with action-specific ARARs if byproducts from chemical oxidation could enter the surrounding environment or impact threatened or endangered species in the area.

Long-term Effectiveness and Permanence

The no action alternative (Alternative 1) has poor long term effectiveness and permanence since no action would be performed. Long term effectiveness would be unknown.

All three of the other alternatives, Alternative 2, Alternative 3, and Alternative 4 have good long term effectiveness and permanence. Once response objectives have been met, there will be no untreated residual contamination, no remaining sources of risk, and no need for institutional controls.

Reduction of Toxicity, Mobility, or Volume through Treatment

The no action alternative (Alternative 1) did not meet the criteria since it would be unknown if contaminant levels would decrease.

Alternative 2, Alternative 3, and Alternative 4 will provide reduction of toxicity, mobility or volume. Alternative 3 and Alternative 4 will provide reduction of toxicity, mobility or volume but have uncertainties associated with the treatment processes. Alternative 2 will provide reduction of toxicity, mobility or volume because natural attenuation will destroy the contaminants on-site even though no active treatment is performed.

Short-term Effectiveness

The no action alternative (Alternative 1) has good short term effectiveness since no short term risks are associated with no action.

Alternative 2, Alternative 3, and Alternative 4 have fair short term effectiveness. Alternative 2 and Alternative 3 would require many years to meet cleanup levels. Alternative 4 has health and worker safety issues related to the strong oxidants when shipping and handling the chemical.

Implementability

The no action alternative (Alternative 1) is easily implementable since no action is taken.

Alternative 2 partially has good implementability because the alternative requires no construction of additional facilities or monitoring points, does not require additional materials, the services required are procured easily, it is reliable, and additional remedial alternatives could be easily implemented. Potential difficulties associated with controls planned as part of this alternative (imposing institutional controls) result in some difficulty in implementation.

Alternative 3 and Alternative 4 have fair implementability due to the additional on-site facilities and specialty equipment required.

Costs

Costs for the groundwater alternatives range from a low of $118,000 for Alternative 2 to a high of $703,000 for Alternative 4.

Costs are provided in Table 2-4.

2.14 PRINCIPAL THREAT WASTES

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur.

There are no principal threat wastes at the Port Heiden RRS. Several removals have been completed dating back to 1981. From 1981 to 1986, hazardous materials and PCB impacted soil was removed from the site (USAF, 1994). During 1990 to 1992, buildings were demolished and additional hazardous materials and PCB contaminated soil was removed. The only hazardous materials remaining on site consist of residual low level PCB/Pesticide/PAH contaminated soil which was not removed during previous work.

2.15 SELECTED REMEDY

2.15.1 Selected Remedy

The selected remedy for soil is Alternative 10 - PCB Excavation (> 1 mg/Kg), Soil Washing to Reduce PCBs to < 10 mg/Kg, and Disposal in Class III Landfill.

The selected remedy for groundwater is Alternative 2 Institutional Controls, Natural Attenuation, and Long-term Monitoring.

2.15.2 Summary of Rationale for Selected Remedy

Soil Alternative 10 was selected because it has the best balance of trade offs with regard to the various evaluation criteria. Alternative 10 also treats the portion of soil containing the highest level of PCBs to remove them from the environment or transports the contaminated soil to a landfill for disposal. This alternative also had a reasonable cost which was approximately mid-range of the costs of the alternatives evaluated while meeting ARARs.

There were three primary reasons for selecting Alternative 10: 1) this technology is much less complicated to implement compared to incineration, thermal treatment, or destruction of the contaminants using biological methods, 2) this technology treats the most contaminated soil to remove toxic chemicals (which complies with the state and federal preference for incorporating treatment and alternative technologies as a principal element in the cleanup) rather than excavating the contaminated soil and moving it to another location for disposal, and 3) the technology is locally available. Overall, Alternative 10 involves the most efficient and effective way to confidently and permanently remove contamination down to the cleanup levels from the surface soil.

Groundwater Alternative 2 was selected because it results in groundwater attaining cleanup levels over time, is protective of human health and the environment since the water at this site is not used for drinking water (there are no resident wells close by), ecological receptors are not at risk, is relative easy to implement, and has the least cost. It rates the same as Alternatives 3 and 4 for all other criteria other than cost.

2.15.3 Description of Selected Remedy

The selected remedy is defined by soil and groundwater media summarized in the following subsections.

The selected remedy for soil applies to the following areas (see Figure 1-1):

- Former Composite Building
- Septic Tank and Septic System Outfall
- Radio Relay Station Landfill

- Antenna Pads
- Contaminated Soil Removal Areas
- Drum Storage Area
- Focus Area.

The selected remedy for groundwater applies to the Black Lagoon Outfall Plume and the Former Facility Area Plume (see Figure 1-3).

Soil and Groundwater contaminants of concern and cleanup levels are provided in Table 2-5.

Table 2-5
Contaminants of Concern and Cleanup Levels

Compound	Cleanup Level
Soil (mg/kg)	
Polychlorinated Biphenyls	1
Benzo(a)pyrene	0.49
Benzo(a)anthracene	3.6
Dibenzo(a,h)anthracene	0.49
Dieldrin	0.015
Heptachlor epoxide	0.2
Groundwater (mg/L)	
Trichloroethylene	0.005
Benzene	0.005

Soil cleanup levels were obtained from 18 AAC 75.3419(c); refer to Section 2.17.
Groundwater cleanup levels were obtained from 18 AAC 75.345(b)(1).

2.15.3.1 Selected Remedy for Soil

The soil cleanup levels to be attained by the selected remedy are shown in Table 2-5. These cleanup levels, once they are attained, will allow the current use of the site. Pesticides may remain at the site after cleanup at concentrations above migration to groundwater standards (per 18 AAC 75.341 Table B1, October 2008). See Section 2.17 of this ROD pertaining to determination of pesticide cleanup levels for further information.

The cleanup will be accomplished by first excavating the portion of soil that contains PCBs greater than or equal to 10 mg/kg (soil may include incidental pesticides and PAHs). This portion of the contaminated soil will be washed in an alcohol-based solvent to extract PCBs and reduce the PCB concentration in the treated soil to less than 10 mg/kg. Sampling of the treated soil will be performed to confirm PCB concentrations are below 10 mg/kg. Recalcitrant soil that cannot be treated using soil washing to meet required PCB concentration (<10 mg/kg) will be barged offsite for proper disposal. Upon confirmation that the treated soil contains PCBs less than 10 mg/kg, the soil will be loaded into trucks and taken to the local permitted Class III landfill for disposal.

The remaining soil containing PCBs greater than 1 mg/kg will be excavated. This soil which contains PCBs greater than 1 mg/kg but less than 10 mg/kg will also be loaded into trucks and taken to the offsite Class III Landfill for disposal.

Soil containing concentrations of PCBs less than 10 mg/kg but with concentrations of pesticides and PAHs above their cleanup levels (see Table 2-5) will be excavated and taken to the local Class III landfill for disposal.

Tundra will only be excavated to remove dieldrin in soil where concentrations exceed the 18 AAC 75.341(c) Method 2 human health risk direct contact value of 0.32 mg/kg. At the existing Port Heiden RRS Landfill, excavation of contaminated soil will stop upon encountering landfill solid waste and the cap will be restored with clean soil.

After all soil washing is complete, the PCB, pesticide, and PAH enriched residue generated during the soil washing process will be handled and disposed in accordance with state and federal regulations.

Upon completing the excavation, confirmation samples will be collected and analyzed to ensure the remaining soil meets the cleanup levels for PCBs, PAHs and/or pesticides listed in Table 2-5. Any soil not meeting cleanup levels will be further excavated and resampled.

The new Class III landfill will be constructed with separate cells identified for disposal of soil containing only PCBs and other cells for disposal of soil containing mixtures of PCBs/pesticides/PAHs. Cells containing PCB/pesticide/PAH contaminated soil will be covered with an impermeable liner as an enhancement to the Class III landfill to prevent rainwater from leaching pesticides/PAHs from these soils.

Approximately 6,000 to 7,500 cy of soil is contaminated with PCBs, PAHs and pesticides at concentrations above cleanup levels. It is also estimated that approximately 1,500 cy of soil contain PCBs greater than or equal to 10 mg/kg and will undergo soil washing.

A notice type of institutional control will be implemented (with the land owners consent) to control the use of soil containing residual concentrations of dieldrin above 0.0076 mg/kg. The location of the institutional control area is depicted on Figure 1-2. This notice will make the Land Owner aware that ADEC approval is required for any disturbance of soil (the goal of this institutional control is to prevent the constant contact of this media with water which could impact groundwater or surface water quality).

At the RRS landfill, institutional controls (IC) will be established to provide notice that the remaining buried wastes may contain contaminants of concern, that the cover should be maintained, and excavation into or development over the Port Heiden RRS Landfill should be restricted to maintain the integrity of cap and to prevent migration of contaminants.

If future property use includes disturbance of the institutional control area (see Figure 1-2) such that the remaining pesticide contaminated soil comes in constant contact with water, or other information becomes available which indicates that the site may pose an unacceptable risk to human health, safety, welfare or the environment, the land owner and/or operator are required under 18 AAC 75.300 to notify ADEC and evaluate the environmental status of the contamination in accordance with applicable laws and regulations. Further site characterizations and cleanup may be necessary under 18 AAC 75.325-.390.

In the future, if soil is removed from the site it must be characterized and managed following regulations applicable at that time. Pursuant to 18 AAC 75.325(i)(1) and (2), ADEC approval is required *prior* to moving or disposing of soil that is, or has been, subject to the cleanup rules found at 18 AAC 75.325-.370.

The Air Force will submit an Institutional Control Performance Report to the ADEC on an annual basis for the first five years post-remedial action in-place. The frequency of the Institutional Control Performance Report will be evaluated with the five-year review under 42 USC 9621(c). This report shall include information pertaining to any breaches to IC's, corrective actions taken, and any property transfer.

2.15.3.2 Selected Remedy for Groundwater

The selected remedy for groundwater is Monitored Natural Attenuation (MNA). Groundwater monitoring will be conducted in accordance with a plan approved by ADEC and the Air Force to monitor natural attenuation of the plume. As other contaminants (i.e., fuels) in the groundwater breakdown over time, their by-products will help to break down the TCE and benzene.

Natural attenuation of TCE and benzene in groundwater will meet the concentrations listed in Table 2-5.

Since groundwater contaminants will be left onsite for many years until cleanup goals are met, institutional controls will be necessary to control human exposure to groundwater.

Periodic groundwater monitoring and subsequent data evaluation will be conducted to verify the effectiveness of natural attenuation and that cleanup goals are achieved as discussed below.

<u>Evaluation/Compilation of Groundwater Data</u>

After the first five years of groundwater monitoring (performed at a frequency no less than annually during the summer period), the Air Force and ADEC will evaluate the progress of natural attenuation. Wells to be monitored will be determined as part of a Groundwater Monitoring Plan to be submitted to ADEC for coordination and approval. The five-year evaluation will compile, analyze, and review all groundwater data collected, to determine the effectiveness of natural attenuation. If during this evaluation, the data indicates contaminant concentrations in groundwater are not declining as estimated, the Air Force and ADEC may reconsider the remedy decision.

One or more of the following observations could lead to reconsideration of the remedy:

- Increase in parent contaminant concentrations indicating that other sources may be present;

- Concentrations of parent contaminants and/or daughter products may indicate that the estimated cleanup time frames may not be reached; and

- Plume of primary contaminants and/or daughter products increases significantly in aerial or vertical extent and/or volume from previous estimates.

<u>Duration/Termination of Monitored Natural Attenuation</u>

Under the selected remedy, natural attenuation will continue until groundwater contamination is no longer a threat to human health and the environment as verified by a minimum of two (2) years of consecutive sampling events where analytical results show that the contaminants of concern (benzene and TCE) are less than the chemical-specific concentrations shown in Table 2-5. In addition, the expected daughter products (cis-1,2-DCE, trans-1,2-DCE and vinyl chloride) derived from the COCs will be monitored and compared to chemical specific Federal MCLs and State groundwater cleanup levels. Sampling for individual groundwater COCs and their associated daughter products may be discontinued at any time after a minimum of two years of consecutive sampling events show concentrations are below chemical-specific Federal MCLs and State groundwater cleanup levels.

Institutional groundwater controls shall include limitations on groundwater use as approved by ADEC, and notices to the land owner and Village Council of site status. The location of the groundwater institutional control area is depicted on Figure 1-3. These ICs will remain in place until groundwater cleanup levels are achieved through natural attenuation. The objectives of the groundwater ICs are to prevent the drinking of TCE and benzene contaminated water and to prevent its extraction and surface use without treatment.

Any planned use of groundwater at the site must be approved by ADEC. In the event information becomes available which indicates that the site groundwater may pose an unacceptable risk to human health, safety, welfare or the environment, the land owner and/or operator are required under 18 AAC 75.300 to notify ADEC and evaluate the environmental status of the contamination in accordance with applicable laws and regulations. Further site characterizations and cleanup may be necessary under 18 AAC 75.325-.390. Any contaminated groundwater that is encountered must be managed in accordance with applicable regulations, for example any dewatering must be done following ADEC approved plans that include any necessary treatment to meet discharge standards.

In the future, if groundwater is removed from the site it must be characterized and managed following regulations applicable at that time. Pursuant to 18 AAC 75.325(i)(1) and (2), ADEC approval is required *prior* to moving or disposing of groundwater that is, or has been, subject to the cleanup rules found at 18 AAC 75.325-.370.

The Air Force will submit an Institutional Control Performance Report to the ADEC on an annual basis for the first five years post-remedial action in-place. The frequency of the Institutional Control Performance Report will be evaluated with the five-year review under 42 USC 9621. This report shall include information pertaining to any breaches to IC's, corrective actions taken, and any property transfer. The Air Force will, with landowners consent, implement, monitor, maintain, and enforce the onsite remedies selected in this ROD.

2.15.4 Summary of the Selected Remedy Cost

The cost for the selected soil remedy (Alternative 10) is $9.001 million. Although this remedy will require a notice type institutional control, there are no operational and maintenance costs associated with this alternative and the 5 year review can be done concurrently with the groundwater 5 year review. This remedy is anticipated to be completed in less than 1 year.

Table 2-6 provides a breakdown of the soil remedy costs.

The cost for the selected groundwater remedy is $118,000. Capital costs for this alternative are $33,700 and recurring operational and maintenance costs (associated with long term monitoring) are $38,900 every five years. The recurring costs include labor, materials, analytical, and reporting costs. This remedy is anticipated to be completed in 26 years followed by a final report; the cost estimate was prepared based on a 30 year period. A discount factor of 7% was used in the present worth cost analysis.

The information in the cost estimate summary tables is based on the best available information regarding the anticipated scope of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

Table 2-7 provides a breakdown of the groundwater remedy costs.

2.15.5 Expected Outcomes of the Selected Remedy

<u>Land Use</u>

Implementation of the selected remedy will remove all soil above cleanup levels. The cleanup levels are based on unrestricted use of the soil for all contaminants except pesticides. A notice type of intuitional control will be implemented with the land-owners consent to prevent use of the low level pesticide contaminated soils in a manner in which they will be in constant contact with water.

The basis for soil cleanup levels to be attained by Soil Alternative 10 are provided in Table 2-8.

<u>Groundwater Use</u>

Implementation of the selected remedy will result in natural attenuation of groundwater contaminants to the desired cleanup levels. Once this occurs, the groundwater can be used for any intended purpose such as a drinking water use.

It is estimated that approximately 26 years would be required for the groundwater organic contaminants to naturally attenuate. During that time, institutional controls would be necessary to prevent groundwater from being used for drinking water or other uses where it may result in human exposure.

The basis for groundwater cleanup levels to be attained by Groundwater Alternative 2 are provided in Table 2-9.

Property Transfer

The Air Force will provide notice to USEPA and ADEC, consistent with CERCLA Section 120(h), at least six (6) months prior to any transfer or sale of Air Force property associated with Port Heiden, including transfers to private, state or local entities, so that USEPA and ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective land use controls (LUCs). If it is not possible for the Air Force to notify USEPA and ADEC at least six (6) months prior to any transfer or sale, then the Air Force will notify USEPA and ADEC as soon as possible but no later than sixty (60) days prior to the transfer or sale of any property subject to land use controls.

In addition to the land transfer notice and discussion provisions above, the Air Force further agrees to provide USEPA and ADEC with similar notice, within the same time frames, as for federal to federal transfer of property accountability and administrative control to ADEC. Review and comment opportunities afforded to USEPA and ADEC as to federal -to-federal transfers shall be in accordance with all applicable federal laws. All notice and comment provisions above shall also apply to leases, in addition to land transfers or sales.

2.16 STATUTORY DETERMINATIONS

Under CERCLA §121 the lead agency must select a remedy that is protective of human health and the environment, complies with applicable or relevant and appropriate requirements (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 offsite disposal of untreated wastes.

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

2.16.1 Protection of Human Health and the Environment

Soil

The selected soil remedy protects human health and the environment by removing all soil over cleanup levels (which are protective of human health and the environment). The most contaminated soil which is removed from the site will be treated in a soil washing process to remove the contaminants. This treated soil and the lower contaminated non-treated soil containing PCBs less than 10 mg/kg will then be disposed in a Class III regional landfill designed and permitted to accept such soil.

The treated and untreated soil placed in the landfill will be provided with an earthen cover meeting State of Alaska requirements. Soils in the landfill containing pesticides above the migration to groundwater level will be placed in a covered cell. The landfill will also be fenced and posted. These controls will eliminate human exposure to contaminated soil.

The soil remaining on the Port Heiden RRS will meet the Alaska State Regulatory cleanup levels (18 AAC 75.341) and will include a notice type institutional control of indefinite duration restricting use of soil in saturated conditions. Therefore, there will be no unacceptable risk to human health or the environment from the soil remaining onsite.

Institutional controls will be established to document the location of the former RRS landfill and limit excavation into or development over the landfill.

<u>Groundwater</u>

The selected groundwater 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, institutional controls will be implemented to prevent groundwater at the Port Heiden RRS from being used as a drinking water source.

This remedy also is protective of the environment. Reindeer Creek and its tributaries are approximately 0.5 away; 90 degrees to the direction of groundwater flow. Degradation of the groundwater contaminants protective of ecological receptors is anticipated to occur prior to groundwater reaching the creek.

Groundwater monitoring and 5 year reviews will be performed to track the attenuation of groundwater contaminants over time. Once the groundwater cleanup levels have been attained, the institutional controls will be removed.

2.16.2 Compliance with Applicable or Relevant and Appropriate Requirements

Cleanup levels were established by the State of Alaska regulation 18 AAC 75.341 for soil, 18 AAC 70.020 for surface water, and 18 AAC 75.345 and federal MCLs (40 CFR 141.61) for groundwater.

<u>Soil</u>

The selected soil remedy complies with State of Alaska Regulations for cleanup of contaminants in soil for unrestricted use (except for residually contaminated pesticide soil where its use will be controlled with a notice type of institutional control [with the landowners consent]). Upon completion of the selected soil remedy, soil remaining at the Port Heiden RRS meet the cleanup levels and will comply with ARARs.

Table 2-10 lists the soil ARARs.

Groundwater

The selected groundwater remedy will result in groundwater contaminant reduction to attain cleanup levels. The selected remedy will meet State of Alaska groundwater cleanup regulations over time. Until state groundwater cleanup regulations are attained, institutional controls will be implemented to ensure groundwater is not used for unintended purposes.

Table 2-10 lists the groundwater ARARs.

2.16.3 Cost Effectiveness

In the lead agency's judgment, the selected soil and groundwater remedy are 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 evaluating 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 soil and groundwater remedies was determined to be proportional to their cost and hence these alternatives represent a reasonable value for the money to be spent.

Soil

The costs for the soil alternatives evaluated ranged from a minimum of $2.08 million (Institutional Controls) to a maximum cost of $20.4 million (Soil Excavation and Onsite Solidification). The cost for the selected remedy is $9.0 million which is in the middle of the cost range of the 10 alternatives evaluated.

The selected remedy treats the soil that contains the highest concentrations of contaminants and isolates the remaining contaminated soil in a landfill. The treated portion of soil accounts for approximately 20% of the total contaminated soil volume and contains PCBs ranging from 10 mg/kg to 930 mg/kg. However, it is estimated that treating this soil will remove greater than 80% of the total mass of contaminants from the soil.

Other alternatives treat more soil but at approximately twice the cost. The additional cost to remove the remaining 20% of the mass of contaminants is not worth the incremental benefit gained.

The remaining alternatives treat the soil insitu using thermal methods or exsitu using bioremediation at the approximate cost of the selected remedy. Although these alternatives have similar costs, the effectiveness of the technologies in treating the contamination is not near as good as the selected remedy which treats the soil exsitu using a soil washing process.

The capping/monitoring alternative is the least expensive but has the lowest level of long term effectiveness and reliability.

Groundwater

The costs for the groundwater alternatives evaluated ranged from a minimum of $118,000 for the selected remedy (Natural Attenuation/Monitoring) to a maximum cost of $703,000 (Insitu Treatment).

The alternatives which were not selected cost five to six times as much as the selected remedy but over the long term provide no additional risk reduction. These more costly alternatives will attain the cleanup levels in a shorter period of time; however, they pose greater short term risks and are more difficult to implement.

The other alternatives rely on insitu treatment to reduce groundwater contaminant levels which can have varying effectiveness. Since there are no contaminated groundwater receptors (nor will there be any future receptors due to the institutional controls proposed), it is not cost effective to implement the more aggressive and costly cleanup remedies.

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

The lead agency has determined that the Selected Soil and Groundwater 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 Remedies provide 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.

Soil

The Selected Soil Remedy treats the portion of soil containing the greatest concentrations of contaminants. This treatment removes the contaminants from the soil significantly reducing the potential risks from exposure. Risks from untreated soil (as well as from residual contaminants in the treated soil) will be reduced to an acceptable level by disposing the soil in a permitted and controlled offsite landfill or by a notice type institutional control.

The selected remedy satisfies the criteria for long-term effectiveness by removing PCBs and other contaminants from the soil; the removed contamination will exist in a concentrated form and will be shipped offsite for destruction/disposal. Short term risks associated with the selected remedy are not significantly different from the other alternatives. Implementability of the selected remedy is anticipated to be more straight forward than most of the other alternatives (with the exception of the capping alternative) which utilize much more complicated remedial technologies.

Groundwater

Although the selected groundwater remedy does not utilize alternative treatment technologies, the concentration of contaminants will be reduced over time through natural processes. Given that there are no groundwater receptors near the site and the effectiveness of the institutional controls, it is not practical to implement more costly and complicated treatment technologies in this remote area.

Long term effectiveness of the selected remedy is the same as the other alternatives with the exception that the time to attain cleanup levels will be longer. The short term risks associated with the selected groundwater remedy are less than the other alternatives; the other alternatives utilize potentially dangerous chemicals and are much more equipment intensive.

2.16.5 Preference for Treatment as a Principal Element

Soil

The selected soil remedy uses soil washing to treat the most highly contaminated soil at the site. Site soil contains PCBs ranging from less than 1 mg/kg to a maximum of 930 mg/kg; the portion of soil containing PCBs greater than or equal to 10 mg/kg will be treated using soil washing. By washing the soil to remove a significant portion of the PCBs, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Groundwater

The selected groundwater 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 difficult due to the remote nature of the site; it is significantly (5 to 6 times) more costly and difficult to implement than the selected remedy; and it does not provide any greater level of protection to human health or the environment. Due to the lack of receptors, natural attenuation (which is estimated to achieve cleanup goals in 26 years) is considered protective and the best remedy for the Port Heiden RRS groundwater.

2.16.6 Five Year Review Requirements

Soil

Soil contaminated with residual quantities of pesticides after the remediation is complete will be controlled by a notice type of institutional control. As a result, a 5 year review under 42 USC 9621(c) will be necessary. [Note: After the soil removal action at the RRS Landfill, the source area may no longer be addressed under CERCLA. However, ICs will likely be required by State laws and regulations due to it being a former landfill. The RRS landfill may have separate requirements under the ADEC Solid Waste Program.]

Groundwater

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.

2.17 DOCUMENTATION OF SIGNIFICANT CHANGES

This section documents significant changes made in this ROD compared to what was published in the proposed plan. These changes are due to revisions in the cleanup levels after issuing the proposed plan for public comment, and in agreement and coordination with agencies.

The proposed plan was issued with cleanup levels based on the most restrictive Method 2 concentrations at the time of its publication. Subsequent to the publication of the proposed plan, the Method 2 soil cleanup levels for dieldrin, heptachlor epoxide, benzo(a)pyrene, dibenzo(a,h)anthracene, and benzo(a)anthracene were revised. The PCB cleanup level was not affected.

Table 2-11 shows the original cleanup levels listed in the proposed plan; the newly revised (9 October 2008) cleanup levels in 18 AAC 75.341(c); and the exposure pathway on which the cleanup levels are based.

The soil cleanup levels for three compounds (dieldrin, heptachlor epoxide, benzo(a)anthracene) in the proposed plan were based on the 30 December 2006 ADEC Method 2 migration to groundwater standards.

The cleanup level for pesticides was based on protection of groundwater. After the proposed plan was issued the cleanup level was reduced by approximately one-half.

Pesticides are present in site soil in low concentrations as a result of their application for insect control. During the remedial investigation, 46 groundwater samples were collected and analyzed for dieldrin. None of the samples had detectable concentrations of dieldrin except for one grab sample of water collected from a borehole (dieldrin in this grab sample was determined to be from the suspended soil particles in the turbid sample). Heptachlor epoxide was not detected in any of the 46 groundwater samples.

Pesticides have not migrated to groundwater over the history of the facility which spans 40 years. Dieldrin and heptachlor epoxide (whose cleanup levels are based on migration to groundwater) are not contaminating groundwater at the site. Therefore, there is no viable migration pathway to groundwater and it is appropriate that their cleanup level be based on a direct contact pathway.

The current (9 October 2008) 18 AAC 75.341(c) Table 2 cleanup levels based on direct contact are shown in Table 2-12.

Since the direct contact cleanup levels for dieldrin and heptachlor epoxide are greater than the cleanup levels published in the proposed plan, the more stringent values in the proposed plan will be retained.

The 9 October 2008 cleanup concentrations for benzo(a)pyrene, benzo(a)anthracene, and dibenzo(a,h)anthracene (based on the lowest of the direct contact or migration to groundwater pathway) are more stringent than the concentrations published in the proposed plan, therefore, these more stringent concentrations are used as the cleanup levels.

In summary, the cleanup concentrations for dieldrin and heptachlor epoxide will remain the same as published in the proposed plan and the cleanup concentrations for benzo(a)pyrene, benzo(a)anthracene, and dibenzo(a,h)anthracene will be the lowest of the recently promulgated concentrations. The cleanup concentrations for site soil are shown in Table 2-13. This modification of cleanup values was coordinated and agreed to by both U.S. EPA and ADEC.

Dieldrin may exist in soil within native tundra at concentrations exceeding the concentration protective of groundwater. Since these areas have high total organic carbon content due to the presence of vegetation, dieldrin is not anticipated to contaminate groundwater. Therefore, within native tundra areas, soil will not be excavated to remove dieldrin unless the concentrations exceed the direct contact pathway value protective of the human health (0.32 mg/kg).

2.18 RESPONSIVENESS SUMMARY

No written comments were received during the public comment period for the *Proposed Plan for Cleanup Action at the Former Facility Area Port Heiden RRS.* Several verbal comments were received during the public meeting. These comments and responses are summarized below.

Question from Unidentified Speaker: How long do you think it will take the groundwater to remediate itself?

Answer from Mr. Koch: The time frame for TCE to degrade is not a quick process. It will take somewhere between 20 and 30 years.

Question from Mr. Christenson: Which soil remedy do you think is the most environmentally friendly?

Answer from Mr. Koch: The most environmentally friendly alternative is the one we have selected. We are going to treat the most highly contaminated soil then put the treated soil in the landfill. Lesser contaminated soil which is not treated will also be disposed in the landfill. This alternative is the least disruptive.

The capping alternative paves the site and turns it into the equivalent of a parking lot. Solidification turns the soil into large concrete blocks which are difficult to manage. The no action alternative is not a good option because of the residual risk. Hot spot removal just removes the most highly contaminated soil leaving contaminated soil onsite to be capped. Incineration would require taking all the contaminated soil offsite for treatment and disposal. Excavation and landfilling would require barging the soil down to Washington State for disposal.

Question from Mr. Walbourne: Excavation and soil washing; when you excavate the soil doesn't that leave big holes or are you going to fill them?

Answer from Mr. Koch: It doesn't leave big holes because the contaminated soil is in the top 1 to 2 feet. The low areas will be 2 feet low when excavation is complete.

Question from Mr. Anderson: Some of the contaminated soil is over the dump sites themselves with lots of debris underneath, correct?

Response from unidentified person: Soil from the previous cleanup that were less than 10 part per million were placed at various locations on the upper landfill. Those PCBs shouldn't be too deep; they will be removed.

Question from Mr. Anderson: And then that would be capped with regular soil? Will you expose the landfill itself?

Answer from Mr. Koch: If removal of contaminated soil exposes the landfill itself, clean soil will have to be put back.

Question from Mr. Anderson: The dump site that this dump is going to now…you are involved in building that, correct?

Answer from Mr. Koch: We are involved in designing it, but it will not be constructed by us. It will be constructed by local resources.

Question from Mr. Anderson: Will the landfill have a special area that is completely fenced off?

Answer from Mr. Koch: The entire landfill will be completely fenced. The reception area would be open for individuals to come and dispose of their trash. The area where the PCB soil will be disposed will be fenced off from the rest of the landfill. The areas for trash and PCB soil will be kept separate.

Question from Mr. Anderson: Is there going to be funding for closing the old dumpsite?

Answer from Mr. Koch: That is not part of the plan. Tipping fees will be paid to the City to put material in the landfill. We don't know if a decision has been made whether these tipping fees will be used to close the old landfill.

Question from unidentified person: The TCE that is down there, what 30 feet?

Answer from Mr. Koch: Approximately 50 feet.

Question from unidentified person: The institutional controls are on the water, not on the land. Why is there no TCE in soil when it is in the groundwater?

Answer from Jacques Gusmano: The way work was done at these radar stations, it could have been from dry wells. All the buildings have been knocked down and other cleanups have been done. It also could have been from spills. The whole area was sampled in grids and no source was found. The source is probably gone and all that remains is the TCE in groundwater.

Question from Mr. Anderson: Could the TCE have gone through the septic system?

Answer from Jacques Gusmano: That is one place where it could have gone. A good job was done of sampling in grids to find the source but nothing was found. These sources are so old that much of the TCE could have evaporated or biodegraded. TCE moves quickly so that is why it is in the water.

Answer from Mr. Verplancke: At those concentrations, you would not anticipate finding a source area.

Question from Mr. Anderson: Is it a small source area?

Answer from Mr. Verplancke: Likely.

Question from Ms. Christensen: How will we know if the groundwater is degrading?

Answer from Mr. Verplancke: There will be a monitoring program following the remedial action to make sure the groundwater contaminants are degrading and that there is no increase in concentration.

Question from Ms. Christensen: Could we email our comments to you and you forward them to John Baker.

Answer from Mr. Koch: You can.

Question from Mr. Louis Howard: And the response summary too?

Answer from Mr. Koch: We will take all the comments were receive and questions from this public meeting and list them with the answers.

End of Questions from Public Meeting.

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FIGURES

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Figure 1-1 Former Port Heiden RRS Source Areas

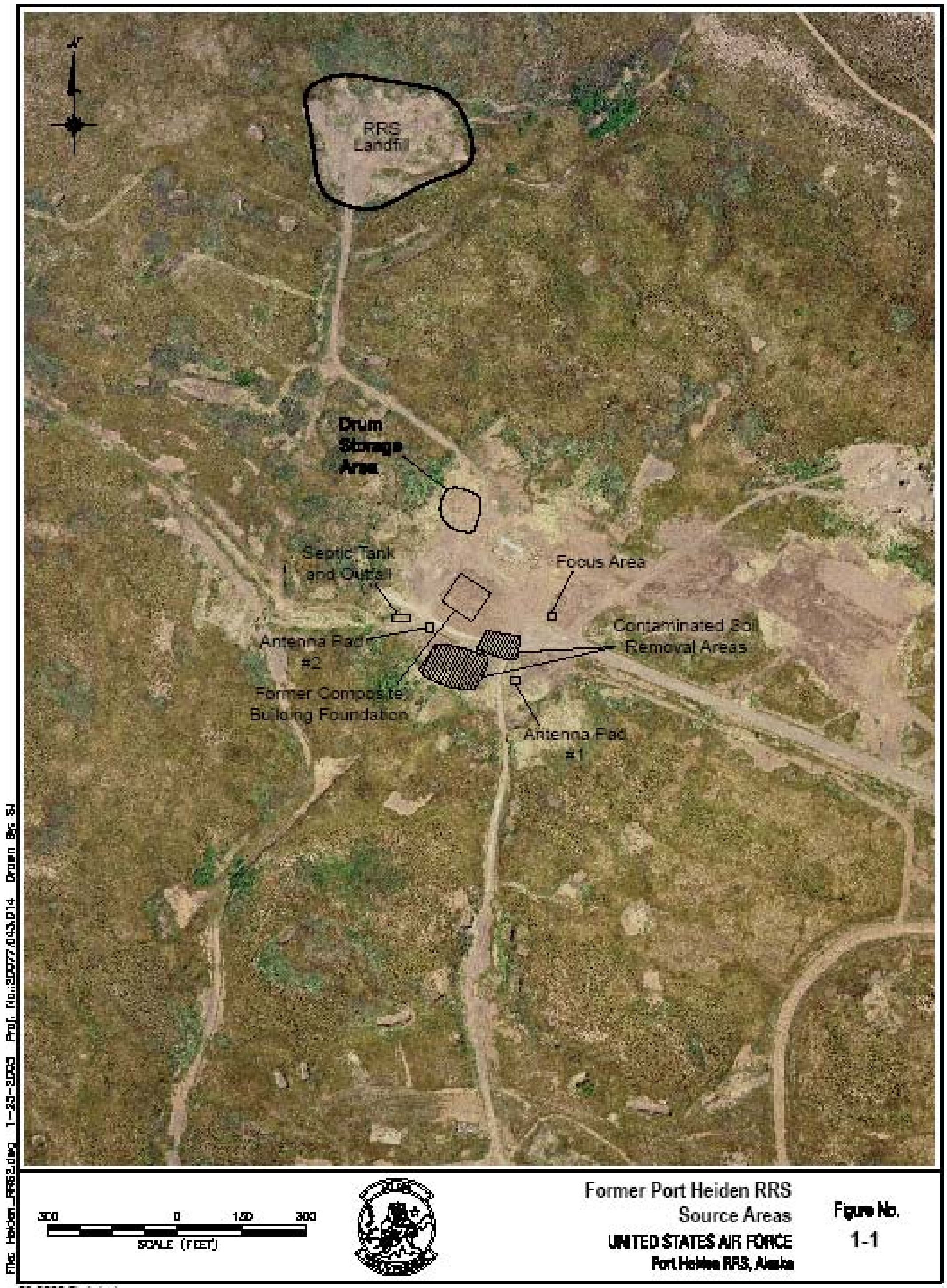


Figure 1-2 Soil Institutional Control Area

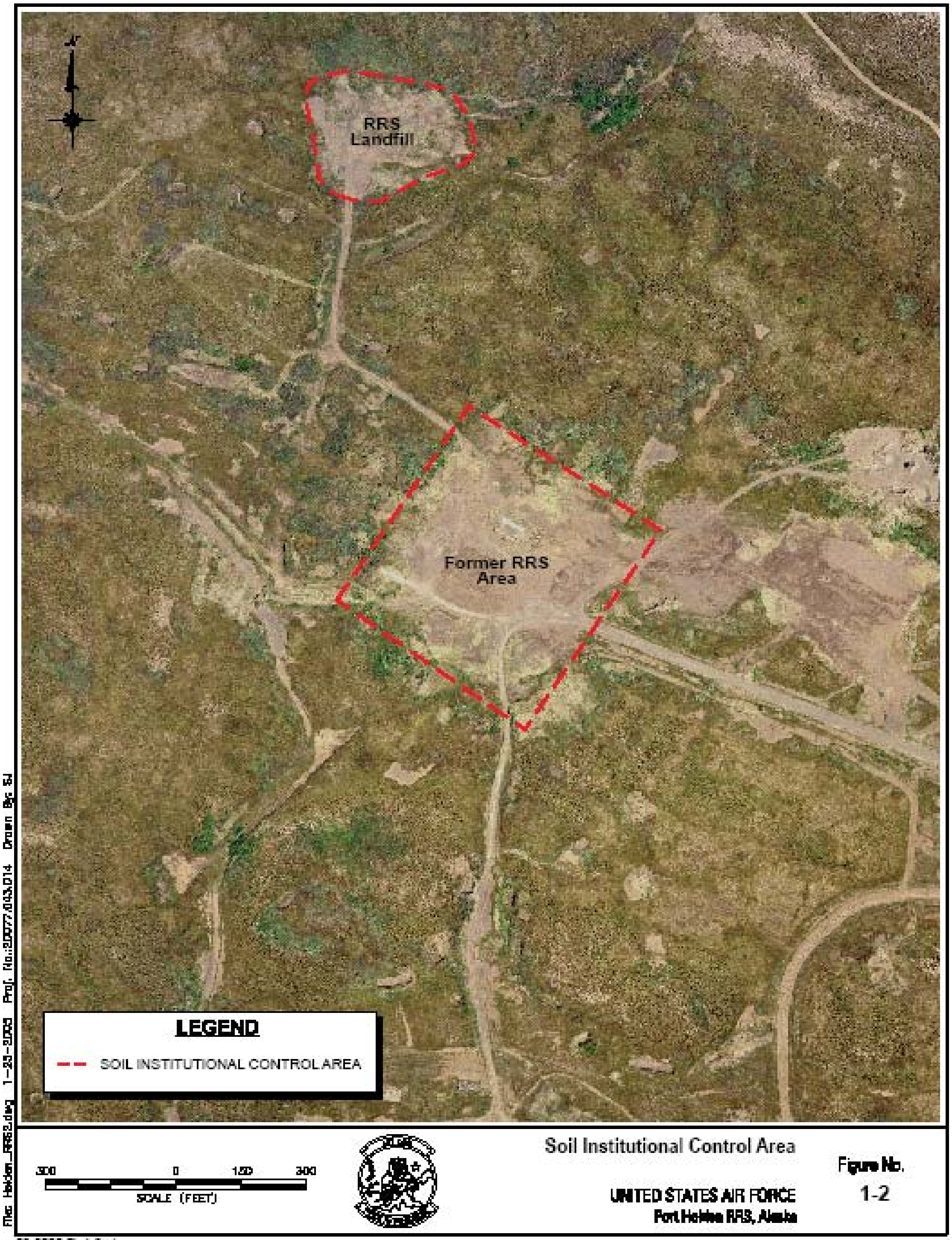


Figure 1-3 Groundwater Institutional Control Area

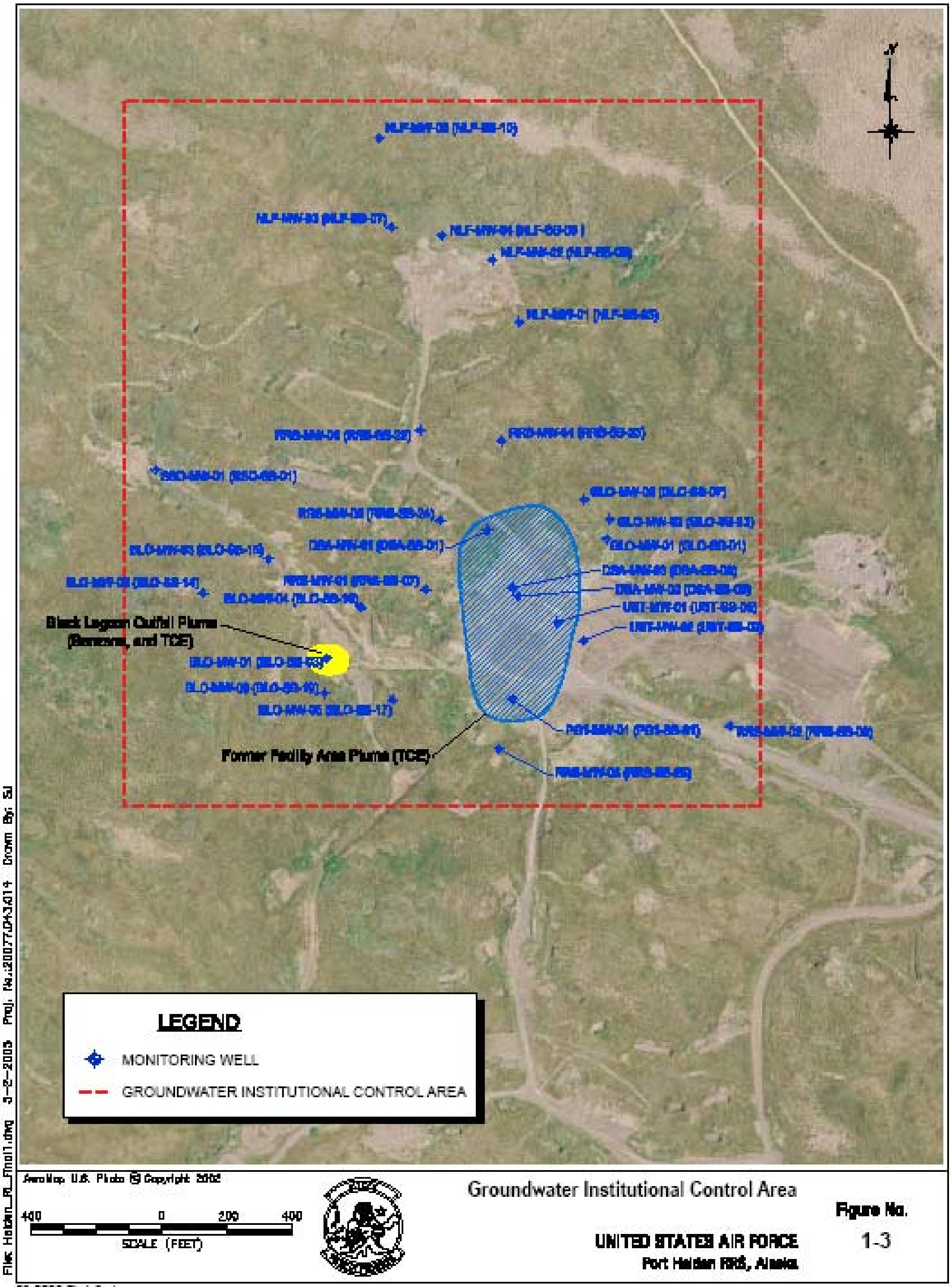
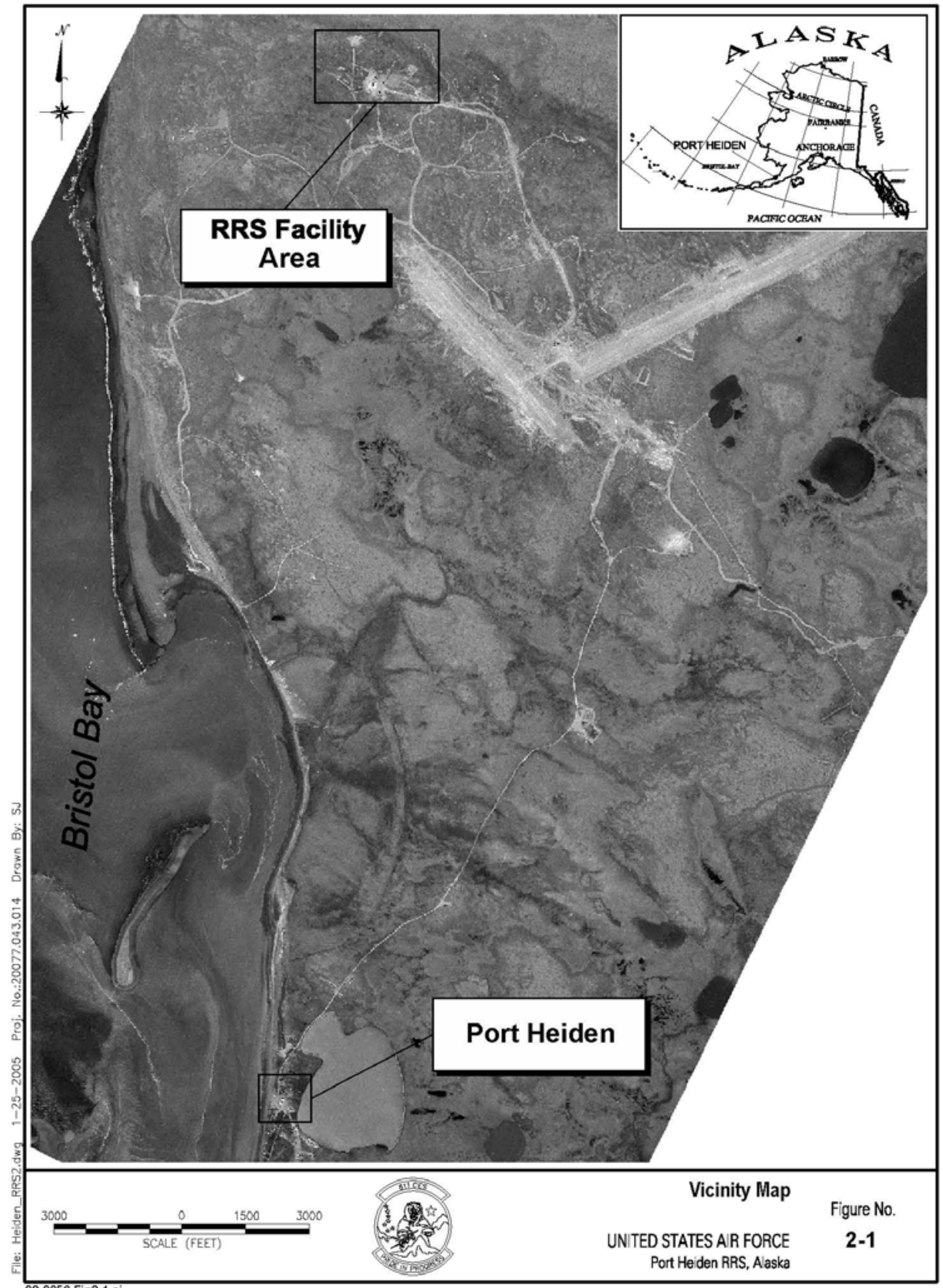
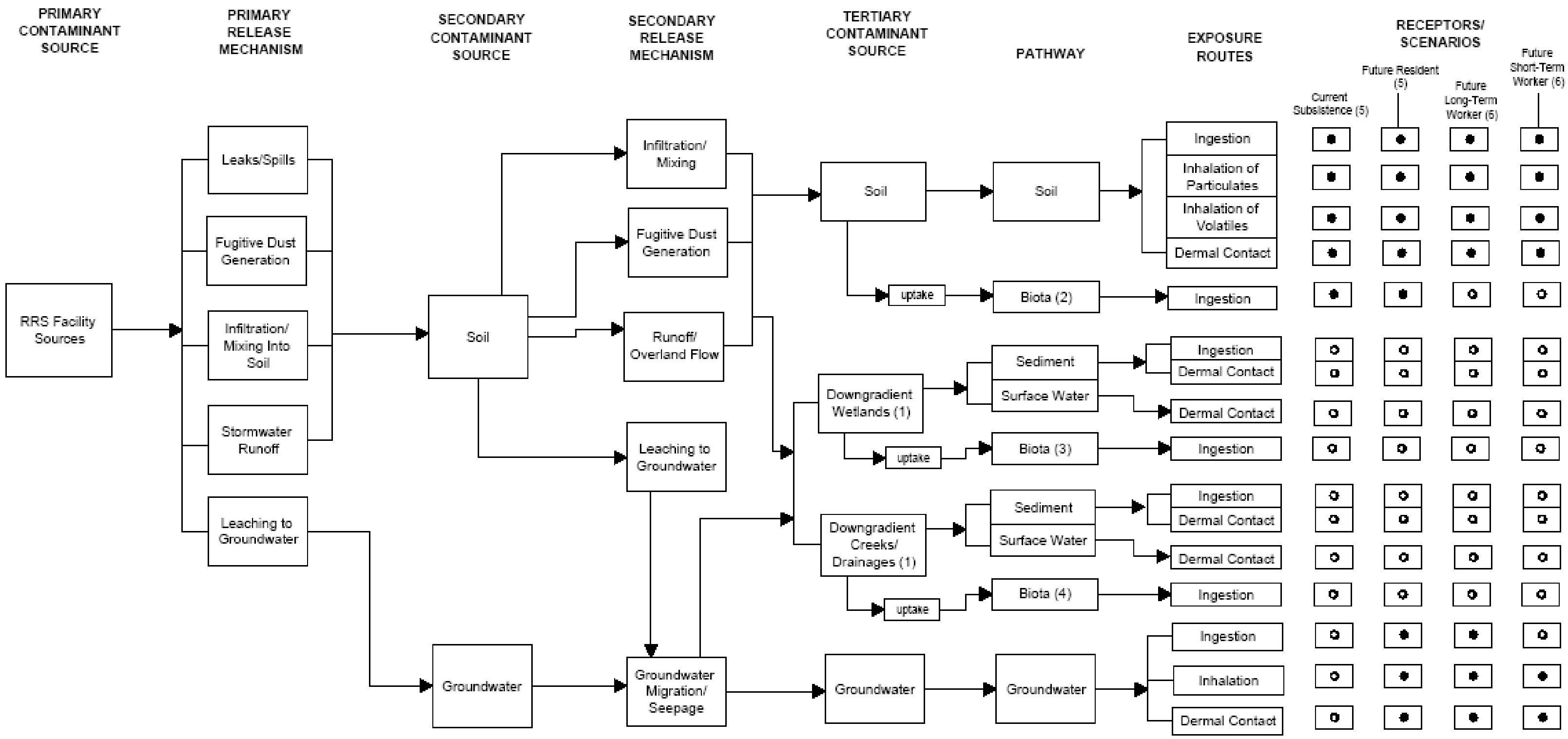


Figure 2-1 Vicinity Map



08-0056 Fig2-1.ai

Figure 2-2 - Conceptual Site Model



● = Medium to High Potential For Exposure
○ = Identified as a Low Potential For Exposure. Was not quantified in the human health risk assessment.

(1) Wetlands begin approximately 3/4 mile southwest of the RRS source areas. The wetlands drain into creeks that eventually flow to Bristol Bay. Wetlandsand/or creeks were not sampled during the RI. The potential for impact to these areas was determined to be minimal during the RI.

(2) Biota evaluated included the collection of berry tissue residue. In addition, small mammal uptake modeling was performed.

(3) It's assumed that human foraging in wetlands is minimal. Ingestion of biota was not evaluated based on uptake in wetland sediment/soil.

(4) Biota were not evaluated for any downgradient creeks. Significant downgradient creeks were not identified during the RI.

(5) Subsistence users hunt for moose and caribou, but the home range size of these animals makes it unlikely that a significant portion of their diet over their lifespan will be obtained at Port Heiden RRS sources. This pathway is considered minor and was not evaluated.

(6) Long-term workers are identified as those that will work at the site in the future for a period of 25 years. Short-term workers (e.g., construction or utility workers) are identified as those that will work at the site in the future for less than a year.

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TABLES

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Table 2-1 Port Heiden RRS Contaminants of Concern

Contaminant of Concern		Maximum Concentration Found
Surface Soil (mg/kg)		
PAHs	Benzo(a)pyrene	7.8 MA
	Benzo(a)anthracene	7.2 MA
	Dibenzo(a,h)anthracene	1.6 MA
PCBs	Aroclor 1260	930 J
Pesticides	Dieldrin	5 J
	Heptachlor epoxide	1 J
Groundwater (mg/L)		
VOCs	TCE	0.69
	Benzene	0.69 J

Notes:
mg/kg – milligrams per kilogram
mg/L – milligrams per liter
J – analyte positively identified; quantitation is an estimate
MA - matrix effect was present

Table 2-2 Summary of Risk Assessment Results

Scenario	Total Hazard Index	Total Cancer Risk
RISKS FROM SOIL		
Current Scenarios		
Current Child Subsistence User (EPS-1)		
FSA - RRS Pad (FSA 1)	39.3	1.4E-04
FSA - North Landfill (FSA 2)	45.9	1.8E-04
FSA -BLO, BLP, SST, and SSP (FSA 3)	56.1	1.9E-04
FSA - Septic System Outfall (FSA 4)	1.1	4.9E-06
Former Pipeline Corridor	0.2	7.2E-07
Current Adult Subsistence User (EPS-2)		
FSA - RRS Pad (FSA 1)	20.4	3.0E-04
FSA - North Landfill (FSA 2)	23.8	3.6E-04
FSA -BLO, BLP, SST, and SSP (FSA 3)	29.1	4.0E-04
FSA - Septic System Outfall (FSA 4)	0.6	9.9E-06
Former Pipeline Corridor	0.1	1.4E-06
Future Scenarios		
Future Child Subsistence User (EPS-3)		
FSA - RRS Pad (FSA 1)	26.0	1.2E-04
FSA - North Landfill (FSA 2)	206.7	7.9E-04
FSA -BLO, BLP, SST, and SSP (FSA 3)	110.7	6.8E-04
FSA - Septic System Outfall (FSA 4)	4.9	2.9E-05
Former Pipeline Corridor	0.8	2.7E-06
Future Adult Subsistence User (EPS-4)		
FSA - RRS Pad (FSA 1)	3.0	5.7E-05
FSA - North Landfill (FSA 2)	23.8	3.6E-04
FSA -BLO, BLP, SST, and SSP (FSA 3)	12.8	3.1E-04
FSA - Septic System Outfall (FSA 4)	0.6	1.3E-05
Former Pipeline Corridor	0.1	1.2E-06
Future Long Term Worker (EPS-5)		
FSA - RRS Pad (FSA 1)	2.6	5.2E-05
FSA - North Landfill (FSA 2)	21.1	3.4E-04
FSA -BLO, BLP, SST, and SSP (FSA 3)	11.3	2.9E-04
FSA - Septic System Outfall (FSA 4)	0.4	1.1E-05
Former Pipeline Corridor	0.1	7.0E-07
Future Short Term Worker (EPS-6)		
FSA - RRS Pad (FSA 1)	6.6	5.3E-06
FSA - North Landfill (FSA 2)	52.9	3.4E-05
FSA -BLO, BLP, SST, and SSP (FSA 3)	28.3	2.9E-05
FSA - Septic System Outfall (FSA 4)	1.2	1.2E-06
Former Pipeline Corridor	0.2	1.1E-07
RISKS FROM GROUNDWATER		
Future Child Subsistence User (EPS-3)		
Facility Source Area	300.6	5.5E-04
Former Pipeline Corridor	5.4	4.4E-05
Future Adult Subsistence User (EPS-4)		
Facility Source Area	121.4	8.6E-04
Former Pipeline Corridor	2.5	7.5E-05
Future Long Term Worker (EPS-5)		
Facility Source Area	54.1	4.4E-04
Former Pipeline Corridor	1.2	2.9E-05

Table 2-3 Soil Alternative Costs

Alternative	Total Present Value
Alternative 2 – Institutional Controls, Impervious Capping, and Long-term Monitoring	$2,080,000
Alternative 3 – Institutional Controls; PCB Soil Hot Spot Excavation [> 20 mg/Kg], Off-site Incineration, and Disposal; and Soil Capping	$17,500,000
Alternative 4 – Institutional Controls; PCB Soil Excavation (> 1 mg/Kg), Solidification, and On-site Disposal	$20,400,000
Alternative 5 – PCB Excavation (> 1 mg/Kg), Off-Site Incineration through a DRMO Facility, and Disposal	$19,300,000
Alternative 6 – PCB Excavation (> 1 mg/Kg) and Off-Site Disposal in a Permitted Landfill	$11,200,000
Alternative 7 – In-Situ PCB Treatment	$7,570,000
Alternative 8 – PCB In-Situ Treatment (see note below)	$5,870,000
Alternative FFASS9 – Bioremediation of PCB-Contaminated Soil	$5,900,000
Alternative 10 – PCB Excavation (> 1 mg/Kg),Soil Washing to Reduce PCBs to < 10 mg/Kg, and Disposal in Class III Landfill	$9,001,000

This alternative is the same as Alternative 7 for PCB treatment. The only difference with this alternative is the approach taken for petroleum products which are not covered under CERCLA nor discussed herein.

Table 2-4 Groundwater Alternative Costs

Alternative	Total Present Value
Alternative 2 – Institutional Controls, Natural Attenuation, and Long-term Monitoring	$118,000
Alternative 3 – Institutional Controls, Enhanced Bioremediation, and Long-term Monitoring	$677,000
Alternative 4 – In-situ Treatment	$703,000

Table 2-5 Soil and Groundwater Cleanup Levels

Compound	Cleanup Level
Soil (mg/kg)	
Polychlorinated Biphenyls	1
Benzo(a)pyrene	0.49
Benzo(a)anthracene	3.6
Dibenzo(a,h)anthracene	0.49
Dieldrin	0.015
Heptachlor epoxide	0.2
Groundwater (mg/L)	
Trichloroethylene	0.005
Benzene	0.005

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Table 2-6 Selected Soil Remedy Cost

CAPITAL COSTS											
Description (Assembly Line Item)	**Quantity**	**Unit**	**Safety Level D**	**Unit Price**			**Total Costs**			**ACF Adjustment**	**TOTAL**
				Labor	**Equipment**	**Materials**	**Labor**	**Equipment**	**Materials**		
EXCAVATION AND LONG TERM BIOPILING OF DRO CONTAMINATED SOILS											
Per diem	100	ea	0.96	$	$	$135.00	$	$	$13,500.00	$	$13,500.00
2 CY, crawler mounted, hydraulic excavator (17 03 0277)	2500	CY	0.96	$83	$1.52	$	$2,161.46	$3,800.00	$	$16,155.55	$22,117.01
Barge Transportation to PH	0.5	LS	0.96	$	$1,500,000.00	$	$	$750,000.00	$	$	$750,000.00
Transport and place excavated soil in long-term stockpile	2500	CY	0.96	$93.02	$74.42	$ 18.60	$242,239.58	$ 186,050.00	$ 46,500.00	$	$474,789.58
Project Management	8%										$100,832.53
Remedial Design	2%										$25,208.13
Construction Mgmt	10%										$126,040.66
Excavation and Long Term Biopiling of DRO Contaminated Soils Subtotal											$1,512,487.91
Overhead (G&A) at 12%											$181,498.55
Profit at 7%											$105,874.15
Contingency 10%											$151,248.79
Excavation and Long Term Biopiling of DRO Contaminated Soils TOTAL											**$1,951,109.41**
EXCAVATION, TREATMENT, AND LANDFILL OF PCB CONTAMINATED SOILS (>1 mg/kg)											
Per diem	300	ea	0.96	$	$	$135.00	$	$	$ 40,500.00	$	$40,500.00
Barge Transportation to PH	0.5	LS	0.96	$	$1,500,000.00	$	$	$750,000.00	$	$	$750,000.00
2 CY, crawler mounted, hydraulic excavator (17 03 0277)	6750	CY	0.96	$0.83	$1.52	$	$5,835.94	$10,260.00	$	$43,619.99	$59,715.93
Transport excavated soil > 10 mg/Kg PCB to treatment area	1500	CY	0.96	$93.02	$74.42	$18.60	$145,343.75	$111,630.00	$27,900.00	$	$284,873.75
Soil Wash PCB contaminated soil to < 10 mg/Kg	1500	CY	0.96	$250.00	$250.00	$200.00	$390,625.00	$375,000.00	$300,000.00	$	$1,065,625.00
Transport excavated soil < 10 mg/kg PCBs to landfill	6750	CY	0.96	$96.42	$77.96	$22.14	$677,953.13	$526,230.00	$149,477.40		$1,353,660.53
Disposal Fee for soils with PCB concentration < 10 mg/kg (Village of Port Heiden)	6750	CY	0.96	$	$	$148.14	$	$	$999,945.00	$	$999,945.00
Project Management	8%										$364,345.62
Remedial Design	2%										$91,086.40
Construction Mgmt	10%										$455,432.02
Excavation, Treatment and Landfill of PCB Contamination (>1 mg/kg) Subtotal											$5,465,184.24
Overhead (G&A) at 12%											$655,822.11
Profit at 7%											$382,562.90
Contingency 10%											$ 546,518.42
Excavation, Treatment and Landfill of PCB Contamination (>1 mg/kg) TOTAL											**$7,050,087.67**
CAPITAL COSTS TOTAL											**$ 9,001,197**

Table 2-7 Selected Groundwater Remedy Cost

Description (Assembly Line Item)	Quantity	Unit	Safety Level D	Unit Price			Total Costs			ACF Adjustment	TOTAL
				Labor	Equipment	Materials	Labor	Equipment	Materials		
CAPITAL COSTS											
INSTITUTIONAL CONTROLS											
Site Project Manager avg cost (99 01 01)	4	wk	0.96	$1,596.00	$	$	$6,650.00	$	$	$18,021.50	$ 24,700
Project Management	10%										$2,470
Remedial Design	0%										S
Construction Mgmt	0%										$
Institutional Controls Subtotal											**$27,100**
Overhead (G&A) at 12%											$3,260
Profit at 7%											$1,900
Contingency 5%											$1,360
Institutional Controls TOTAL											**$ 33,700**
CAPITAL COSTS TOTAL											**$33,700**

PERIODIC LONG-TERM MONITORING (EVERY 5 YEARS) COSTS

Description (Assembly Line Item)	Quantity	Unit	Safety Level D	Unit Price			Total Costs			ACF Adjustment	TOTAL
				Labor	Equipment	Materials	Labor	Equipment	Materials		
Mobilize crew >500 mi	2	ea	0.96	$	$	$475.21	$	$	$950.42	$2,575.64	$3,530
Per diem	14	ea	0.96	$	$	$135.00	$	$	$1,890.00	$	$1,890
Van or pick-up rental (33 01 0102)	7	dy	0.96	$	$	$37.00	$	$	$259.00	$701.89	$961
Field eng, avg cost (99 01 0402) (to sample)	1	wk	0.96	$995.00	$	$	$1,036.46	$	$	$2,808.80	$3,850
Water level indicator rental (33 02 0572)	1	wk	0.96	$	$64.52	$	$	$64.52	$	$174.85	$239
Water quality parameter testing device rental (33 02 1509)	1	wk	0.96	$	$236.00		$	$236.00	$	$639.56	$876
Disposal materials per sample (33 02 0401)	6	ea	0.96	$	$	$8.36	$	$	$50.16	$135.93	$186
Pesticides and PCBs (quoted cost)	6	ea	0.96	$	$	$289.00	$	$	$1,734.00	$	$1,730
AK 102 and AK 103 (quoted cost)	6	ea	0.96	$	$	$67.00	$	$	$402.00	$	$402
Summary Report	1	LS	1	$15,000.00			$15,000.00				$15,000
Project Management 10%											$1,370
Technical Services 10%											$1,370
Long-term Monitoring (Every 5 Years) Subtotal											$31,400
Overhead (G&A) at 12%											$3,770
Profit at 7%											$2,200
Contingency 5%											$1,570
PERIODIC LONG-TERM MONITORING (EVERY FIVE YEARS) TOTAL											**$ 38,900**

PRESENT VALUE ANALYSIS

Cost Type	Year	Total Cost	Total Cost Per Year	Discount Factor (7%)[1]	Present Value
Capital Costs	0	$33,700	$33,700	1.000	$33,700
Periodic Costs (LTM and Report Every 10 years)	5, 10, 15, 20, 25, 30	$233,400	$38,900	2.158	$83,900
TOTAL PRESENT VALUE OF GROUNDWATER ALTERNATIVE 2					**$118,000**

Table 2-8 Soil Cleanup Levels and Basis

Contaminant of Concern		Cleanup Level (mg/kg)	Basis for Cleanup Level (citation)
Site Soil			
PAHs	Benzo(a)pyrene	0.49	Unrestricted Use (based on direct contact, 18 AAC 75.341(c)
	Benzo(a)anthracene	3.6	Unrestricted Use (based on protection of groundwater, 18 AAC 75.341(c)
	Dibenzo(a,h)anthracene	0.49	Unrestricted Use (based on direct contact, 18 AAC 75.341(c)
PCBs	Aroclor 1260	1	Unrestricted Use (based on ingestion/inhalation, 18 AAC 75.341(c)
Pesticides	Dieldrin	0.015	Unrestricted Use (based on direct contact, 18 AAC 75.341(c). See ROD Section 2.17.
	Heptachlor epoxide	0.2	Unrestricted Use (based on direct contact, 18 AAC 75.341(c). See ROD Section 2.17.

Notes: mg/kg – milligrams per kilogram

Table 2-9 Groundwater Cleanup Level and Basis

Contaminant of Concern	Proposed Cleanup Level (mg/L)	Basis for Cleanup Level (citation)
Groundwater		
Benzene	0.005	Drinking Water Use (18 AAC 75.345(b)(1)
TCE	0.005	Drinking Water Use (18 AAC 75.345(b)(1)

Notes: mg/L – milligrams per liter

Table 2-10 Compliance with ARARs

Authority	Medium	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
State of Alaska Department of Environmental Conservation	Soil	Oil and Other Hazardous Substances Pollution Control 18 AAC 75.341 AS 46.03 & AS 46.04.	Applicable	These regulations set forth the State's definitions and criteria for establishing soil cleanup levels. Four different methods are provided based on the type of contamination, site specific soil data or a site specific risk assessment.	The selected soil remedy will comply with these requirements by removing all soil from the site in excess of cleanup levels, treating the most contaminated soil and disposing of the soil in a controlled permitted landfill.
		Alaska Solid Waste Regulations: AS 44.46, AS 46.03, 18 AAC 60	Applicable	Set forth standards for waste disposal facilities, including accumulation and storage limitations, land spreading restrictions, and requirements for special waste disposal. Permitting standards as well as monitoring and reporting requirements are set forth in these regulations.	Disposal of the soil in a controlled permitted Class III landfill.
State of Alaska Department of Environmental Conservation	Ground Water	Oil and Other Hazardous Substances Pollution Control 18 AAC 75.345	Applicable	These regulations set forth the State's definitions and criteria for establishing groundwater cleanup levels. Cleanup levels are drinking water standards	The selected groundwater remedy will comply with these requirements by preventing groundwater from being used as a drinking water source until natural attenuation degrades the contaminants to appropriate levels.
Federal Regulatory Requirement	Ground Water	Federal Safe Drinking Water Maximum Contaminant Levels (MCLs) 40 CFR 141	Relevant and Appropriate	MCLs have been regulated for a number of common organic and inorganic contaminants. These levels regulate the concentrations of contaminants in public drinking water supplies and are considered relevant and appropriate for ground-water aquifers potentially used for drinking water.	The selected groundwater remedy will comply with these requirements by preventing groundwater from being used as a drinking water source until natural attenuation degrades the contaminants to appropriate levels.

Authority	Medium	Requirement	Status	Synopsis of Requirement	Action to be Taken to Attain Requirement
Federal Regulatory Requirement	Soil	RCRA Subtitle C: Hazardous Waste Management (Identification, Treatment, Storage, and Land Disposal) 42 USC §6901 et seq. 40 CFR §261, 264, and 268.	Applicable	RCRA Subtitle C addresses the identification, treatment, storage, and land disposal of hazardous wastes. To the extent hazardous waste, as defined by RCRA, is removed from soil and/or extracted from the groundwater and to the extent air emissions result from treatment operations, the selected remedies must comply with the requirements of 40 CFR 261 and 264.	Selected remedy will comply with these requirements by identifying, classifying, and managing hazardous waste generated for proper disposal at an off-site USEPA-approved treatment facility. Off-site actions are not ARARs and are not discussed.
		CERCLA Waste Off-Site Rule. 40 CFR §300.440	Applicable	The purpose of the Off-Site Rule is to prevent wastes generated from remedial activities conducted under CERCLA from contributing to present or future environmental problems at offsite waste management facilities that receive them.	The Off-Site Rule requires that off-site facilities receiving CERCLA wastes meet established acceptability criteria.

Table 2-11 9 October 2008 Cleanup Level Revisions

Constituent	Exposure Pathway	Cleanup Concentrations (mg/kg)	
		Proposed Plan	Revised (9 Oct 08)
Polychlorinated biphenyls	Ingestion/Direct Contact	1.0	1.0
Dieldrin	Migration to groundwater	0.015	0.0076
Heptachlor Epoxide	Migration to groundwater	0.2	0.014
Benzo(a)pyrene	Ingestion/Direct Contact	1.0	0.49
Benzo(a)anthracene	Migration to groundwater	6.0	3.6
Dibenzo(a,h)anthracene	Ingestion/Direct Contact	1.0	0.49

Table 2-12 Direct Contact Cleanup Levels

Constituent	Direct Contact Cleanup Levels (mg/kg)
Dieldrin	0.32
Heptachlor epoxide	0.63
Benzo(a)pyrene	0.49
Benzo(a)anthracene	4.9
Dibenzo(a,h)anthracene	0.49

Table 2-13 Site Soil Cleanup Levels

Constituent	Cleanup Concentration (mg/kg)
PCBs	1.0
Dieldrin	0.015
Heptachlor Epoxide	0.20
Benzo(a)pyrene	0.49
Benzo(a)anthracene	3.6
Dibenzo(a,h)anthracene	0.49

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