U.S. AIR FORCE
FORMER PORT HEIDEN RADIO RELAY STATION, ALASKA

Final Report

First Five-Year Review of Environmental Restoration Program Sites OT001, WP002, SS004, LF007, and Four Unnumbered Sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) Former Port Heiden Radio Relay Station

AFCEC CONTRACT FA8903-08-D-8769, TASK ORDER 351

AUGUST 2014

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Lead Agency Acceptance

This signature sheet documents the United States Air Force's acceptance of the first Five-Year Review Report for Sites OT001, WP002, SS004, LF007, and four unnumbered sites all located at the Former Port Heiden Radio Relay Station, Alaska.

Frank A. Flores, Colonel, USAF
Commander, PACAF Regional Support Center
Joint Base Elmendorf-Richardson, Alaska

25 Sep 14
Date

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Executive Summary

The remedies selected for Installation Restoration Program (IRP; also referred to as Environmental Restoration Program, or ERP) Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) at the former Port Heiden Radio Relay Station (RRS), Alaska, are described in the February 2009 *Record of Decision for Port Heiden Radio Relay Station, Port Heiden, Alaska* (U.S. Air Force [USAF], 2009) (ROD) and the May 2010 *Explanation of Significant Differences for Port Heiden Radio Relay Station, Port Heiden, Alaska* (USAF, 2010a) (ESD). The final selected remedy for soil initially consisted of excavation of soil containing polychlorinated biphenyls (PCBs) greater than or equal to 10 milligrams per kilogram (mg/kg); 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/polynuclear aromatic hydrocarbons over their respective cleanup levels; and offsite disposal of washed or unwashed soil in a permitted Class III landfill near the Village of Port Heiden, identified as the Native Village of Port Heiden (NVPH) Landfill. During the 2009 field season, issues were encountered with soil washing and landfilling at the site that resulted in the landfilling of PCB-contaminated soil in excess of 10 mg/kg. Also, larger quantities of PCB-contaminated soil were identified during 2009 RA soil sampling. As a result, an ESD was prepared to further refine the soil remedy to only excavation and offsite disposal. Institutional controls (IC) will be instituted following completion of the soil RA, which is anticipated to be completed during the 2015 field season. The remedy for groundwater consists of ICs and monitored natural attenuation (MNA).

The following eight issues were noted during the first five-year review.

1. Several soil stockpiles were observed during the site inspection. Some of the stockpiles were not covered. High winds in the area have been known to transport PCB-contaminated soil to other parts of the site (NVPH, 2010).
2. Additional quantities of soil have been identified during the soil RA, conducted since 2009. The decision documents (ROD and ESD) do not account for the additional quantity of soil (USAF, 2009 and USAF, 2010a, respectively).
3. PCB-contaminated soil has been identified within Site Road and some adjacent areas, and the areas are not included in the current decision documents (ROD and ESD) for the site (USAF, 2009 and USAF, 2010a, respectively).
4. The soil RA has not been completed at the site, and is anticipated to continue through at least the 2015 field season. Increased quantities of soil, discrepancies associated with soil washing and landfilling during the 2009 field season, and the presence of contamination within Site Road and adjoining areas has required a longer timeframe to complete the soil RA than originally anticipated in the ROD.
5. During the site inspection of ERP Site LF007, it was observed that the landfill appeared to have subsided in places, and in one instance, the subsidence exposed metallic debris. Some metal debris was also visible on the ground surface. While this is not indicative of current exposure, if left unchecked, the landfill cap may further erode and contaminated soil may be exposed.
6. Although Annual IC Performance Reports are prepared to document reviews of the remedial actions and to determine whether these actions are protective, including whether the intent of the ROD-required ICs are being met, ICs for soil and groundwater have not been put into place formally. Soil ICs will be put into place once the soil remedy is complete, but there is no reason to wait on implementation of groundwater ICs.

7. The ROD requires an evaluation of the progress of natural attenuation based on 5 years of groundwater monitoring (at a minimum). Only 4 years of data were available at the time of this five-year review. The purpose of the five-year evaluation is to compile, analyze, and review all groundwater data collected to determine the effectiveness of natural attenuation. The ROD also states that if during this evaluation the data indicates contaminant concentrations in groundwater are not declining as estimated, the remedy decision may be re-considered.
8. The compound 1,4-dioxane was not included in the list of analytes for groundwater samples collected during the LTM program. This compound should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted.

Based on the findings of this first five-year review, the actions performed for soil and groundwater at ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are considered protective in the short-term because exposures appear to be under control, and no unacceptable risks are occurring. The remedy is ongoing, however, and it is not clear yet that the selected remedy, when complete, will be protective in the long-term because the quantities of soil to be remediated has changed since the decision documents were issued. In addition, soil stockpiling practices should be reviewed and modified to ensure contaminated soil stockpiles are contained in a manner that prevents exposure and cross contamination due to wind erosion or runoff of PCB-contaminated soil. At ERP Site LF007, the exposed debris and subsidence should be assessed and repairs made, if necessary. Lastly, groundwater ICs should be implemented according to the requirements of the ROD, and a site-specific operation and maintenance plan should be prepared to provide the methods and reporting requirements for ICs.

The remedy selected for groundwater at the former Port Heiden RRS remains protective of human health and the environment in the short-term. To assess long-term protectiveness of groundwater, an MNA evaluation should be conducted, prior to the second five-year review, using the groundwater analytical results from 2004, 2009, 2010, 2011, 2012, and 2013 sampling events. The ICs required by the ROD should be implemented to formally prevent groundwater use. Also, 1,4-dioxane should be added to the list of groundwater sample analytes for two consecutive sampling events, and a statistical analysis of groundwater concentration trends should be performed. The actions taken for soil are considered protective in the short-term, and protectiveness should be achieved in the long-term once the issues identified in this five-year review report are addressed.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: USAF Former Port Heiden RRS		
EPA ID: Not applicable (site is not on the NPL)		
Region: 10	**State:** AK	**City/County:** Port Heiden/Lake and Peninsula Borough

SITE STATUS	
NPL Status: Non- NPL	
Multiple OUs? No	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: Other Federal **If "Other Federal Agency" was selected above, enter Agency name:** US Air Force
Author name (Federal or State Project Manager): Keith Barnack
Author affiliation: Contractor
Review period: May 2009 – May 2014
Date of site inspection: 07/17/2013 and 07/18/2013
Type of review: Statutory
Review number: 1
Triggering action date: May 2009
Due date *(five years after triggering action date)*: May 2014

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

1. Issues and Recommendations Identified in the Five-Year Review:	
	Issue Category: Remedy Performance
	Issue: During the site inspection, polychlorinated biphenyl (PCB)-contaminated soil stockpiles were observed to be uncovered. The stockpiles were likely uncovered as the soil remedial action (RA) was ongoing at the time of the inspection; however, the U.S. Air Force should assess if additional

OU(s):[1] Former Port Heiden Radio Relay Station (RRS) Environmental Restoration Program (ERP) Sites	measures are needed to prevent migration of PCB-contaminated soil as a result of wind or runoff.			
	Recommendation: Review and modify stockpile maintenance plans to ensure contaminated soil stockpiles are covered and contained in a manner that prevents exposure to, and migration of, PCB-contaminated soil.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	October 2015

2. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Former Port Heiden RRS ERP Sites	**Issue Category: Remedy Performance**			
	Issue: Increased quantities of PCB-contaminated soil have been identified at the site during the course of the RA. An Explanation of Significant Differences (ESD) was prepared in 2010 to address an increase in the amount of contaminated soil identified following the 2009 field season; however, since the ESD was prepared in 2010, a significant amount of additional PCB-contaminated soil has been identified during the 2011, 2012, and 2013 field seasons that is not addressed in the decision documents (Record of Decision [ROD] and ESD).			
	Recommendation: Review the existing decision documents (ROD and ESD) and prepare an amendment or additional ESD to address additional quantities of PCB-contaminated soil not covered by the current decision documents.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	October 2016

3. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Port Heiden RRS Source Areas	**Issue Category: Remedy Performance**
	Issue: PCB-contaminated soil has been identified within Site Road and some adjoining areas which are not included in the decision documents (ROD and ESD).
	Recommendation: Review the Administrative Record including existing decision documents (ROD and ESD) to assess if an amendment or additional document is needed to address PCB-contaminated soil within Site Road and adjoining areas.

[1] Includes following the Environmental Restoration Program Sites with associated Alaska Department of Environmental Conservation Hazard ID numbers: OT001—185; WP002—186; SS004—188; LF007—25430; Antenna Pads—no ID; Contaminated Soil Removal Areas—no ID; Drum Storage Area—no ID; Focus Area—no ID.

Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	Federal Facility	State	October 2016

4. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Port Heiden RRS Source Areas	Issue Category: Remedy Performance			
	Issue: The soil RA has not been completed at the site, and is anticipated to continue through at least the 2015 field season. Increased quantities of soil, discrepancies associated with soil washing and landfilling during the 2009 field season, and the presence of contamination within Site Road and adjoining areas has required a longer timeframe to complete the soil RA than originally anticipated in the ROD. PCB-contaminated soil should be removed in accordance with the decision documents to ensure continued protectiveness of the soil remedy.			
	Recommendation: Complete the soil RA.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	October 2016

5. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Port Heiden RRS Source Areas	Issue Category: Operations and Maintenance			
	Issue: During the site inspection of ERP Site LF007, it was observed that the landfill appeared to have subsided in places, and in one instance, the subsidence exposed metallic debris. Some metal debris was also visible on the ground surface. While this is not indicative of current exposure, if left unchecked the landfill cap may further erode and contaminated soil may be exposed.			
	Recommendation: Address exposed debris and subsidence at ERP Site LF007.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	October 2016

6. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Port Heiden RRS Source Areas	Issue Category: Institutional Controls
	Issue: Although Annual IC Performance Reports are prepared to document reviews of the remedial actions and to determine whether these actions are protective, including whether the intent of the ROD-required ICs are being met, ICs for soil and groundwater have not been put into place formally. Soil ICs will be put into place once the soil remedy is complete, but there is no reason to wait on implementation of groundwater ICs.
	Recommendation: Implement groundwater ICs

Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	Federal Facility	State	October 2016

7. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Port Heiden RRS Source Areas	**Issue Category: Remedy Performance**			
	Issue: The ROD requires an evaluation of the progress of natural attenuation based on 5 years of groundwater monitoring (at a minimum). Only 4 years of data were available at the time of this five-year review. It was noted during the review of these data that MNA parameters included major cations such as iron and manganese; however, other major cations such as calcium, sodium magnesium, and potassium were not analyzed. Similarly, major anions, sulfate and alkalinity, were analyzed, but major anions such as chloride and carbonate/bicarbonate were not analyzed. Also, other common MNA parameters such as ethene, ethane, and methane are not included in the data set. The purpose of the five-year evaluation is to compile, analyze, and review all groundwater data collected to determine the effectiveness of natural attenuation. The ROD also states that if during this evaluation the data indicates contaminant concentrations in groundwater are not declining as estimated, the remedy decision may be re-considered.			
	Recommendation: Perform an evaluation of the progress of natural attenuation based on 5 years of groundwater monitoring as required by the ROD. Future MNA evaluations should include an assessment of whether or not additional MNA parameters should be added to the analyte list for future groundwater sampling events. Results from the additional analytes, in conjunction with analytical results for TCE and daughter products cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride, can be used to evaluate if TCE degradation is occurring and assist in identifying the process(es) through which it is occurring.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	October 2016

8. Issues and Recommendations Identified in the Five-Year Review:

OU(s): Port Heiden RRS Source Areas	**Issue Category: Remedy Performance**			
	Issue: The compound 1,4-dioxane was not included in the list of analytes for groundwater samples collected during the LTM program. This compound should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted.			
	Recommendation: The compound 1,4-dioxane should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling			

	events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Federal Facility	State	Annually

Protectiveness Statement(s)

Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date:*
Port Heiden RRS Source Areas	Protectiveness Deferred	Not applicable

Protectiveness Statement:

Based on the findings of this first five-year review, the actions performed for soil and groundwater at ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are considered protective in the short-term because exposures appear to be under control, and no unacceptable risks are occurring. The remedy is ongoing, however, and it is not clear yet that the selected remedy, when complete, will be protective in the long-term the quantities of soil to be remediated has changed since the decision documents were issued. In addition, soil stockpiling practices should be reviewed and modified to ensure contaminated soil stockpiles are contained in a manner that prevents exposure and cross contamination due to wind erosion or runoff of PCB-contaminated soil. At ERP Site LF007, the exposed debris and subsidence should be assessed and repairs made, if necessary. Lastly, groundwater ICs should be implemented according to the requirements of the ROD, and a site-specific operation and maintenance plan should be prepared to provide the methods and reporting requirements for ICs. The remedy selected for groundwater at the former Port Heiden RRS remains protective of human health and the environment in the short-term. To assess long-term protectiveness of groundwater, an MNA evaluation should be conducted, prior to the second five-year review, using the groundwater analytical results from 2004, 2009, 2010, 2011, 2012, and 2013 sampling events. The ICs required by the ROD should be implemented to formally prevent groundwater use. Also, 1,4-dioxane should be added to the list of groundwater sample analytes for two consecutive sampling events, and a statistical analysis of groundwater concentration trends should be performed. The actions taken for soil are considered protective in the short-term, and protectiveness should be achieved in the long-term once the issues identified in this five-year review report are addressed.

Contents

Acronyms and Abbreviations

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AMNWR	Alaska Maritime National Wildlife Refuge
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CES	Civil Engineering Squadron
COC	contaminant of concern
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration program
ESD	Explanation of Significant Difference
°F	degrees Fahrenheit
IC	institutional control
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MCL	maximum contaminant level
MNA	monitored natural attenuation
NCP	National Contingency Plan
NTCRA	Non-time-critical removal actions
NVPH	Native Village of Port Heiden
O&M	operation and maintenance
PA	preliminary assessment
PACAF	Pacific Air Force Regional Support Center
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
POL	petroleum oil lubricants
ppm	parts per million
RA	remedial action
RAO	remedial action objective
RI	remedial investigation
ROD	Record of Decision
RRO	residual range organics
RRS	Radio Relay Station

SI	site inspection
SVOC	semivolatile organic compound
TCE	trichloroethene
TSCA	Toxic Substances Control Act
USAF	U.S. Air Force
UST	underground storage tank
VOC	volatile organic compound

SECTION 1

Introduction

The purpose of a five-year review conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) is to determine whether the remedies in place at a site are protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, the five-year review reports identify issues found during the review, if any, and provide recommendations to address them.

The U.S. Air Force (USAF) is preparing this five-year review report pursuant to Section 121 of CERCLA and the National Contingency Plan (NCP).

CERCLA Section 121 states:

> "If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

This requirement is further interpreted in the NCP. Title 40, Section 300.430(f)(4)(ii) of the *Code of Federal Regulations* states:

> "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE)[2], the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

USAF conducted this five-year review of the remedial actions (RAs) selected and implemented at Installation Restoration Program (IRP; also referred to as Environmental Restoration Program, or ERP) Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) at the former Port Heiden Radio Relay Station (RRS), Alaska, as presented in the *Record of Decision for Port Heiden Radio Relay Station, Port Heiden, Alaska* (USAF, 2009) and subsequent *Explanation of Significant Differences for Port Heiden Radio Relay Station, Port Heiden, Alaska* (USAF, 2010a). This five-year review report documents the results of the review and was prepared for the Pacific Air Force Regional Support Center (PACAF) Restoration Division under Contract Number FA8903-08-D-8769, Task Order Number 351, with the Air Force Center for Engineering and the Environment.

This is the first five-year review of RAs implemented for ERP Sites OT001, WP002 (identified in the Record of Decision [ROD] as the Black Lagoon Outfall and the former Facility Area Plumes), SS004, LF007, and the four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area).

[2] Unlimited use and unrestricted exposure (UU/UE) means that the selected remedy will place no restrictions on the potential use of land or other natural resources. In general, if the selected remedy relies on restrictions of land and/or groundwater use by humans and/or ecological populations to be protective, then the use has been limited and a five-year review should be conducted. For example, if a site is cleaned up to an industrial-use level, and/or other types of uses are restricted (e.g., residential use), then, generally, UU/UE is not met.

The triggering action for this statutory review is initiation of the first RA, which began in May 2009. This five-year review is required for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) because the selected remedies, at completion, will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure. The five-year review is conducted to verify that the remedies are, or will be, protective of human health and the environment.

SECTION 2

Site Chronology

The chronology of events leading up to and including this five-year review for ERP Sites OT001, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are summarized in Table 2-1. Complete citations for references in the table are provided in Attachment 2.

TABLE 2-1
Chronology of Site Events
Former Port Heiden RRS, Port Heiden, Alaska

Date	Event
1981	USAF removed asbestos-containing pipe insulation, scrap metal, wood, water and fish oil-based paints, and 20 empty petroleum oil lubricants (POL) barrels from the former Port Heiden RRS (USAF, 2009).
1984	The 5099th Civil Engineering Squadron (CES) shipped transformer oil containing polychlorinated biphenyls (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 former Port Heiden RRS (USAF, 2009).
1985 and 1986	The 5099th CES shipped 54 and 395 drums, respectively, of PCB-contaminated 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 that had been excavated to a depth of 3 feet, near a doorway on the southeast corner of the Former Composite Building (currently part of ERP Site OT002); and 33 drums of PCB-impacted soil were removed from an area on the west side of Antenna No. 3 (USAF, 1996).
1986	Soil samples were collected throughout the former 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 (VOCs) (USAF, 2009).
1986, 1987, 1988	The U.S. Army Corps of Engineers conducted site inspections (SIs) and prepared bid documents for the demolition and restoration of the site (CH2M HILL, 1994).
1987 and 1988	Eighty soil samples were collected on the north end of the Former Composite Building and analyzed for PCBs. PCB-contaminated soil was identified along the entire northern wall of the Former Composite Building. The north end of the Former Composite Building was subsequently the focus of soil excavation and removal during the 1990 investigation and restoration activities (USAF, 2009).
1989	An SI was completed at the former 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) (USAF, 2009).
1990 to 1992	Contractors demolished the buildings and structures at the facility and buried them in a landfill just east of the former Port Heiden RRS gravel pad; and removed hazardous wastes and PCB- and petroleum-contaminated soil (CH2M HILL, 1994).
1990	PCB-contaminated soil was excavated and removed near an area north of the Former Composite Building. PCB-contaminated soil was also found in a diamond-shaped area northwest of the northwest corner of the Former 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 of PCB-impacted soil was removed from the former Port Heiden RRS and from a Federal Aviation Administration site (USAF, 2009).
1995	A preliminary assessment (PA) and SI were performed and included the collection of soil samples (USAF, 1996). The assessment identified nine areas where hazardous substances or petroleum products may have been stored or released to the environment. Four of the ERP Sites (OT001, WP002, SS004, and LF007) are included in this five-year review (USAF, 2009).

TABLE 2-1
Chronology of Site Events
Former Port Heiden RRS, Port Heiden, Alaska

Date	Event
2000	An additional SI was performed. The SI included the collection of soil samples at locations identified as needing further investigation (USAF, 2000).
2003	Private drinking water supply wells in the community of Port Heiden were sampled under the Alaska Department of Environmental Conservation (ADEC) Village Safe Water Program (ADEC, 2003).
2004	Remedial Investigation (RI) fieldwork was completed at the former 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 ROD (USAF, 2009).
2009	The ROD was finalized in February 2009 and annual groundwater sampling was conducted (USAF, 2009).
2009	In May 2009, the soil RA was initiated, but was not completed because a higher volume of PCB-contaminated soil was encountered than what was described in the ROD. In addition, corrective actions were necessary to complete work initiated in 2009. The corrective actions were subsequently conducted in 2010 and 2011. A description of the corrective actions, along with their rationale, are explained in Section 4.3.1. The *Final Corrective Action Report* (Weston Solutions, Inc. [Weston], 2011) also provides information regarding the corrective actions.
2010	An Explanation of Significant Differences (ESD) was prepared to address the increase in volume of PCB-contaminated soil. The ESD also stipulated that the additional soil with over 1 milligram per kilogram [mg/kg] PCBs would be disposed of offsite at a location in the lower 48 states. Annual groundwater sampling was conducted (USAF, 2010a).
2011	Corrective actions were completed to address discrepancies identified during the initial soil RA in 2009. Section 4.3.1 provides a more detailed description of the soil remedy implemented and discrepancies discovered following the 2009 field season. Annual groundwater sampling was conducted.
2012	The soil RA continued at the site and annual groundwater sampling was conducted.
2013	Annual groundwater sampling was conducted and the soil RA continued at the site.
2013	First five-year review initiated.

SECTION 3

Background

Section 3 describes the physical setting of ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area), including a description of land use, resource use, and environmental setting. This section also describes the history of contamination associated with each site, the initial response actions taken at each site, and the basis for each of the initial response actions. RAs conducted subsequent to the initial response actions are described in Section 4.

3.1 Physical Characteristics

The former Port Heiden RRS is located approximately 1.5 miles east of Bristol Bay and approximately 400 miles southwest of Anchorage (Figure 1) on the north side of the Alaska Peninsula on the coastal plain of Bristol Bay. The former Port Heiden RRS is located within the former Fort Morrow, a World War II Army Corps Air Base. The buildings and facilities associated with the former Port Heiden RRS have been removed. Site Road extends north from the Port Heiden airport, then north west to the former Port Heiden RRS. The majority of Site Road is southeast and south of the former Port Heiden RRS, however a portion of the road extends into the former Port Heiden RRS, through ERP Site OT001 and the four unnumbered sites. Figure 2 depicts the former Port Heiden RRS installation boundary. 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. The closest residential population is approximately 2.5 miles south at the Village of Port Heiden.

Four ERP Sites (OT001, WP002, SS004, and LF007) and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) (Figure 3) are identified in the ROD and, as such, are included in this five-year review.

- Former Composite Building (ERP Site OT001)
- Black Lagoon Outfall Plume and the former Facility Area Plume (ERP Site WP002) (Figure 4)
- Septic Tank and Septic System Outfall (ERP Site SS004)
- Landfill and Debris Burial Areas, including ERP Site LF007 (Radio Relay Station Landfill)
- Other Areas (Non-numbered) Identified in the Remedial Investigation (RI) Report
  - Antenna Pads
  - Contaminated Soil Removal Areas
  - Drum Storage Area
  - Focus Area

There are also some areas contaminated with POL that were not addressed in the ROD, and are not addressed further in this five-year review.

3.2 Land and Resource Use

The Port Heiden installation was initially one of the 18 Distant Early Warning Line stations constructed in Alaska between 1950 and 1959. The Port Heiden RRS was made operational in 1961 to provide reliable communications for the Distant Early Warning Line station. Originally known as White Alice Communications System, the Air Force Alaska Air Command redesignated White Alice Communications System facilities as RRSs in 1969. The Port Heiden RRS was deactivated in 1978. The site consisted of a Composite Building with dormitories, office space, storage space, and equipment for standby power generation, four billboard antennas and feed horns (White Alice Arrays), and a heliport (USAF, 2001).

According to the ROD, the landowners within the former Port Heiden RRS include "the Alaska Peninsula Corporation, the Alaska Department of Transportation (AKDOT), and the United States Air Force (USAF)" (USAF, 2009).

3.2.1 Land Use and Population

The population of the town of Port Heiden was recorded at 119 in 2001 (USAF, 2001). Land use is primarily residential. 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 former Port Heiden RRS is anticipated to be primarily residential. The Native Village of Port Heiden (NVPH), a federally recognized tribe, is located in Port Heiden. It is a traditional Aleut community, with a commercial fishing and subsistence lifestyle.

3.2.2 Physiography and Climate

The Port Heiden area 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 degrees Fahrenheit (°F), while winter temperatures between November and February average 22.8°F. Extreme temperatures of 87°F and −26°F have been recorded. According to the Federal Aviation Administration, average annual wind speed at the former Port Heiden RRS site is 14.6 miles per hour, with the prevailing wind direction from the south-southeast (USAF, 2001).

3.2.3 Geology

The former Port Heiden RRS is located on the Alaska Peninsula, which 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 have produced large ash eruptions (USAF, 2009).

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 mean sea level. Near the former Port Heiden RRS, soils appear to be composed of glacial till. Little was known about subsurface soil conditions at the former Port Heiden RRS prior to the 2004 RI. Previous work indicated that there is a regional clay layer of unknown thickness that starts approximately 12 feet below ground surface (bgs) near the former Port Heiden RRS (CH2M HILL, 1994). Well drilling data from the community of Port Heiden indicates that surface soil is composed of sand and pumice deposits that extend to approximately 15 to 25 feet bgs. The surface soil layer is apparently underlain by a layer of silty clay to silty gravel, which extends to a depth of approximately 50 to 90 feet. Beneath the strata is a layer of saturated coarse sand and gravel (U.S. Army Corps of Engineers, 2003). Similar strata were described during trenching at the former Port Heiden RRS (USAF, 1996).

3.2.4 Groundwater and Surface Water Uses

Groundwater beneath the site is encountered at approximately 50 feet bgs and generally flows to the west and northwest, toward Bristol Bay and away from the residential populations of Port Heiden. 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 south of the site in the Village of Port Heiden. There is no current known use of groundwater in the proximity of the former Port Heiden RRS, nor are there any known plans for future use. Based on general water quality, however, the remedy selected for groundwater assumes that groundwater may be used as a future source of drinking water (USAF, 2009).

Ponds, lakes, and wetlands are abundant near the site. No major rivers or creeks flow through the former Port Heiden RRS but the smaller Reindeer Creek (locally known as North River) is located approximately 1

mile north of the site. The wetlands may drain into local creeks that flow westerly into Bristol Bay or through groundwater movement into Bristol Bay. As previously noted, subsistence fishing is common in surface waters around the former Port Heiden RRS (USAF, 2009).

3.3 History of Contamination

Past activities at Port Heiden RRS that may have generated hazardous substances during facility operation include chemical storage, building and mechanical equipment maintenance, use of transformers, landfill disposal, sewage disposal, and application of herbicides and pesticides. Based on the known use and disposal practices of these substances, environmental investigations and eventually initial response actions were conducted following the deactivation of this facility in 1978 (USAF, 2009).

3.4 Initial Response

This section summarizes the initial responses performed, and in some instances, the initial response actions performed at each site. Initial response activities identified soil contaminated with PCBs, polynuclear aromatic hydrocarbons (PAHs), and pesticides above State of Alaska cleanup levels protective of unrestricted use. Groundwater was documented to be contaminated with trichloroethene (TCE) and benzene above unrestricted use concentrations (USAF, 2009).

A PA/SI and data review were conducted in August 1995, followed by a site inspection (USAF, 1996). The PA/SI identified nine areas where hazardous substances or petroleum products may have been stored, released to the environment, or disposed of onsite. Findings from the PA/SI were used to designate one of the areas, OT001, as an ERP site, while the remaining sites were considered preliminary areas of concern (USAF, 1996). Eventually, these areas of concern sites became ERP sites following subsequent investigations. As a result, the initial responses and initial response actions described in the following subsections do not refer to the individual ERP sites when the action occurred prior to 1995.

3.4.1 Initial Response Investigations

Investigation of the contamination found at the former Port Heiden RRS site was initiated in 1986. The following provides a summary of the various investigations performed:

- In 1986, soil samples were collected throughout the former Port Heiden RRS area. Selected samples were tested for PCBs, metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), SVOCs, and halogenated VOCs (USAF, 2009).
- In 1986, 1987, and 1988, the U.S. Army Corps of Engineers conducted SIs and prepared bid documents for the demolition and restoration of the site (CH2M HILL, 1994).
- During 1987 and 1988, 80 soil samples were collected on the north end of the Former Composite Building and analyzed for PCBs. PCB-contaminated soil was identified along the entire northern wall of the Former Composite Building. The north end of the Former Composite Building was subsequently the focus of soil excavation and removal during the 1990 investigation and restoration activities (USAF, 2009).
- In 1989, an SI was completed at the former Port Heiden RRS. Five soil samples were collected at the septic tank location and analyzed for VOCs, SVOCs, priority pollutant metals, PCBs, DRO, and RRO (USAF, 2009).
- In 1995, a PA and SI were performed and included the collection of soil samples (USAF, 1996). This assessment identified nine areas where hazardous substances or petroleum products may have been stored or released to the environment. Four of the ERP Sites (OT001, WP002, SS004, and LF007) are included in this five-year review (USAF, 2009).
- In 2000, an additional SI was performed. The SI included the collection of soil samples at locations identified as needing further investigation (USAF, 2000).

- In 2003, 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 fieldwork was completed at the former Port Heiden RRS. The objective of the RI was to delineate the nature and extent of any contamination present, determine the RAs that would best address risks to human health and the environment associated with any site contamination, and prepare a ROD (USAF, 2009).

The following subsections provide a brief description of each ERP site included in this five-year review and a summary of the initial investigations performed.

3.4.1.1 ERP Site OT001—Former Composite Building Foundation

ERP Site OT001 (Figure 3) consists of a gravel pad that contained the Former Composite Building along with four former underground storage tanks (USTs) around the Former Composite Building. The Former Composite Building was constructed of reinforced concrete slabs and contained offices, dormitories, storage space, a garage, and a generator room. The White Alice Array consisted of feed horns and billboard antennas (USAF, 2009).

Investigations conducted at OT001 identified PCBs and chlorinated solvent-contaminated soil around the perimeter of the former concrete foundations. Much of the soil was reportedly excavated and shipped offsite in earlier remedial efforts (USAF, 2009).

In 1986, soil samples were collected throughout the former Port Heiden RRS. Selected samples were tested for PCBs, metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), SVOCs, and halogenated VOCs. At the Former Composite Building, results indicated the presence of PCBs up to 15 parts per million (ppm) near the auto shop, and the halogenated VOC, trichlorofluoromethane, at a maximum concentration of 84.2 parts per billion outside the generator room (USAF, 2009).

Eighty soil samples were then collected from the north end of the Former Composite Building during investigations conducted in 1987 and 1988, and were analyzed for PCBs. Analytical results identified PCB-contaminated soil along the entire northern wall of the Former Composite Building at concentrations up to 190 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 Former Composite Building was subsequently the focus for soil excavation and removal during the 1990 investigation and restoration activities (USAF, 1996).

During the 2004 RI, 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 the initial analytical results, an additional six soil samples were collected laterally, away from the initial samples, and were analyzed for PCBs. Of the soil samples collected during the 2004 RI, eight had concentrations of PCBs above the screening criteria (USAF, 2009).

3.4.1.2 ERP Site WP002—Groundwater Plumes

POL wastes were reported to have been disposed of in a floor drain that connected the auto shop in the Former Composite Building to the Black Lagoon. A review of the analytical results from soil samples collected in 1987 and 1988 show total petroleum hydrocarbons, PCBs, and SVOCs in exceedance of preliminary action levels. Based on the results, it was estimated that approximately 4,000 cubic yards of soil impacted with total petroleum hydrocarbon concentrations above 5,000 ppm were present at ERP Site WP002 (USAF, 2009).

Groundwater samples were collected from the soil borings where groundwater or fully saturated soil was encountered. A total of 33 monitoring wells were installed during the 2004 RI at the former Port Heiden RRS. The decision to install a groundwater monitoring well was based on the following 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 (USAF, 2009).

Based on the results of the 2004 RI data, two plumes have been identified in the aquifer underlying the former Port Heiden RRS. They include a TCE plume (approximately 700 feet long, 400 feet wide, and at a depth of 50 feet bgs) underlying the former Port Heiden RRS pad and a smaller benzene and TCE plume (approximately 100 feet long, 100 feet wide, and at a depth of 50 to 60 feet bgs) underlying the Black Lagoon Outfall. The maximum TCE concentration (0.69 milligram per liter) was found in Well DSA-MW-02 in the Drum Storage Area (USAF, 2009).

3.4.1.3 ERP Site SS004

ERP Site SS004 (Figure 3) consists of a former septic tank location, septic tank piping, and a septic system outfall area. The septic system was generally located in the southwestern portion of the former Port Heiden RRS. Piping from the Former Composite Building ran west to the septic tank, which was approximately 200 feet long. 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 outfall area consists of a concrete wing wall that discharges into a depressed area, approximately 50 feet in diameter. The septic tank may have been abandoned in place during an initial response action conducted in 1990 (USAF, 2009).

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 (USAF, 2009).

Subsequent investigations conducted at ERP Site SS004 identified an area of PCB-contaminated soil measuring approximately 100 feet by 100 feet. PCB contamination near the septic tank portion of the site was above the screening criteria in surface soil. During the 2004 RI, PCBs were also detected in surface soil directly below the outfall discharge point during the 2004 RI (USAF, 2009).

ERP Site SS004 was suspected to have been used to dispose of POL wastes from the ERP Site OT001. Soil samples collected from the location of the former septic tank had detections of the PCB Aroclor 1260 at a concentration of 13,100 ppm. Additionally, DRO and RRO were detected at concentrations as high as 1,310 mg/kg and 1,180 mg/kg, respectively (USAF, 2006).

3.4.1.4 ERP Site LF007

The RRS Landfill is located to the north of the former Port Heiden RRS, and covers an area of approximately 350 feet long by 300 feet wide. Several feet of fill have been placed over the RRS Landfill contents as a cover. No previous investigations were conducted on the RRS Landfill prior to the 2004 RI (USAF, 2009).

During the 2004 RI, numerous surface and subsurface soil samples were collected, and PCBs, PAHs, and pesticide contamination were detected in the soil cover material over the landfill. PCBs were detected in three of the collected soil samples obtained at 2 feet bgs. PAHs and pesticides were also detected in one sample above cleanup levels. The maximum concentration of PCBs detected was 360 mg/kg (USAF, 2009).

The aerial extent of buried debris in the landfill is approximately 300 feet by 400 feet, the thickness of the cover soil averages approximately 3.5 feet. No detections of contaminants above screening criteria in surface or subsurface soil around the perimeter of the landfill have been detected (USAF, 2009).

3.4.1.5 Antenna Pads

Four former Port Heiden RRS antennas and feed horns were constructed on four separate concrete pads situated around the Former Composite Building (ERP Site OT001). 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. The four pads are depicted in Figure 3. 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 (USAF, 2009).

Based on analytical results from soil samples collected during the 2004 RI, PCBs were detected slightly above the screening criteria in samples obtained from two borings around the perimeter of Antenna Pads 1 and 2. The contamination may have resulted from the migration of contaminated soil from the adjacent contaminated soil removal areas. Per the ROD, native soil around the perimeter of Pads 3 and 4 appears to be uncontaminated (USAF, 2009). The results suggest that it is unlikely that operation of the former antennas caused any large release of PCBs or solvents based on analytical results (USAF, 2009).

According to the ROD (USAF, 2009), it appears unlikely that operation of the former antennas caused any large release of PCBs or solvents based on analytical results of soil samples. PCBs were detected slightly higher than the screening criteria in soil samples obtained from two borings around the perimeter of Antenna Pads 1 and 2. The ROD states that "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" (USAF, 2009). The ROD indicates that "native soil around the perimeter of Antenna Pads 3 and 4 appears to be uncontaminated" (USAF, 2009).

3.4.1.6 Contaminated Soil Removal Areas

Per the ROD, the extent of contamination associated with the contaminated soil removal areas spans across the former Port Heiden RRS (USAF, 2009). It includes eight contaminated soil removal areas associated with past operations (USAF, 2009).

Several hundred drums of PCB-contaminated soil were excavated from several areas within the former Port Heiden RRS and shipped offsite in the late 1980s and early 1990s. The areas include soil on the north and east sides 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. The contaminated soil removal areas are located across the former Port Heiden RRS and correspond to locations where contaminants exceeded screening criteria in soil based on data obtained during previous studies (USAF, 2009).

According to the ROD, pesticides and PCBs constituted the majority of the contaminants found at the contaminated soil removal areas. The maximum pesticide and PCB concentrations were 5 mg/kg and 930 mg/kg, respectively (USAF, 2009).

3.4.1.7 Drum Storage Area

The Drum Storage Area is located in the northwestern portion of the site. An aerial photograph taken in 1965 (USAF, 2006) clearly shows the Drum Storage Area to the northwest of the Former Composite Building (ERP Site OT001). Drums of various liquids were likely stored in this area. As-built drawings indicate that a 1,450-gallon truck-filled motor gasoline tank and pump were located in the southeastern portion of the Drum Storage Area. During the 2004 RI, no USTs were found (USAF, 2009).

Investigations conducted at this site identified approximately 200 feet by 150 feet of PCB- and pesticide-contaminated surface soil (USAF, 2009). PCBs have been detected up to 9.9 mg/kg in surface soil in the southern portion of this site in an area referred to as the "Diamond Area." During the RI, PCBs were detected at a maximum concentration of 19 mg/kg in an area of close proximity located just north of this site (USAF, 2009).

3.4.1.8 Focus Area

The Focus Area was identified during the 2004 RI fieldwork and consists of an area of stressed vegetation at the northwestern portion of the former Port Heiden RRS, located approximately 200 feet west of the Former Composite Building foundation (USAF, 2009).

During the RI, reconnaissance was performed over the entire pad to locate any areas of stained soil or stressed vegetation in an attempt to identify all possible sources of contamination. The Focus Area site consists of one area of stressed vegetation that was identified in the northwestern portion of the site. Analytical results from soil samples collected during the 2004 RI indicated that soil was impacted with PCBs.

According to the ROD, this area is relatively small in size and is likely due to the result of surface spills. The maximum PCB concentration detected was 5.4 mg/kg (USAF, 2009).

3.4.2 Initial Response

The following series of initial response actions have been documented at the former Port Heiden RRS sites (as noted, some of the descriptions do not refer to the individual ERP sites when the action occurred prior to 1995 because the designations were not yet in place).

- In 1981, USAF removed asbestos-containing pipe insulation, scrap metal, wood, water and fish oil-based paints, and 20 empty POL barrels from the former Port Heiden RRS. The materials were reported to be disposed in an area designated Landfill A (asbestos-containing material and building debris) and an area designated burial site I, northwest of the Former Composite Building. More than 100 empty POL barrels were buried at landfills designated burial site 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 CES (PACAF) for shipment to Elmendorf Air Force Base (USAF, 2009).
- 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 former Port Heiden RRS (USAF, 2009).
- In 1985 and 1986, the 5099th CES shipped 54 and 395 drums, respectively, of PCB-contaminated 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 that had been excavated to a depth of 3 feet, near a doorway on the southeast corner of the Former Composite Building (currently part of ERP Site OT002); 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 buildings and structures at the facility and buried them in a landfill just east of the former Port Heiden RRS gravel pad, and removed hazardous wastes and PCB- and petroleum-contaminated soil (CH2M HILL, 1994).
- In 1990, a grid in the area north of the Former 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 (USAF, 2009).
- Excavation work progressed until field testing showed PCB concentrations were below 10 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 (USAF, 2009).
- PCB-contaminated soil was also found in a diamond-shaped area northwest of the northwest corner of the Former 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 of PCB-impacted soil were removed from the former Port Heiden RRS and from a Federal Aviation Administration site (USAF, 2009).
- In October 1995, a PA/SI was conducted at the former 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 USTs were also removed (USAF, 2009).

3.5 Basis for Taking Action

There are several CERCLA hazardous substances identified as contaminants of concern (COCs) at the former Port Heiden RRS. Soil is contaminated with PCBs, PAHs, and pesticides. Groundwater is contaminated with TCE and benzene as two small plumes. Based on the human health and ecological risk assessments completed, it was determined that action was needed to protect human health from exposure to groundwater and soil contamination at the former Port Heiden RRS (USAF, 2009).

The purpose of the completed and ongoing response actions at ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are to satisfy the remedial action objectives (RAOs) and to protect human health and welfare, and the environment from exposure to COCs from the sites. Per the ROD, the response actions that were selected are necessary under CERCLA 42 U.S.C Sections 9601 – 9628, to protect public health or welfare or the environment. Also, as stated in the ROD, 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. In addition, the ROD determined that the soil response actions selected are necessary under Alaska State authority to meet soil cleanup levels promulgated in ADEC regulation 18-Alaska Administrative Code (AAC) 75.341(c), Table B1, Method 2, and that the groundwater response actions selected are necessary under Alaska State authority to meet groundwater cleanup levels promulgated in ADEC regulation 18 AAC 75.345(b)(1), Table C (USAF, 2009).

SECTION 4

Remedial Actions

Initial response actions were conducted prior to finalization of the remedies in the February 2009 ROD (USAF, 2009). On February 15, 2008, USAF distributed a proposed plan for cleanup action to the local communities, and the public, to solicit public input. As a result of community feedback, the selected remedies were revised, a revised proposed plan was submitted for public review on October 10, 2008, and a second public meeting was held. The ROD was completed and finalized in 2009 following the second public meeting and adjudication of comments (USAF, 2009).

Initial RAs conducted are described in Section 3.4 (Initial Response). When the ROD was finalized in 2009, the actions already completed at each site were taken into account, and the selected remedies focused on what remained to be done to provide protectiveness of human health and the environment. Section 4 describes the RAs performed since completion of the ROD in 2009 and subsequently the ESD in 2010.

4.1 Remedial Action Objectives

The overall objectives of the former 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 RA is designed to achieve (USAF, 2009).

Port Heiden RAOs were developed to 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. The RAOs will eliminate site risks through either isolation of the COCs or their removal from the environment (USAF, 2009).

As described further in Section 4.2, an ESD was prepared to document refinements to the remedy described in the ROD (USAF, 2010a). The RAOs were not modified in the ESD.

4.1.1 Human Health Remedial Action Objectives

As stated in the ROD (USAF, 2009), human health RAOs for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) 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 Applicable or Relevant and Appropriate Requirements (ARARs) (the cleanup levels specified by the ROD are listed in Table 4-1 below).
- Reduce TCE[3] and benzene in groundwater to chemical-specific ARARs (the cleanup levels specified by the ROD are listed in Table 4-1 below).
- Prevent exposure (through ingestion, inhalation, and/or dermal contact) to contaminated groundwater until such time as the federal drinking water standards and state cleanup levels (that is, 18 AAC 75, Table C) are met, and 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.
- 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.

[3] When the Air Force addresses TCE in groundwater through natural attenuation, the expected daughter or breakdown products of TCE (cis-dichloroethene, trans-dichloroethene, and vinyl chloride) will also be monitored until they have met the required federal maximum contaminant levels and state cleanup levels (that is, 18 AAC 75, Table C).

4.1.2 Environmental Protection Remedial Action Objectives

As stated in the ROD (USAF, 2009), environmental protection RAOs for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are as follows:

- 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).

4.2 Selection of Final Remedy

A ROD and subsequent ESD have been issued for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area). The ROD selected remedies for soil and groundwater media.

The selected remedy for soil applies to the following areas:

- ERP Site OT001—Former Composite Building
- ERP Site SS004—Septic Tank and Septic System Outfall
- ERP Site LF007—Radio Relay Station Landfill
- Four unnumbered sites
  - 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 (ERP Site WP002).

Soil and groundwater COCs and cleanup levels are provided in Table 4-1.

TABLE 4-1
Contaminants of Concern and Cleanup Levels
Former Port Heiden RRS, Port Heiden, Alaska

Compound	Cleanup Level
Soil (mg/kg)	
PCBs	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 (milligrams per liter [mg/L])[4]	
Trichloroethene	0.005

[4] Per the ROD (USAF, 2009), the expected TCE daughter products (cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride) will be monitored and compared to their respective MCLs and state groundwater cleanup levels.

TABLE 4-1
Contaminants of Concern and Cleanup Levels
Former Port Heiden RRS, Port Heiden, Alaska

Compound	Cleanup Level
Benzene	0.005

Source: USAF, 2009

The remedies selected for soil and groundwater are described in the following subsections.

4.2.1 Soil

As described in the ROD, the initial selected remedy for soil is excavation of soil with PCB contamination in excess of 1 mg/kg, soil washing to reduce PCBs to less than 10 mg/kg, and disposal in Class III landfill (USAF, 2009). The ROD described the specific soil remedy elements as follows:

- 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, identified as the NVPH Landfill.
- Disposal of residuals from the soil washing process in accordance with the appropriate state and federal regulations.

The soil alternative was selected because it has the best balance of tradeoffs with regard to the various evaluation criteria, it 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, and has a reasonable cost that was approximately mid-range of the costs of the alternatives evaluated while meeting ARARs (USAF, 2009).

The soil cleanup levels to be attained by this final remedy are shown in Table 4-1. As stated in the ROD, “the cleanup levels, once they are attained, will allow the current use of the site.” The ROD goes on to state “pesticides may remain at the site after cleanup at concentrations above migration to groundwater standards (per 18 AAC 75.341, Table B1, October 2008)” (USAF, 2009).

During implementation of the remedy in 2009, two significant differences in site conditions were recognized, which led to refinements documented in the ESD (USAF, 2010a). The ESD was prepared to address the following two significant differences:

- A larger quantity of PCB-contaminated soil was discovered (USAF, 2010a).
- With the discovery of greater quantities of PCB-contaminated soil, the final disposition of the soil became limited to barging it offsite to a permitted facility for disposal (USAF, 2010a).

The discovery of the significant differences and subsequent implementation of the revised RA are explained further in Section 4.3.1.

4.2.2 Groundwater

The selected final remedy for groundwater is institutional control (ICs), natural attenuation, and long-term monitoring. The specific elements of this remedy are as follows:

- Natural attenuation of groundwater contaminated with TCE and benzene.

- Periodic groundwater monitoring 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. The ICs would remain in place until the groundwater cleanup levels were achieved through natural attenuation.

The groundwater alternative was selected for the following reasons:

- It results in groundwater attaining cleanup levels over a reasonable timeframe.
- It is protective of human health and the environment since the water at this site is not used for drinking water.
- Ecological receptors are not at risk.
- It is relative easy to implement.
- It has the least cost.

The ROD also notes the following:

> *After the first five-years of groundwater monitoring (to be performed at a frequency of 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. (USAF, 2009)*

4.3 Implementation of Final Selected Remedies

4.3.1 Soil Remedial Actions

Implementation of the final selected remedy for soil began in May 2009, at which time the RA was initiated at ERP Sites OT001, SS004, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area). As of 2013, the soil RA has not been initiated at ERP Site LF007.

2009 Remediation Activities. Following mobilization in 2009, approximately 7,740 cubic yards of soil with PCB concentrations exceeding 1 mg/kg and below 10 mg/kg were excavated, and an additional 1,505 cubic yards of soil with PCB concentrations exceeding 10 mg/kg were excavated and washed. The combined amount of soil generated from both of the operations, approximately 9,245 cubic yards, was disposed at the NVPH Landfill (Weston, 2011).

This initial effort did not complete the soil removal action at the site because of the following three significant issues:

- During the initial removal action, the quantity of PCB-contaminated soil excavated, treated, and disposed at the NVPH Landfill exceeded the amount estimated in the ROD by approximately 2,245 cubic yards. Also, soil sampling conducted at the time of the 2009 RA identified approximately 4,000 cubic yards of PCB-contaminated soil remained at the former Port Heiden RRS. The NVPH was not willing to accept additional PCB-contaminated soil since the anticipated amount would add to their long-term liability. These additional quantities, and the need to change the disposal location, were addressed by the ESD (USAF, 2010a).
- A dump truck overturned while transporting PCB-contaminated soil. During the subsequent cleanup of the overturned truck, PCB-contaminated soil was identified along Site Road and some adjacent areas that were not associated with the overturned dump truck. An SI was subsequently initiated to characterize the extent of PCB contamination associated with Site Road (USAF, 2014).

- The 2009 RA was completed by a prime contractor with support from four subcontractors. One of the four subcontractors was responsible for conducting the soil washing (treatment activities) for soil with PCB concentrations greater than 10 mg/kg, including assuming responsibility for soils that had been excavated by the prime contractor. During the review of the draft removal action report completed by the soil washing subcontractor, extensive discrepancies and deficiencies were identified that called into question the execution of the soil washing activities that were claimed to have been completed. Additional investigations were conducted to quantify the discrepancies and deficiencies identified during the draft report review. The investigations included additional sampling across the entire installation, which in turn identified PCB-contaminated soil within Site Road and some adjacent areas. The areas were not included in the ROD or ESD because previous investigation efforts did not identify PCB contamination within these areas. However, USAF has made the community aware of the contamination and is monitoring access as if an IC was already in place. USAF is currently planning to remediate the road to unrestricted use/unrestricted exposure (less than 1 mg/kg) (USAF, 2012a). The investigations conducted following the 2009 RA resulted in a list of findings that required follow-on corrective action (Weston, 2011).

2010 ESD. The ESD was prepared to allow for the increased quantities identified in the 2009 removal action, which at that time was thought to have consisted of the 9,200 cubic yards already removed and an estimated 4,000 cubic yards remaining, and to provide an alternative plan for disposing the remaining PCB-contaminated soil (USAF, 2010a). As described in the ESD, the main issue driving the change in disposal location was the fact that disposing of PCB-contaminated soil (less than 10 mg/kg) in the community landfill was no longer an option, and the State of Alaska was reluctant to permit additional capacity for landfilling PCB-contaminated soil at this or other locations. The ESD concluded all remaining PCB-contaminated soil greater than 1 mg/kg PCBs would be shipped offsite to a permitted disposal facility (USAF, 2010a). The ESD also indicated that reducing PCB concentrations below 1 mg/kg of PCBs using soil washing was no longer needed because the contaminated soil would be shipped offsite and soil washing would in fact be a detriment to transport as the additional weight due to moisture content would increase the cost of shipment (USAF, 2010a).

2010 Remediation Activities. The 2010 Institutional Control Performance Report states that during the 2010 field season, approximately 3,000 cubic yards of PCB-contaminated soil were removed from the former Port Heiden RRS (USAF, 2010b). The cited report did not indicate from which site within the former Port Heiden RRS this soil was removed, although it did state that no work was performed at the RRS Landfill. The cited report also indicated that at that time it was estimated that 12,000 cubic yards of PCB-contaminated soil requiring excavation remained at the former Port Heiden RRS (a greater quantity than accounted for in the ESD).

An SI was conducted in October 2010 and continued in February 2011, and included the collection of surface and subsurface soil samples from Site Road. PCBs were detected at concentrations exceeding the ADEC cleanup level in both surface and subsurface soil samples within the portion of Site Road that extends onto the former Port Heiden RRS (as well as the portion that extends south towards the airport) (NVPH, 2011). Analytical results on the road surface ranged from nondetect to 60.6 mg/kg. The technical memorandum summarizing these results indicated that PCB contamination likely occurred from dust control measures that were employed when the RRS was active. Dust control measures at other similar facilities have been known to use PCB-containing oil (NVPH, 2011).

2011 Remediation Activities. During the 2011 field season, three different entities (Weston, Jacobs Engineering, and NVPH) were involved in removing PCB-contaminated soil. A combined total of approximately 16,763 cubic yards of PCB-contaminated soil and PCB-contaminated debris were excavated and removed (USAF, 2011). The Final Corrective Action Report indicates the 2011 field activities included removal of contaminated soil, equipment, and miscellaneous items from several locations within the former Port Heiden RRS, including the soil washing area, the NVPH Class III landfill, the tank abandonment area adjacent to the runway, the Alaska Department of Transportation and Public Facilities (ADOT&PF) storage

building and associated tank storage area at the former Port Heiden RRS, and at the beach landing area, which was the barge landing site for the NVPH (Weston, 2011). At the time, it was estimated that another estimated 10,000 cubic yards of PCB-contaminated soil remained in Port Heiden pending disposal (USAF, 2011).

2012 Remediation Activities. During the 2012 field season, two different entities (Jacobs Engineering and NVPH) were involved in removing PCB-contaminated soil. According to the 2012 Institutional Control Performance Report, Jacobs excavated approximately 20,951 cubic yards of PCB-contaminated soil from Site Road (and adjacent areas that include ERP Site OT001 and the four unnumbered sites), and the soil was stockpiled to be shipped offsite by others. Approximately 320 cubic yards of this soil were placed into 5-cubic yard super sacks for disposal as Toxic Substances Control Act (TSCA) wastes. Of the remainder (non-TSCA waste soil), 11,900 cubic yards remained in stockpiles, and 8,731 was placed in super sacks and disposed offsite (USAF, 2012a).

In addition, the NVPH excavated approximately 5,650 cubic yards of PCB-contaminated soil and placed it into stockpiles for later disposal. At the time, it was estimated that 7,000 cubic yards of PCB-contaminated soil remained to be removed from the former Port Heiden RRS and approximately 5,000 cubic yards of PCB-contaminated soil was identified for removal in the road and adjacent areas. The report also estimated that as the multiple stockpiles remaining at the site were decommissioned, an additional 3,000 cubic yards of PCB-contaminated soil would be generated (USAF, 2012a). A majority of the volume of soil removed during the 2012 field season was excavated from Site Road. The amount of soil excavated from ERP Sites OT001, SS004, and four unnumbered sites is not known.

2013 Remediation Activities. During the 2013 field season, approximately 2,344 cubic yards of PCB-contaminated soil were excavated and removed from the site (Jacobs Engineering Group, Inc. [Jacobs], 2013a and Jacobs, 2013b). The specific sites from which this material was removed was not specified in the cited document, although the draft After Action Report for 2013 indicates removals were performed along Site Road and adjacent areas (PACAF, 2014b). In addition, 1,429 bags containing 10,770.88 tons of PCB-contaminated soil (82 bags/348.15 tons of TSCA-regulated soil and 1,347 bags/10,442.73 tons of non-TSCA soil) was transported to disposal facilities in Arlington, Oregon (PACAF, 2014a).

Based on the September 30, 2013, to October 6, 2013, Weekly Summary Report for Task Order 046 (Jacobs, 2013a), future work will involve both characterization and removal of PCB-contaminated soil from Site Road and the former Port Heiden RRS area (Jacobs, 2013a). The 2013 Fieldwork Summary Report indicates that a further 195 bags (estimated 1,532 tons) of non-TSCA soil remain staged onsite for transport and disposal during the 2014 field season, about 4,790 tons of non-TSCA soil stockpiled at Storage Areas J1, CA1, and CA4 will need to be containerized and transported for disposal in 2014, and an estimated 2,260 tons of TSCA soil and 2,309 tons of non-TSCA soil will be excavated along the southern edge of the former Port Heiden RRS site in 2014 (PACAF, 2014a). Similar to the 2012 field season, a majority of the volume of soil removed during the 2013 field season was excavated from Site Road. The amount of soil excavated from ERP Sites OT001, SS004, and four unnumbered sites is not known.

The soil RA is expected to continue until the 2015 field season (CH2M HILL, 2013). According to the PACAF, additional excavation work is required at ERP Sites OT001 WP002, SS004, LF007, and Four Unnumbered Sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area), and the soil RA needs to be initiated at ERP Site LF007. Once the soil RA is complete, a notice type of IC 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 notice will make the land owner aware that ADEC approval is required for any disturbance of soil (the goal of this IC is to prevent the constant contact of this media with water, which could impact groundwater or surface water quality) (USAF, 2009).

4.3.1.1 Soil ICs

During ongoing RA activities, USAF has made the community aware of the location of known contamination and has regularly notified the community of the activities taking place. USAF is also monitoring the site as if an IC was already in place (USAF, 2012a). Each Annual IC Performance Report reviewed for this five-year review (USAF, 2010b, 2011, and 2012a) reported that no violation of the required ICs had been noticed. Following completion of the soil RA, ICs will be established at the RRS Landfill to provide notice that the remaining buried wastes may contain COCs, 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 the cap and to prevent migration of contaminants (USAF, 2009).

If future property use includes disturbance of the IC area, such that the remaining pesticide contaminated soil comes in constant contact with water, or other information becomes available that 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 (USAF, 2009).

In the future, if soil is removed from the site, it must be characterized and managed following regulations applicable at that time.

4.3.2 Groundwater

Groundwater monitoring is being conducted annually in accordance with a plan approved by ADEC and USAF to monitor natural attenuation of the ERP Site WP002 plumes. As other contaminants (such as fuel-related compounds) in the groundwater break down over time, their by-products will help to break down the TCE and benzene (USAF, 2009). The expected daughter products (cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride) derived from the COCs will be monitored and compared to chemical-specific federal maximum contaminant levels (MCLs) for drinking water 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 (USAF, 2009).

Since groundwater contaminants will be left onsite for many years until cleanup goals are met, ICs 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 in the following subsection (USAF, 2009).

4.3.2.1 Evaluation and Compilation of Groundwater Data

Per the ROD, implementation of the groundwater remedy will involve annual groundwater monitoring for the first 5 years (USAF, 2009). After this time, USAF and ADEC will evaluate the progress of natural attenuation (USAF, 2009).

Four groundwater sampling events have occurred at the site since the ROD was finalized in 2009. The events were conducted in 2010, 2011, 2012, and 2013, and were documented in three separate reports. Note that analytical results from the 2013 event were not available for review. The *Final 2012 Groundwater Monitoring Report* (NVPH, 2013) was the only groundwater report available for this five-year review; however, it included a comparison of the 2012 groundwater analytical results with the previous 2 years. Groundwater sampling events were conducted in accordance with the *Final Port Heiden RRS Remedial Work Plan* (NVPH, 2010). Section 6.4 provides an evaluation of the data presented in the *Final 2012 Groundwater Monitoring Report*.

4.3.2.2 Duration and 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 years of consecutive sampling

events where analytical results show that the COCs (benzene and TCE) are less than the chemical-specific concentrations shown in Table 4-1. In addition, the expected daughter products (cis-1,2-dichloroethene, trans-1,2-dichloroethene, 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.

Groundwater ICs, though not yet formally in place, shall include limitations on groundwater use to control human exposure to groundwater as approved by ADEC and notices to the land owner and Village Council of site status. The 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. Each Annual IC Performance Report reviewed for this five-year review (USAF, 2010b, 2011, and 2012a) reported that no violation of the required ICs had been noticed.

Any planned use of groundwater at the site must be approved by ADEC. In the event information becomes available that 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.

Per the ROD, if groundwater is removed from the site, it must be characterized and managed following regulations applicable at that time (USAF, 2009).

4.4 System Operations and Maintenance

4.4.1 Soil

The soil RA is ongoing and is not expected to be completed until the 2015 field season at the earliest (CH2M HILL, 2013). Even though the soil RA is ongoing, USAF has been communicating RA progress to the local community and conducting and documenting annual monitoring as if ICs were already in place (USAF, 2012a). Access controls observed during the July 17 and 18, 2013 site inspection included construction fencing around excavated areas and signs marking PCB-contaminated soil stockpiles.

Per the ROD, once the soil RA is complete, ICs will be implemented in the form of deed notices (with the land owners consent) to control the use of soil containing residual concentrations of dieldrin above 0.0076 mg/kg (USAF, 2009). ICs will also be established to provide notice that the remaining buried wastes may contain COCs, 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 (USAF, 2009).

Each Annual IC Performance Report reviewed for this five-year review (USAF, 2010b, 2011, 2012a) includes an “IC Controls Effectiveness” section that provides a description of whether the intended ICs are being met in terms of both soil and water. In each report available for the five-year review (covering 2010, 2011, and 2012), it was reported that no violation of the required ICs had been noticed.

4.4.2 Groundwater

The groundwater remedy involves annual groundwater sampling and an evaluation to assess if natural attenuation is occurring. Operations and maintenance (O&M) activities related to the groundwater remedy are being conducted in accordance with *Final Port Heiden RRS Remedial Work Plan* (NVPH, 2010). Since completion of the ROD in 2009, groundwater sampling has been conducted in 2010, 2011, 2012, and 2013.

Groundwater ICs in the form of limitations on groundwater use to prevent drinking of water contaminated with COCs and to prevent groundwater extraction and surface use without treatment have not yet been put into place, although the status of groundwater use is checked in each Annual IC Performance Report.

Each Annual IC Performance Report reviewed for this five-year review (USAF, 2010b, 2011, 2012a) includes an "IC Controls Effectiveness" section which provides a description of whether the intended ICs are being met in terms of both soil and water. In each report available for the five-year review (covering 2010, 2011, and 2012), it was reported that no violation of the required ICs had been noticed.

4.4.3 Operation and Maintenance Reporting

Per the ROD, annual O&M is required for the soil and groundwater remedies (USAF, 2009). O&M activities are documented in Annual IC Performance Reports. Three Annual IC Performance Reports (2010, 2011, and 2012) were reviewed for this first five-year review and are discussed in Section 6.3. The 2013 Annual IC Performance Report had not been completed in time for inclusion in this five-year review.

Annual IC Performance Reports are required to be submitted annually until the soil RA has been completed.

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SECTION 5

Progress Since Last Five-Year Review

This is the first five-year review for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area), and therefore, Section 5 is not applicable.

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SECTION 6

Five-year Review Process

This first five-year review for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) has been conducted in accordance with the U.S. Environmental Protection Agency's (EPA's) *Comprehensive Five-Year Review Guidance*, dated June 2001 (EPA, 2001) and related guidance documents, including EPA's memorandum entitled *Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews* (EPA, 2012). Interviews were conducted with relevant parties; a site inspection was conducted; and applicable data and documentation covering the period of the review were evaluated. The findings of the review are described in the following subsections.

6.1 Administrative Components

The five-year review for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) was initiated by USAF. The review team was led by the PACAF Remedial Project Manager, Keith Barnack. The components of the review included document review, data review, a site inspection, interviews, and development of this five-year review report, as described in the following sections.

6.2 Community Involvement

The closest community to the former Port Heiden RRS is the Village of Port Heiden located approximately 2.5 miles south. In accordance with the NCP requirements, USAF distributed the *Proposed Plan for Cleanup Action at the Former Facility Area, Port Heiden RRS* to the local communities and the public to solicit public input. The proposed plan was distributed on February 15, 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 October 10, 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 section in the ROD (USAF, 2009).

Based on the interview responses (Attachment 4), there have been multiple positive effects on the community. According to the 611th CES Remedial Project Manager, many residents have been employed, rented equipment, and rented housing. Furthermore, there is less contaminated soil at the ground surface, which has reduced the potential for exposure. No community relations issues were identified during this five-year review. The PACAF has briefed the NVPH and City of Port Heiden staff annually, and has participated in several public meetings to inform them of the current work, future plans, and to hear their concerns.

6.3 Document Review

This five-year review consisted of a review of relevant project documents, including the ROD, ESD, and Annual IC Performance Reports. Documents reviewed during this five-year review are listed in Attachment 2.

The USEPA Integrated Risk Information System (IRIS) was reviewed to assess possible changes in toxicity values for site contaminants. A review of the IRIS indicated that the toxicity value for TCE was revised on September 28, 2011. This revision changed the Chronic Oral Reference Dose (RfD) Assessment, Chronic Reference Concentration (RfC) Assessment and Carcinogenicity Assessment (USEPA, 2014). Per the ROD, the RAO for TCE is 0.005 mg/L (the current maximum contaminant level [MCL] for TCE). Even though the toxicity value has changed, the MCL (the selected preliminary remediation goal [PRG]) has not, and there is no change in the exposure scenario. As such, the change in toxicity value is not considered an issue, but should

be assessed at the time of the second five-year review if a change to the MCL is promulgated or if other assumptions related to the exposure scenario have changed.

6.4 Data Review

The soil remedy is ongoing. For this five-year review, the *Final Corrective Action Report, Remedy Selection and Implementation, Demolition and Debris Removal* (Weston, 2011) was reviewed, along with Final Institutional Control Performance Reports for 2010 through 2012 (USAF, 2010, 2011, 2012) and weekly progress reports from September to October, 2013 (Jacobs, 2013a and 2013b). These documents describe work performed to remediate soil from 2009 through October 2013, and the increased quantities encountered. A detailed summary of information obtained from these reports is presented in Section 4.3.1.

The *Final Groundwater Monitoring Report at the Former Port Heiden Radio Relay Station, Port Heiden, Alaska* (NVPH, 2013) was reviewed during this first five-year review. This report includes analytical results for groundwater samples collected in 2004, 2010, 2011, and 2012. Groundwater sampling was conducted in 2013; however, the report documenting the event had not been completed in time to be included in this five-year review report.

The *Final Groundwater Monitoring Report at the Former Port Heiden Radio Relay Station, Port Heiden, Alaska* (NVPH, 2013) compared results from five monitoring wells, along with results from three newly installed monitoring wells that were sampled for the first time in 2012. Analytical results for groundwater samples collected in 2004, 2010, 2011, and 2012 included TCE, monitored natural attenuation (MNA) parameters (iron, manganese, sulfate, alkalinity, and nitrate/nitrite (NO3/NO2-N), and DRO. The 2012 data set also included analytical results for DRO, benzene, ethylbenzene, xylene, and toluene. Lastly, water quality parameters measured during groundwater sampling were documented in the report and included the following: pH, conductivity, temperature, oxidation reduction potential, dissolved oxygen, and turbidity.

In summary, TCE concentrations in the 2012 data set ranged from 0.54 micrograms per liter (µg/L) in monitoring well DSA-MW06 to 506 µg/L in monitoring well DSA-MW02. DRO concentrations ranged from nondetect in most monitoring wells to 2.02 mg/L, 8.85 mg/L, and 26.5 mg/L in monitoring wells 066-MW05, 215-MW09, and BLO-MW01, respectively. The TCE daughter product, cis-1,2-dichloroethene, was detected in two monitoring wells, which indicates that degradation of TCE could be occurring in these areas; however, additional sampling and evaluation is needed to confirm.

The following observations and recommendations are based on the review of the *Final Groundwater Monitoring Report at the Former Port Heiden Radio Relay Station, Port Heiden, Alaska* (NVPH, 2013):

- The report concluded that there is no discernible pattern to TCE concentrations at each of the five existing monitoring wells. However, a detailed review of historical analytical results from five existing monitoring wells show that some minor trends are apparent. Future groundwater sampling is recommended to assess and confirm if there are increasing or decreasing concentration trends in groundwater.
- The report recommends quarterly groundwater monitoring to ascertain if there are seasonal groundwater flow variations. While seasonal flow variations could be possible, it appears as though there is an adequate network of monitoring wells that define the plume boundaries. If future groundwater analytical results show concentrations of contaminants in upgradient or side gradient wells that were previously nondetect, then additional studies may be warranted.
- Figure 4 of the report depicts composite TCE and POL plumes in combined shallow and deep aquifer zones. Future reports should depict separate shallow and deep aquifer plumes to more clearly show what contamination is present within each aquifer zone.
- Most of the dissolved oxygen readings during the 2012 sampling event were J-flagged, meaning that the concentration shown is estimated and may be biased high. Future sampling events should consider

modifying the sampling technique to obtain more accurate dissolved oxygen readings. The amount of dissolved oxygen present in the aquifer can be used to assist in evaluating if the environment is conducive to degradation of site contaminants.

- MNA parameters were collected and analyzed; however, the report did not include an interpretation of the MNA results or evaluation of whether or not MNA is occurring at the site. A natural attenuation evaluation should be conducted using analytical results from the 2004 and 2009 through 2013 data sets. Per the ROD, the natural attenuation evaluation is to be conducted after the first 5 years of monitoring, which will be in May 2014 (USAF, 2009).
- MNA parameters included major cations such as iron and manganese; however, other major cations such as calcium, sodium magnesium, and potassium were not analyzed. Similarly, major anions, sulfate and alkalinity, were analyzed, but major anions such as chloride and carbonate/bicarbonate were not analyzed. Also, other common MNA parameters such as ethene, ethane, and methane are not included in the data set. Future MNA evaluations should include an assessment of whether or not additional MNA parameters should be added to the analyte list for future groundwater sampling events. Results from the additional analytes, in conjunction with analytical results for TCE and daughter products cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride, can be used to evaluate if TCE degradation is occurring and assist in identifying the process(es) through which it is occurring.

A review of analytical results indicated that the compound 1,4-dioxane was not included in the list of analytes for groundwater samples collected during the groundwater sampling program. Since this compound is an emerging chemical of concern, and documented at other Air Force installations, 1,4-dioxane should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted. Further, because the ADEC Table C groundwater cleanup level for 1,4-dioxane is 0.077 mg/L (77 µg/L), analytical method of 8270 SIM or isotope dilution is recommended as this method can provide reliable results down to 1 µg/L, well below the ADEC standard.

6.5 Interviews

Interviews were conducted with the following agency representatives. Interview documentation is included in Attachment 4.

- Patrick Roth, former Port Heiden RRS Remedial Project Manager for PACAF, was interviewed by e-mail.
- Louis Howard, ADEC Environmental Program Specialist assigned to Port Heiden RRS, was interviewed by e-mail.

In Patrick Roth's interview record, he indicated that significant progress has been made toward completion of the soil RA. Mr. Roth indicated that ICs will be formalized after the RAs are completed. In the meantime, signage has been in place and the public informed. Each year, the site is inspected to monitor RA progress. Mr. Roth indicated that he has conducted at least two site visits per year. A quality assurance representative has been reviewing the RA contractor's daily work for the last 3 years. An O&M plan will be prepared once the soil RA is complete, and eventually an O&M plan for ongoing groundwater MNA will be instituted. There have been no significant changes in the site status or maintenance requirements that may affect the protectiveness or effectiveness of the selected remedy. Excavation and removal of soil appears to be the best method for removing PCB-contaminated soils at the site. Lastly, Mr. Roth suggested that since the area of the former Port Heiden RRS is so small, each of the ERP Sites (with the exception of ERP Site LF007) should be consolidated into one site, ERP Site OT001.

In Louis Howard's interview record, he indicated that work at the site has been conducted with professionalism and that when any issues have come up, USAF was quick to notify ADEC to work together on a solution to the problem. Mr. Howard indicated that ICs have been put in place, enforced, and inspected per remedy requirements. He noted that the RA has had a positive effect on the local community and that

there are no known community concerns regarding USAF's site or its operation and administration. There have been regular visits to inspect ongoing cleanup operations and participate in community meetings during the five-year review period. Mr. Howard acknowledged that the volume of contaminated soil was underestimated in the ROD, and required revision to the total volume to be disposed of at a permitted facility in the lower 48 states. There have been no significant changes in the site status or maintenance requirements that may affect the protectiveness or effectiveness of the selected remedy. There have been no opportunities to optimize the operation, maintenance, or sampling efforts at the site. Mr. Howard indicated that an O&M plan has not been prepared, although ICs are regularly inspected and IC performance reports have been completed.

6.6 Site Inspection

A site inspection was conducted at the sites on July 17 and 18, 2013. The completed site inspection checklist is provided in Attachment 4. Photographs taken during the site inspection are provided in Attachment 5.

6.6.1 ERP Site OT001, Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area

Approximately 1.5 miles north of the airport, ERP Site OT001 and the four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are located within a gravel area that measures approximately 500 feet by 600 feet. The gravel area is situated on a hill that is higher in elevation than the immediate surrounding area and is surrounded by tundra. The central portion of gravel area that formerly housed the radome was relatively flat. There were two concrete foundations remaining in the area (Photographs 1 and 2, Attachment 5), along with a sign that read "Evacuation Area." Two monitoring wells were located on the east and south sides of the concrete pads. A bulldozer was parked next to the concrete pads.

Five soil stockpiles were noted on various portions of the square-shaped pad and are presumed to have been stockpiled during ongoing soil RA activities that were being conducted at the time of the site inspection. Each of these stockpiles were removed after the July 17 and 18, 2013 site inspection.

The largest soil stockpile was located at the southwest corner of the gravel area. The stockpile was approximately 15 feet in height and approximately 60 feet around the base. It was partially vegetated.

A second stockpile was located north-northwest. It was surrounded by mounded soil and was covered with plastic sheeting that was held in place with sandbags. The stockpile was about 2 to 3 feet high and relatively flat. Wind-blown soil was present on top of the plastic sheeting on this pile.

There were two stockpiles at the northern portion of the pad. The pile on the northwest side was approximately 5 to 10 feet high and covered with plastic sheeting that was held in place with sandbags. The pile on the northeast side was labeled "PCB Stockpile" (Photographs 3 and 4, Attachment 5). The stockpile was uncovered, although, plastic sheeting and sandbags were present around the base, and it appeared as though it was covered at one time. Previous reports (NVPH, 2010) have documented that high winds in the area have caused the migration of PCB-contaminated soil to other areas of the site, such as Site Road (NVPH, 2010). As a result, the uncovered soil is a potential issue.

A fifth soil stockpile was located on the eastern portion of the gravel area. The stockpile was not labeled; however, it was covered with plastic sheeting that was held in place with sandbags.

A straight, shallow trench was noted along the western side of this gravel area. The trench was approximately 10 feet wide and extended from the west side of the pad, toward the former SS004 outfall. Plastic sheeting was present in the westernmost portion of this trench.

The south side of the square sloped toward the south and generally consisted of an uneven gravely surface. An open excavation surrounded by metal stakes and rope was on the southwest portion of the pad. The area appeared to be the location of the former septic tank associated with ERP Site SS004.

6.6.2 ERP Site WP002

ERP Site WP002, consisting of a former blackwater pond, was located southwest of the gravel area. It consisted of partially vegetated, uneven terrain that was generally a depressed area (Photograph 5, Attachment 5). At the time of the site inspection, another contractor was advancing geoprobe borings in this area. The geoprobe borings were being advanced to collect soil samples for analytical analysis.

6.6.3 ERP Site SS004

There are two portions to site ERP Site SS004. The first portion consists of a former septic tank that was located at the southwest corner of the gravel area by ERP Site OT001. The septic tank had been removed from the site, and the excavated area was surrounded by metal stakes connected with yellow and black rope. The ground surface was very uneven surrounding the excavated area.

The second portion of ERP Site SS004 consisted of the former septic system outfall. The outfall was located approximately 1,100 feet northwest of the ERP Site OT001 gravel area. A concrete wing wall with an approximately 8-inch-diameter steel pipe was noted during the site inspection (Photographs 6 and 7, Attachment 5). The pipe discharged to the north into a depressed area that had relatively new vegetation.

6.6.4 ERP Site LF007

ERP Site LF007 is located north of the former Port Heiden RRS (ERP Site OT001 and the four unnumbered sites). The site was marked with a sign that read “North Landfill” (Photograph 8, Attachment 5). Similar to the gravel area under and around ERP Site OT001, it also consists of a gravel area with some sparse vegetation, surrounded by tundra. Three depressed areas were noted during the site inspection. One of the depressed areas was located at the central portion of ERP Site LF007 and appeared to be approximately 5 feet by 3 feet and approximately 1 foot deeper than the surrounding area (Photograph 9, Attachment 5). The largest depressed area was located at the north-central portion of ERP Site LF007. A 3-foot by 3-foot sink hole with metal debris and metal drums was identified in this area (Photograph 10, Attachment 5). The sinkhole appeared to be approximately 3 to 4 feet deep. The third, and smallest depression, was located at the southern portion of ERP Site LF007. There were also various rusted metal debris on the ground surface at ERP Site LF007, some of which appeared to be pieces of metal drums.

Several monitoring wells were identified during the site inspection. Some monitoring wells were not labeled. Each of the monitoring wells appeared to have intact outer casings that were secured with pad locks. None of the monitoring wells appeared to be damaged.

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SECTION 7

Technical Assessment

The technical assessment of a selected remedy provides a framework for organizing and evaluating data and information and ensuring that all relevant issues are considered when determining the protectiveness of the remedy. The technical assessment comprises evaluating and answering the following three questions:

- Question A: Are the remedies functioning as intended by the decision documents (ROD and ESD)?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

7.1 Question A: Are the remedies functioning as intended by the Decision Documents?

Yes, the remedies for groundwater and soil are considered protective in the short-term because exposures appear to be under control and no unacceptable risks are occurring. The selected remedy for soil, as established in the ROD (USAF, 2009) and ESD (USAF, 2010a), is soil removal at ERP Sites OT001, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area). The selected remedy for groundwater associated with the Black Lagoon Outfall and the former Facility Area Plumes is ICs, natural attenuation, and long-term monitoring.

Soil. The review of documents, ARARs, risk assumptions, and the results of the site inspection and interviews conducted as part of this first five-year review indicate that the soil remedy has changed since the ROD was signed and the ESD was finalized. Implementation of the soil remedy is ongoing, and is anticipated to be complete by the end of the 2015 field season.

During the site inspection, it was observed that PCB-contaminated soil piles that were part of the ongoing remedy work were not covered and were therefore susceptible to windblown cross contamination. And, at ERP Site LF007, a subsidence area was observed that may result in erosion or further exposure of landfill contents.

Groundwater. The five-year review documents that the groundwater remedy is functioning in the short-term as intended by the ROD (USAF, 2009). Groundwater monitoring has been conducted annually at the site since the ROD was signed, as required. Per the ROD, natural attenuation is predicted to meet cleanup goals within 26 years. Site contaminants (as listed in the ROD) still exceed RAOs; however, a review of the monitoring well network that is currently in place and groundwater analytical results collected from monitoring wells to date indicate that the groundwater contamination is well delineated and there is no exposure.

Continued groundwater monitoring is being used to confirm progress toward achieving RAOs. Based on a review of the *Final Groundwater Monitoring Report at the Former Port Heiden Radio Relay Station, Port Heiden, Alaska* (NVPH, 2013), a natural attenuation evaluation is still needed to confirm that concentrations of contaminants are decreasing as predicted in the ROD. Until cleanup levels in the ROD are attained, annual reviews are being performed to confirm that groundwater at the former Port Heiden RRS is not used as a drinking water source.

Institutional Controls. Annual IC Performance Reports are prepared to document reviews of the RAs and to determine whether these actions are protective, including whether the intent of the ROD-required ICs are being met, although ICs for soil and groundwater have not been put into place formally. Each Annual IC Performance Report includes an "IC Controls Effectiveness" section that provides a description of whether

the intended ICs are being met in terms of both soil and water. In each report available for the five-year review (2010, 2011, and 2012), it was reported that no violation of the required ICs had been noticed. It is intended that the soil ICs will be put into place once the soil remedy is complete, but there is no reason to wait on formal implementation of groundwater ICs.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedies still valid?

Yes, a review of the exposure assumptions in the ROD, changes to toxicity data and cleanup levels since the ROD was finalized, and RAOs stated in the ROD confirm that the current remedies for soil and groundwater are valid.

7.2.1 Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

Soil stockpiles with PCB-contaminated soil are present at ERP Site OT001 and the four unnumbered sites, and in some instances are not covered with plastic. Studies conducted after the 2009 soil RA have demonstrated that PCB-contaminated soil has spread to other areas of the site by high winds. The stockpiles were likely not covered at the time of the site inspection as the soil RA was being conducted, and were subsequently removed following the July 17 and 18 site inspection. Nonetheless, USAF should take steps to ensure that cross contamination does not occur due to windblown spread of PCB-contaminated soil from uncovered stockpiles during future soil excavation efforts. If left unchecked, uncovered soil stockpiles could potentially represent a new exposure pathway at the site.

At ERP Site LF007, three areas of subsidence were observed, one of which had exposed landfill debris. There were also metal debris readily visible on the surface of ERP Site LF007. The soil RA has not yet been initiated at ERP Site LF007, and the areas of subsidence will likely be addressed during the 2014 or 2015 field seasons. The subsidence could result in a change in exposure pathway if the soil RA is not implemented within a reasonable timeframe.

Site Road, an unpaved road that extends from the airport to the former Port Heiden RRS, was found to contain PCB-contaminated soil. This contamination was not identified during earlier, pre-ROD, investigation efforts and is believed to have resulted from road oiling operations when the facility was still active. Non-time-critical removal actions (NTCRA) have been underway since 2011 to remove this contamination.

A review of the USEPA IRIS indicated that the toxicity value for TCE was revised September 28, 2011. This revision changed the Chronic Oral RfD, Chronic RfC and Carcinogenicity (USEPA, 2014). Per the ROD, the RAO for TCE is 0.005 mg/L (the current MCL for TCE). Even though the toxicity value has changed, the MCL (the selected PRG) has not, and there is no change in the exposure scenario. As such, the change in toxicity value is not considered an issue, but should be assessed at the time of the second five-year review if a change to the MCL is promulgated or if other assumptions related to the exposure scenario have changed.

No other changes in exposure pathways, toxicity, or other contaminant characteristics have been identified.

7.2.2 Changes in ARARs

ARARs for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) were identified in the ROD (USAF, 2009). Per the ROD, 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 *Code of Federal Regulations* 141.61) for groundwater.

This five-year review included identification of and evaluation of changes in the ARARs to determine whether such changes may affect the protectiveness of the selected remedy. There have been no changes in ARARs since the ROD was finalized.

7.3 Question C: Has any other information come into light that could call into question the protectiveness of the remedies?

Yes, in 2009 additional PCB-contaminated soil quantities were identified at the site, and as a result, the disposal option was modified as described in the ESD (USAF, 2010a). Deficiencies with work performed during the 2009 field season were later corrected in 2011 (Weston, 2011).

Since implementation of the remedy began in 2009, PCB-contaminated soil has been identified within Site Road and some adjoining areas. USAF is currently conducting NCRAs to remove PCB-contaminated soil from these areas (USAF, 2012a).

Uncovered PCB-contaminated soil stockpiles were observed during the July 17, 2013, and July 18, 2013, site inspection. The stockpiles were likely not covered at the time of the site inspection as the soil RA was being conducted, and were removed following the July 17 and 18 site inspection.

A review of analytical results indicated that the compound 1,4-dioxane was not included in the list of analytes for groundwater samples collected during the LTM program. Since this compound is an emerging chemical of concern, and documented at other Air Force installations, 1,4-dioxane should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted. Further, because the ADEC Table C groundwater cleanup level for 1,4-dioxane is 0.077 mg/L (77 µg/L), analytical method of 8270 SIM or isotope dilution is recommended as this method can provide reliable results down to 1 µg/L, well below the ADEC standard.

No other information has been identified as part of this first five-year review for the ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area).

7.4 Technical Assessment Summary

A technical assessment has been conducted using information from interviews, a site inspection, and document review. Findings from this technical assessment indicate that the soil RA selected for ERP Sites OT001, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) has been initiated, and the earliest completion date is estimated to be during the 2015 field season (CH2M HILL, 2013). There is no indication of current exposure.

The decision documents should be reviewed to assess if an amendment or additional document is needed to address increased quantities of soil and the presence of PCB-contaminated soil within Site Road and adjoining areas. The remaining PCB-contaminated soil must be excavated and disposed in accordance with the decision documents, and soil stockpiling practices should be reviewed to assess if changes are needed to avoid potential cross contamination of PCB-contaminated soil. At ERP Site LF007, the exposed debris and subsidence should be assessed and repairs made, if necessary. Lastly, soil ICs should be implemented according to the requirements of the ROD, and a site-specific O&M plan should be prepared to provide the methods and reporting requirements for ICs.

The groundwater RA, consisting of ICs and MNA, has been carried out since completion of the ROD in 2009, and is considered to be protective in the short-term. To assess long-term protectiveness of groundwater, an MNA evaluation should be conducted, prior to the second five-year review, using the groundwater analytical results from 2004, 2009, 2010, 2011, 2012, and 2013 sampling events. In addition, the ICs required by the ROD should be implemented to formally prevent groundwater use. Also, 1,4-dioxane should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review.

No new laws or regulations have been promulgated or enacted that would call into question the effectiveness of the soil or groundwater remedies to protect human health and the environment. For groundwater,

although the cleanup level for TCE has not changed from the MCL of 0.005 mg/L, EPA has released a final health assessment for TCE that may lead to a change in the MCL (EPA, 2011). The status of the MCL for TCE should be addressed in the next five-year review, and if it has changed, an evaluation of whether the cleanup goal should be changed for the former Port Heiden RRS should be performed.

No other information such as a potential future land use change near the sites or other changes in site conditions or exposure pathways have been identified as part of this five-year review that might call into question the protectiveness of the selected remedies. The issues identified during this first five-year review should be addressed to avoid potential problems at the sites.

SECTION 8

Issues

Issues identified during this first five-year review for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are summarized in Table 8-1.

TABLE 8-1

Issues Identified during First Five-Year Review for ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area)

Former Port Heiden RRS, Port Heiden, Alaska

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
Several soil stockpiles were observed during the site inspection. Some of the stockpiles were not covered. High winds in the area have been known to transport PCB-contaminated soil to other parts of the site (NVPH, 2010).	No	Yes
Additional quantities of soil have been identified during the soil RA, conducted since 2009. The decision documents (ROD and ESD) do not account for the additional quantity of soil (USAF 2009 and 2010a, respectively).	No	Yes
PCB-contaminated soil has been identified within Site Road and some adjacent areas, and the areas are not included in the current decision documents (ROD and ESD) for the site (USAF 2009 and 2010a, respectively).	No	Yes
The soil RA has not been completed at the site, and is anticipated to continue through at least the 2015 field season. Increased quantities of soil, discrepancies associated with soil washing and landfilling during the 2009 field season, and the presence of contamination within Site Road and adjoining areas has required a longer timeframe to complete the soil RA than originally anticipated in the ROD.	No	Yes
During the site inspection of ERP Site LF007, it was observed that the landfill appeared to have subsided in places, and in one instance, the subsidence exposed metallic debris. Some metal debris was also visible on the ground surface. While this is not indicative of current exposure, if left unchecked, the landfill cap may further erode and contaminated soil may be exposed.	No	Yes
Although Annual IC Performance Reports are prepared to document reviews of the RAs and to determine whether these actions are protective, including whether the intent of the ROD-required ICs are being met, ICs for soil and groundwater have not been put into place formally. Soil ICs will be put into place once the soil remedy is complete, but there is no reason to wait on implementation of groundwater ICs.	No	Yes
The ROD requires an evaluation of the progress of natural attenuation based on 5 years of groundwater monitoring (at a minimum). Only 4 years of data were available at the time of this five-year review. The purpose of the five-year evaluation is to compile, analyze, and review all groundwater data collected to determine the effectiveness of natural attenuation. The ROD also states that if during this evaluation the data indicates contaminant concentrations in groundwater are not declining as estimated, the remedy decision may be re-considered.	No	Yes
The compound 1,4-dioxane was not included in the list of analytes for groundwater samples collected during the LTM program. This compound should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted.	No	Yes

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SECTION 9

Recommendations and Follow-up Actions

Table 9-1 presents the recommendations and follow-up action based on this first five-year review.

TABLE 9-1
Recommendations and Follow-up Actions
Former Port Heiden RRS, Port Heiden, Alaska

Number	Recommendations/Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness	
					Current	Future
1	Review and modify stockpile maintenance plans to ensure contaminated soil stockpiles are covered and contained in a manner that prevents exposure to, and migration of, PCB-contaminated soil.	PACAF	ADEC	October 2015	Yes	Yes
2	Review the existing decision documents (ROD and ESD) and prepare an amendment or additional ESD to address additional quantities of PCB-contaminated soil not covered by the current decision documents (USAF 2009 and 2010a, respectively).	PACAF	ADEC	October 2016	No	Yes
3	Review the Administrative Record including existing decision documents (ROD and ESD) to assess if an amendment or additional document is needed to address PCB-contaminated soil within Site Road and adjoining areas (USAF 2009 and 2010a, respectively).	PACAF	ADEC	October 2016	No	Yes
4	Complete the soil RA.	PACAF	ADEC	October 2016	No	Yes
5	Address exposed debris and subsidence at ERP Site LF007.	PACAF	ADEC	October 2016	No	Yes
6	Implement groundwater ICs.	PACAF	ADEC	October 2016	No	Yes
7	Perform an evaluation of the progress of natural attenuation based on 5 years of groundwater monitoring as required by the ROD.	PACAF	ADEC	October 2016	No	Yes
8	The compound 1,4-dioxane should be added to the list of analytes for two consecutive groundwater sampling events after 2014, but before the next five-year review. Analytical results from these sampling events can then be used to assess if additional or future sampling of 1,4-dioxane is warranted.	PACAF	ADEC	Annually	No	Yes

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SECTION 10

Protectiveness Statement

Based on the findings of this first five-year review, the actions performed for soil and groundwater at ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are considered protective in the short-term because exposures appear to be under control and no unacceptable risks are occurring. The remedy is ongoing, however, and it is not clear yet that the selected remedy, when complete, will be protective in the long-term because the quantities of soil to be remediated has changed since the decision documents were issued. In addition, soil stockpiling practices should be reviewed and modified to ensure contaminated soil stockpiles are contained in a manner that prevents exposure and cross contamination due to wind erosion or runoff of PCB-contaminated soil. At ERP Site LF007, the exposed debris and subsidence should be assessed and repairs made, if necessary. Lastly, groundwater ICs should be implemented according to the requirements of the ROD, and a site-specific O&M plan should be prepared to provide the methods and reporting requirements for ICs.

The remedy selected for groundwater at the former Port Heiden RRS remains protective of human health and the environment in the short-term. To assess long-term protectiveness of groundwater, an MNA evaluation should be conducted, prior to the second five-year review, using the groundwater analytical results from 2004, 2009, 2010, 2011, 2012, and 2013 sampling events. The ICs required by the ROD should be implemented to formally prevent groundwater use. Also, 1,4-dioxane should be added to the list of groundwater sample analytes for two consecutive sampling events, and a statistical analysis of groundwater concentration trends should be performed. The actions taken for soil are considered protective in the short-term, and protectiveness should be achieved in the long-term once the issues identified in this five-year review report are addressed.

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SECTION 11

Next Review

Future five-year reviews are necessary because contamination remaining at ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) are above concentrations that allow for unlimited use and unrestricted exposure at the site. The next five-year review must be completed by May 2019.

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Attachment 1
Site Maps

Air Force Installation

City

N

0 150 300

Miles

Note:
1. Background Source: Environmental Systems Research Institute (Esri)

FIGURE 1
Vicinity Map
Port Heiden RRS 5-Year Review
Port Heiden RRS, Alaska

CH2MHILL

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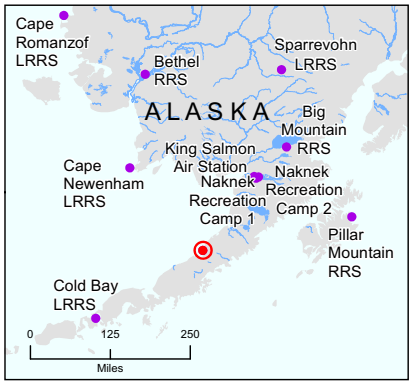


Installation Boundary

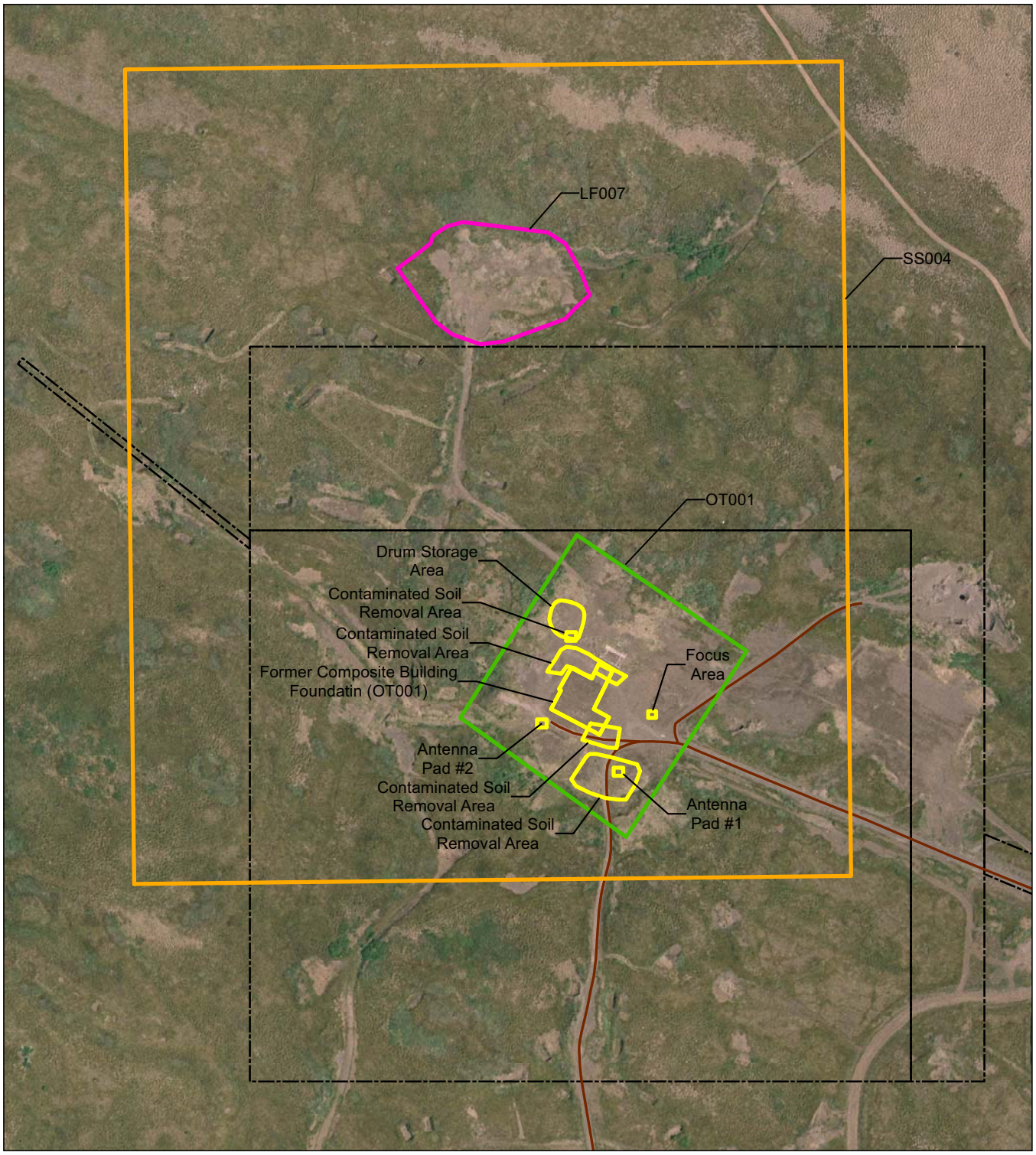
Notes:
1. RRS = Radio Relay Station.
2. Data from 611th GeoBase for Port Heiden RRS. GeoBase data could be incomplete and are of unknown accuracy.
3. Data are rendered in UTM Zone 4N, WGS84, Meters.

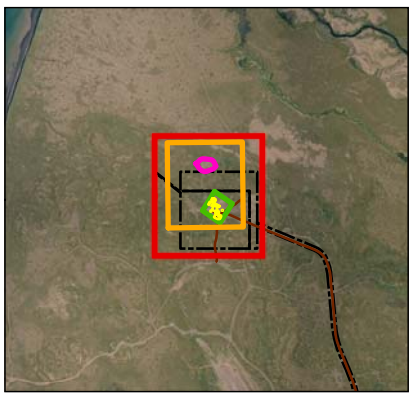
N

0 3,125 6,250
Feet

FIGURE 2
Site Layout Plan
Port Heiden RRS 5-Year Review
Port Heiden RRS, Alaska

R:\AFCEC_TO351_20001499\MAPFILES\PORT_HEIDEN\FIG2_PORT_HEIDEN_SITE_LAYOUT.MXD SRUDOLPH 10/23/2013 5:02:52 AM





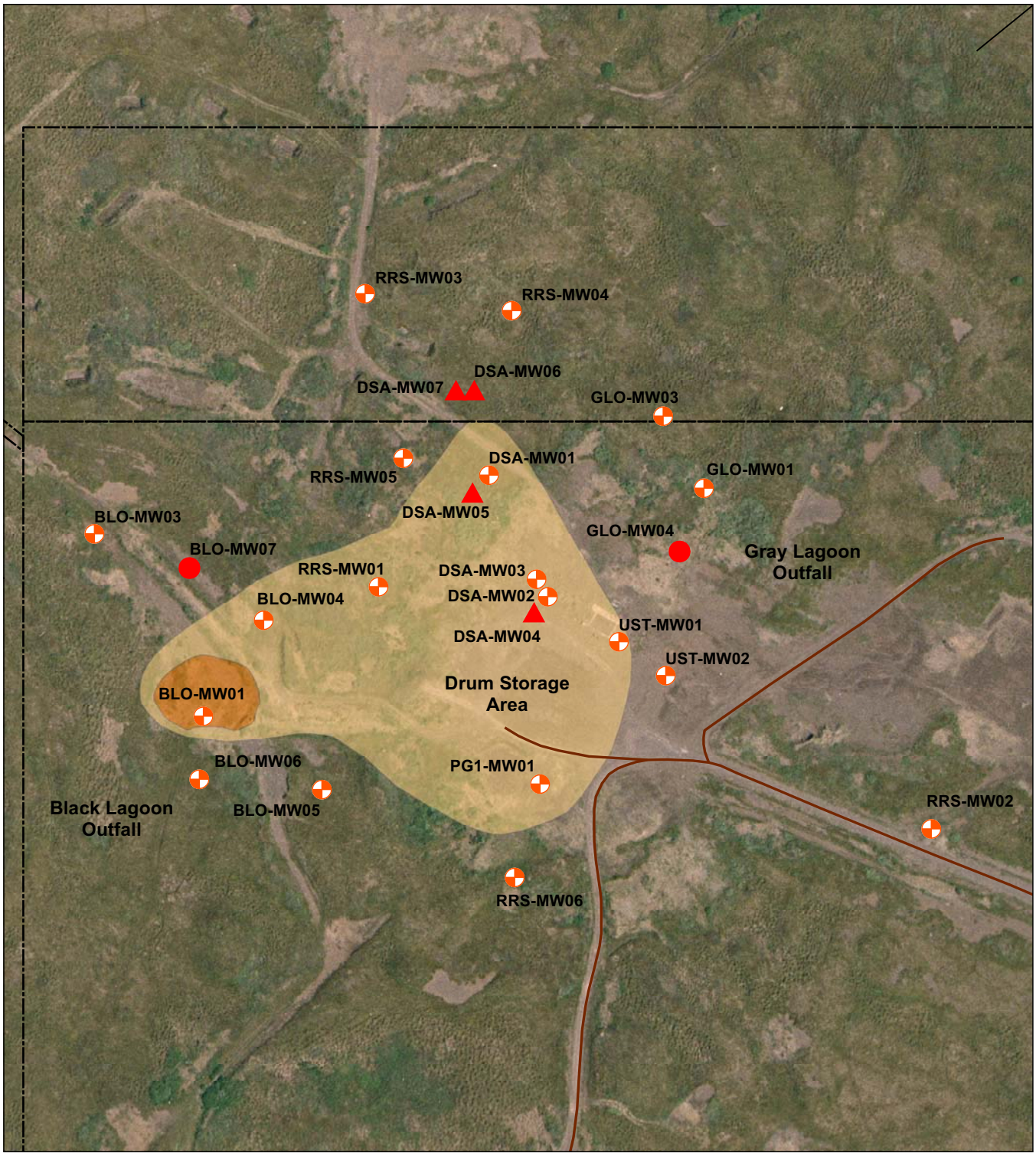
Installation boundary
Buried Solid Waste Area (Soil)
Dig Restriction Area
Groundwater Use Restriction Area
Environmental Restoration Site Boundary
Road to Port Heiden

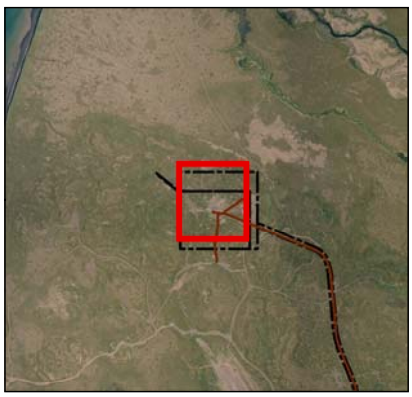
0 400 800
Feet

N

Notes:
1. RRS = Radio Relay Station.
2. ERP = Environmental Restoration Program.
3. Data from 611th GeoBase for Port Heiden RRS. GeoBase data could be incomplete and are of unknown accuracy.
4. Data are rendered in UTM Zone 4N, WGS84, Meters.

FIGURE 3
Location of ERP Sites OT001, SS004, LF007, & Four Unnumbered Sites
Port Heiden RRS 5-Year Review
Port Heiden RRS, Alaska





Installation boundary
POL Plume
TCE Plume
2012 Deep Well
2012 Shallow Well
Existing Well
Road to Port Heiden

0 250 500
Feet

N

Notes:
1. RRS = Radio Relay Station.
2. Data from 611th GeoBase for Port Heiden RRS. GeoBase data could be incomplete and are of unknown accuracy.
3. Data are rendered in UTM Zone 4N, WGS84, Meters.

FIGURE 4
Black Lagoon Outfall and the Former Facility Area Plumes
Port Heiden RRS 5-Year Review
Port Heiden RRS, Alaska

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Attachment 2
List of Documents Reviewed

ATTACHMENT 2

List of Documents Reviewed

ADEC. 2003. *Port Heiden Sanitation Improvement Feasibility Study, 95 percent Draft*. Prepared under the Alaska Department of Environmental Conservation Village Safe Water Program.

CH2M HILL. 1994. *Preliminary Assessment, Port Heiden*. Prepared for the US Air Force (USAF).

CH2M HILL. 2013. Personal communication between Brian Wied/CH2M HILL and Patrick Roth/PACAF. October 28.

Hogan, E. V. 1995. *Overview of Environmental and Hydrogeologic Conditions Near Port Heiden, Alaska*. Prepared in cooperation with the Federal Aviation Administration. United States Geological Survey Open File Report 95-407.

Jacobs Engineering Group, Inc. (Jacobs). 2013a. *Task Order 046, Port Heiden Weekly Progress Report, September 30, 2013 – October 6, 2013.* October. Prepared for the US Air Force (USAF).

Jacobs Engineering Group, Inc. (Jacobs). 2013b. *Task Order 006, Port Heiden Weekly Progress Report, September 30, 2013 – October 6, 2013.* October. Prepared for the US Air Force (USAF).

Native Village of Port Heiden (NVPH). 2010. *Final Port Heiden RRS Remedial Work Plan*. July. Prepared for the US Air Force (USAF).

Native Village of Port Heiden(NVPH). 2011. *Technical Memorandum, Additional PCB Soil Sampling, Former Port Heiden Radio Relay Station, Port Heiden, Alaska*. March.

Native Village of Port Heiden (NVPH). 2013. *Final Groundwater Monitoring Report at the Former Port Heiden Radio Relay Station, Port Heiden, Alaska.* June. Prepared for the U.S. Air Force (USAF).

Pacific Air Forces Regional Support Center (PACAF), 2014a. *PCB-Contaminated Soil Removal Action, 2013 Fieldwork Summary Report, Port Heiden, Alaska*. February.

Pacific Air Forces Regional Support Center (PACAF), 2014b. *Site Road PCB-Contaminated Soil Removal, 2013/2014 After-Action Report, Port Heiden, Alaska*. Draft. March.

USAF 1996. *Final Preliminary Assessment/Site Inspection Port Heiden Radio Relay Station, Port Heiden Alaska*. March 1996.

USAF 2000. *Final Site Inspection, Port Heiden RRS, Alaska*. July 2000.

U.S. Air Force (USAF). 2001. *Management Action Plan, Port Heiden Radio Relay Station, Alaska*. December.

U.S. Air Force (USAF). 2006. *Final Remedial Investigation/Feasibility Study*. April.

U.S. Air Force (USAF). 2009. *Record of Decision for Port Heiden Radio Relay Station, Port Heiden, Alaska*. February.

U.S. Air Force (USAF). 2010a. *Explanation of Significant Differences for Port Heiden Radio Relay Station, Port Heiden, Alaska*. May.

U.S. Air Force (USAF). 2010b. *Final Institutional Control Performance Report, for Port Heiden Radio Relay Station, Alaska*. November 18.

U.S. Air Force (USAF). 2011. *Final Institutional Control Performance Report, for Port Heiden Radio Relay Station, Alaska*. November 15.

U.S. Air Force (USAF). 2012a. *Final Institutional Control Performance Report, for Port Heiden Radio Relay Station, Alaska*. November 20.

U.S. Air Force (USAF). 2014. *Site Road PCB-Contaminated Soil Removal 2013/2014 After Action Report, Draft*. March.

U.S. Environmental Protection Agency (EPA). 2001. *Comprehensive Five-Year Review Guidance*. EPA 540-R-01-007. OSWER 9355.7-03B-P. June.

U.S. Environmental Protection Agency (EPA). 2011. *EPA Releases Final Health Assessment for TCE.* Release date 9.28.2011. Accessed April 2, 2014, http://environblog.jenner.com/files/09-28-2011-epa-releases-final-health-assessment-for-tce-1.mht

U.S. Environmental Protection Agency (EPA). 2012. *Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews*. OSWER 9200.2-111. September 13.

United States Army Corp of Engineers (USACE). 2003. *Limited Drinking Water Quality Assessment of Domestic Wells in the Native Village of Port Heiden*. Prepared for the United States Army Corp of Engineers Alaska District. October.

Weston Solutions, Inc. (Weston). 2011. *Final Corrective Action Report, Remedy Selection and Implementation, Demolition and Debris Removal, Port Heiden Radio Relay Station, Alaska.* November. Prepared for the U.S. Air Force (USAF).

Attachment 3
Inspection Checklist

Former Port Heiden RRS ERP Sites OT001, WP002, SS004, LF007 and Four Unnumbered Sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) Five-Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program. N/A means "not applicable".

I. SITE INFORMATION	
Site Name: Former Port Heiden RRS, ERP Sites OT001, WP002, SS004, LF007, and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, and Focus Area)	ADEC Hazard Numbers: OT001 - 185 WP002 - 186 SS004 - 188 LF007 - 25430 Antenna Pads –no ID Contaminated Soil Removal Areas – no ID Drum Storage Area – no ID Focus Area – no ID
City/State: Village of Port Heiden, Alaska	Date of Inspection: July 17 and 18, 2013
Agency Completing 5 Year Review: U.S. Air Force	Weather/temperature: Partly cloudy, some light rain, high of 65° F
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☐ Access controls ☒ Institutional controls ☐ Groundwater pump and treatment ☐ Surface water collection and treatment ☐ Other:	
Attachments: ☒ Inspection team roster attached	☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. 611th Civil Engineering Squadron (CES) Remedial Project Manager (RPM):
   Name: Patrick Roth
   Title: 611th CES RPM
   Date: completed interview form received by e-mail on 9-27-2013
   Interviewed: ☐ at site ☒ by e-mail ☐ by phone Phone Number:
   Problems, suggestions: ☒ Additional report attached (if additional space required).

2. Jacobs Engineering Project Manager:
   Name: Pat Price
   Title: Soil RA Project Manager
   Date: July 17, 2013
   Interviewed: ☒ at site ☐ by e-mail ☐ by phone Phone Number:
   Problems, suggestions: ☐ Additional report attached (if additional space required).

3. Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency: ADEC
   Contact: Louis Howard
   Name: Louis Howard
   Title: Case Manager
   Date: Interview form received on 9-27-2013
   Phone Number: (907) 451-5175
   Problems, suggestions: ☒ Additional report attached (if additional space required). See Attachment 4 interview form.

   Agency:
   Contact:
   Name:
   Title:
   Date:
   Phone Number:
   Problems, suggestions: ☐ Additional report attached (if additional space required).

   Agency:
   Contact:
   Name:
   Title:
   Date:
   Phone Number:
   Problems, suggestions: ☐ Additional report attached (if additional space required).

4. Other interviews (optional) ☐ N/A ☐ Additional report attached (if additional space required).

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents
   - ☐ O&M Manuals — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ As-Built Drawings — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Maintenance Logs — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks: A land use control management plan (USAF, 2012) has been prepared for 611th Air Support Group Installations to provide a comprehensive strategy for implementation, maintenance, monitoring, enforcement, and modification or termination of land use controls (that is, ICs). However, based on interview responses, a site-specific O&M manual has not been prepared for the former Port Heiden RRS sites. Once the soil RA is complete, the USAF will implement ICs and will complete a site-specific O&M manual to provide the methods for assessing and documenting ICs.

2. Health and Safety Plan Documents
   - ☐ Site-Specific Health and Safety Plan — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

3. O&M and OSHA Training Records — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

4. Permits and Service Agreements
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Other permits — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

5. Gas Generation Records — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

6. Settlement Monument Records — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

7. Groundwater Monitoring Records — ☒ Readily available — ☐ Up to date — ☐ N/A

   Remarks: The *Final Groundwater Monitoring Report at the Former Port Heiden Radio Relay Station, Port Heiden, Alaska* (NVPH, 2013) was reviewed during this firs five-year review.

8. Leachate Extraction Records Remarks:	☐ Readily available	☐ Up to date	☒ N/A
9. Discharge Compliance Records Remarks:	☐ Readily available	☐ Up to date	☒ N/A
10. Daily Access/Security Logs Remarks:	☐ Readily available	☐ Up to date	☒ N/A

IV. O&M Costs ☐ Applicable ☒ N/A

1. O&M Organization
   - ☐ State in-house ☐ Contractor for State
   - ☐ PRP in-house ☐ Contractor for PRP
   - ☒ Other: USAF 611th CES

2. O&M Cost Records
   - ☐ Readily available ☐ Up to date ☐ Funding mechanism/agreement in place
   - Original O&M cost estimate: Actual O&M costs were not available for review ☐ Breakdown attached

Total annual cost by year for review period if available

From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached
From (Date):	To (Date):	Total cost:	☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period ☐ N/A
   Describe costs and reasons:

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

1. Fencing

1. Fencing damaged ☐ Location shown on site map ☐ Gates secured ☒ N/A
Remarks:

2. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☐ N/A
Remarks: Signs were in place and clearly visible at OT001, SS004, and LF007

3. Institutional Controls

1. Implementation and enforcement
Site conditions imply ICs not properly implemented: ☐ Yes ☒ No ☒ N/A (see below)
Site conditions imply ICs not being fully enforced: ☐ Yes ☒ No ☐ N/A
Type of monitoring (e.g, self-reporting, drive by): Not required
Frequency: Annual
Responsible party/agency: U.S. Air Force
Contact: Patrick Roth
Name: Patrick Roth
Title: 611th CES RPM
Date:
Phone Number: (907) 552-7893
Reporting is up-to-date: ☒ Yes ☐ No ☐ N/A
Reports are verified by the lead agency: ☒ Yes ☐ No ☐ N/A
Specific requirements in deed or decision documents have been met: ☒ Yes ☐ No ☐ N/A
Violations have been reported: ☐ Yes ☒ No ☐ N/A
Other problems or suggestions: The soil RA is currently on going and the USAF is conducting annual inspections at the site. Soil ICs will be implemented once the RA is complete. Groundwater ICs are currently being implemented in accordance with the ROD (USAF, 2009).
☐ Additional report attached (if additional space required).

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☒ N/A
Remarks: Groundwater ICs are adequate. Soil ICs will be implemented once the soil RA is completed.

4. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident
Remarks:

2. Land use changes onsite ☐ N/A
Remarks: No land use changes were noted

3. Land use changes offsite ☐ N/A
Remarks: No land use changes were noted

VI. GENERAL SITE CONDITIONS

1. Roads ☒ Applicable ☐ N/A

1. Roads damaged ☐ Location shown on site map ☒ Roads adequate ☐ N/A
Remarks: Roads are all publicly owned and maintained. Based on the document review, PCB-contaminated soil has been identified at the installation roads and some surrounding areas. These areas are not addressed in the decision documents (ROD and ESD); however, the USAF is conducting characterization and remediation of these areas.

2. Other Site Conditions

Remarks: PCB-contaminated soil stockpiles were observed to be uncovered at the time of the site inspection.

VII. LANDFILL COVERS (LF001 and LF002 only) ☒ Applicable ☐ N/A

1. Landfill Surface

1. Settlement (Low spots) ☒ Settlement evident ☐ Settlement not evident
Areal extent: Depth:
Remarks: Three depressed areas were noted during the site visit. One of the depressed areas was located at the central portion of LF007 and appeared to be approximately 5-feet by 3-feet and approximately 1 foot deeper than the surrounding area (Photograph 9, Attachment 5). The largest depressed area was located at the north central portion of LF007. A 3-foot by 3-foot sink hole with metal debris and metal drums was identified in this area (Photograph 10, Attachment 5). The sinkhole appeared to be approximately 3-4 feet deep. The third, and smallest depression, was located at the southern portion of LF007. There were also various rusted metal debris on the ground surface at LF007, some of which appeared to be pieces of metal drums.

2. Cracks ☐ Location shown on site map ☒ Cracking not evident
Lengths: Widths: Depths:
Remarks:

3. Erosion ☐ Location shown on site map ☒ Erosion not evident
Areal extent: Depth:
Remarks:

4. Holes ☒ Location shown on site map ☐ Holes not evident
Areal extent: Depth:
Remarks: See remarks under number 1 above.

5. Vegetative Cover
☐ Cover properly established ☐ No signs of stress ☐ Grass ☐ Trees/Shrubs
Remarks: Mix of gravel and vegetation

6. Alternative Cover (armored rock, concrete, etc.) ☒ N/A
Remarks:

7.	Bulges Areal extent: Remarks:	☐ Location shown on site map Height:		☒ Bulges not evident
8.	Wet Areas/Water Damage			☐ Wet areas/water damage not evident
	☐ Wet areas	☐ Location shown on site map	Areal extent:	
	☐ Ponding	☐ Location shown on site map	Areal extent: approx 5 feet by feet (tire tracks)	
	☐ Seeps	☐ Location shown on site map	Areal extent:	
	☐ Soft subgrade Remarks:	☐ Location shown on site map	Areal extent:	
9.	Slope Instability Areal extent: Remarks:	☐ Slides	☐ Location shown on site map	☒ No evidence of slope instability
2.	Benches (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	☐ Applicable ☒ N/A		
1.	Flows Bypass Bench Remarks:	☐ Location shown on site map		☒ N/A or okay
2.	Bench Breached Remarks:	☐ Location shown on site map		☒ N/A or okay
3.	Bench Overtopped Remarks:	☐ Location shown on site map		☒ N/A or okay
3.	Letdown Channels	☐ Applicable ☒ N/A		
1.	Settlement Areal extent: Remarks:	☐ Location shown on site map Depth:		☐ No evidence of settlement
2.	Material Degradation Material type: Remarks:	☐ Location shown on site map Areal extent:		☐ No evidence of degradation

3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ No evidence of erosion
4.	Undercutting Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ No evidence of undercutting
5.	Obstructions Type: Areal extent: Remarks:	☐ Location shown on site map Height:	☐ N/A
6.	Excessive Vegetative Growth ☐ Evidence of excessive growth ☐ Location shown on site map Remarks:	☐ No evidence of excessive growth ☐ Vegetation in channels but does not obstruct flow Areal extent:	
4.	Cover Penetrations	☐ Applicable ☒ N/A	
1.	Gas Vents ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Routinely sampled ☐ Functioning ☐ Needs O& M	☐ N/A ☐ Good condition
2.	Gas Monitoring Probes ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Functioning ☐ Needs O&M	☐ N/A ☐ Good condition
3.	Monitoring Wells (within surface area of landfill) ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Functioning ☐ Needs O&M	☐ N/A ☐ Good condition
4.	Leachate Extraction Wells ☐ Routinely sampled ☐ Properly secured/locked ☐ Evidence of leakage at penetration Remarks:	☐ Functioning ☐ Needs O&M	☐ N/A ☐ Good condition

5.	Settlement Monuments Remarks:	☐ Located	☐ Routinely surveyed	☐ N/A
5.	Gas Collection and Treatment	☐ Applicable	☒ N/A	
1.	Gas Treatment Facilities ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
2.	Gas Collection Wells, Manifolds and Piping ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs O& M Remarks:			☐ N/A
6.	Cover Drainage Layer	☐ Applicable	☒ N/A	
1.	Outlet Pipes Inspected Remarks:	☐ Functioning		☐ N/A
2.	Outlet Rock Inspected Remarks:	☐ Functioning		☐ N/A

7.	Detention/Sedimentation Ponds ☐ Applicable ☒ N/A		
1.	Siltation Areal extent: Remarks:	☐ Siltation evident Depth:	☐ N/A
2.	Erosion Areal extent: Remarks:	☐ Erosion evident Depth:	☐ N/A
3.	Outlet Works Remarks:	☐ Functioning	☐ N/A
4.	Dam Remarks:	☐ Functioning	☐ N/A
8.	Retaining Walls	☐ Applicable ☒ N/A	
1.	Deformations Horizontal displacement: Remarks:	☐ Location shown on site map Vertical displacement:	☐ Deformation not evident Rotational displacement:
2.	Degradation Remarks:	☐ Location shown on site map	☐ Degradation not evident
1.	Perimeter Ditches/Off-site discharge	☐ Applicable ☒ N/A	
1.	Siltation Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Siltation not evident
2.	Vegetative Growth Areal extent: Remarks:	☐ Location shown on site map Type:	☐ Vegetation does not impede flow
3.	Erosion Areal extent: Remarks:	☐ Location shown on site map Depth:	☐ Erosion not evident

4. Discharge Structure ☐ Location shown on site map ☐ N/A
☐ Functioning ☐ Good Condition
Remarks:

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. Settlement ☐ Location shown on site map ☐ Settlement not evident
Areal extent: Depth:
Remarks:

2. Performance Monitoring ☐ N/A
☐ Performance not monitored
☐ Performance monitored Frequency:
☐ Evidence of breaching Head differential:
Remarks:

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

1. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. Pumps, Wellhead Plumbing, and Electrical ☐ N/A
☐ All required wells located ☐ Good condition ☐ Needs O&M
Remarks:

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A
☐ System located ☐ Good condition ☐ Needs O&M
Remarks:

3. Spare Parts and Equipment ☐ N/A
☐ Readily available ☐ Good condition
☐ Requires Upgrade ☐ Needs to be provided
Remarks:

2. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. Collection Structures, Pumps, and Electrical ☐ N/A
☐ Good condition ☐ Needs O&M
Remarks:

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances ☐ N/A
☐ Good condition ☐ Needs O&M
Remarks:

3. Spare Parts and Equipment ☐ N/A
☐ Readily available ☐ Good condition
☐ Requires Upgrade ☐ Needs to be provided
Remarks:

3. Treatment System ☐ Applicable ☐ N/A

1. Treatment Train (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers ☐ Filters (list type):
☐ Additive (list type, e.g., chelation agent, flocculent)
☐ Others (list):
☐ Good condition ☐ Needs O&M
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☐ Equipment properly identified
☐ Quantity of groundwater treated annually (list volume):
☐ Quantity of surface water treated annually (list volume):
Remarks:

2. Electrical Enclosures and Panels (properly rated and functional) ☐ N/A
☐ Good condition ☐ Needs O& M
Remarks:

3. Tanks, Vaults, Storage Vessels ☐ N/A
☐ Good condition ☐ Proper secondary containment ☐ Needs O&M
Remarks:

4. Discharge Structure and Appurtenances ☐ N/A
☐ Good condition ☐ Needs O& M
Remarks:

5. Treatment Building(s) ☐ N/A
☐ Good condition (esp. roof and doorways) ☐ Needs Repair
☐ Chemicals and equipment properly stored
Remarks:

6. Monitoring Wells (pump and treatment remedy) ☐ N/A
☐ All required wells located ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled
☐ Good condition ☐ Needs O&M
Remarks:

4. Monitored Natural Attenuation ☒ Applicable ☐ N/A

1. Monitoring Wells (natural attenuation remedy) ☐ N/A
☒ All required wells located ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled
☒ Good condition ☐ Needs O&M
Remarks:

5. Long Term Monitoring ☒ Applicable ☐ N/A

2. Monitoring Wells ☐ N/A
☒ All required wells located ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled
☒ Good condition ☐ Needs O&M
Remarks:

X. OTHER REMEDIES ☐ Applicable ☒ N/A

XI. OVERALL OBSERVATIONS

1. Implementation of the Remedy

The groundwater remedy is being implemented as intended in the ROD (USAF, 2009). The soil RA is ongoing, soil ICs will be implemented once the soil RA is complete.

2. Adequacy of O&M

Groundwater sampling and annual site inspections are occurring.

3. Early Indicators of Potential Remedy Failure
PCB-contaminated soil stockpiles were observed to be uncovered during the July 17 and 18, 2013 site inspection. The soil stockpiles were most likely uncovered as ongoing soil RA activities were taking place during the time of the site inspection. However, because previous studies have documented the occurrence of windblown cross contamination, the stockpiles should be covered or closely monitored.
4. Opportunities for Optimization
Implement soil ICs once the soil RA has been completed.

Former Port Heiden RRS ERP Sites OT001, WP002, SS004, LF007 and Four Unnumbered Sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area) – Inspection Team Roster

Date of Site Inspection – July 17, 2013 and July 18, 2013

Name	Organization	Title
Brian Wied	CH2M HILL	Hydrogeologist
Jeremiah Knuth	CH2M HILL	Environmental Engineer

Attachment 4
Interview Reports

Five-Year Review Interview Record	**Interviewee:** Louis Howard/ADEC Email: louis.howard@alaska.gov	
Site Name	**Date of Interview**	**Interview Method**
Port Heiden RRS, IRP Sites OT001, WP002, SS004, LF007 and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area)	9/27/13	Email

Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Patrick Roth	AFCEC	(907) 552-7893	patrick.roth.1@us.af.mil	AFCEC, 10471 20th Street, Suite 302, JBER, AK 99506
Brian Wied	CH2MHILL, for AFCEC	(972) 663-2291	bwied@ch2m.com	12750 Merit Drive, Suite 1100 Dallas, Texas 75251

Interview Questions

1. What is your overall impression of work conducted at the site since the remedy was implemented?

Response: Overall, the work has been conducted with professionalism and any issues that have come up, the Air Force was quick to notify ADEC and work together on a solution to the problem.

2. Since implementation of the remedy, to your knowledge, have land use controls (LUC) been put in place, enforced, and inspected per remedy requirements?

Response: Yes.

3. From your perspective, what effect have remedial activities at the site had on the surrounding community? Are you aware of any ongoing community concerns regarding the site or its operation and administration? If yes, please explain.

Response: Positive effect. Not aware of any community concerns regarding the Air Force's site or its operation and administration.

4. Are you aware of any significant events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities? If so, please give details.

Response: No.

5. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

Response: Yes. There have been regular visits to inspect ongoing cleanup operations and participate in community meetings during the five year review period.

6. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and results of the responses.

Response: No.

7. Are you aware of any problems encountered at the site which may require changes in the Record of Decision or remedial action performed? (Brief summary)?

Response: None other than the volume of contaminated soil was underestimated and required revision to the total volume to be disposed of at a permitted facility in the Lower 48.

8. Have there been any significant changes in the site status or maintenance requirements that may affect the protectiveness or effectiveness of the selected remedy? Please describe changes and impacts.

Response: Nothing of significance.

9. Have there been opportunities to optimize the operation, maintenance, or sampling efforts at the site? Please describe changes and the resultant or desired cost savings or improved efficiency.

Response: None that ADEC is aware of.

10. Is there a site operations and maintenance (O&M) for the site, and if so, has the plan been updated?

Response: No.

11. Have annual site inspections and site inspection reports been completed by the 611th? Are copies of inspection reports available?

Response: Institutional controls are regularly inspected and institutional control performance reports are available.

12. Do you feel well-informed about the site's activities and progress?

Response: Yes.

13. Do you have any comments, suggestions, or recommendations regarding the site?

Response: No. The Air Force is doing a commendable job at cleanup of the former Port Heiden RRS to protect human health, welfare, safety and the environment.

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Five-Year Review Interview Record			**Interviewee:** Patrick Roth/AFCEC Email: patrick.roth.1@us.af.mil	
Site Name			**Date of Interview**	**Interview Method**
Port Heiden RRS, IRP Sites OT001, WP002, SS004, LF007 and four unnumbered sites (Antenna Pads, Contaminated Soil Removal Areas, Drum Storage Area, and Focus Area)			9/30/13	Email
Interview Contacts	**Organization**	**Phone**	**Email**	**Address**
Patrick Roth	AFCEC	(907) 552-7893	patrick.roth.1@us.af.mil	AFCEC, 10471 20th Street, Suite 302, JBER, AK 99506
Brian Wied	CH2MHILL, for AFCEC	(972) 663-2291	bwied@ch2m.com	12750 Merit Drive, Suite 1100 Dallas, Texas 75251

Interview Questions

1. What is your overall impression of work conducted at the site since the remedy was implemented?

Response: Every year progress is made to identify all contamination and remove as much contaminated soil as feasible to reduce risk to human health and the environment.

2. Since implementation of the remedy, to your knowledge, have land use controls (LUC) been put in place, enforced, and inspected per remedy requirements?

Response: As noted in the Institutional Control Performance Reports, "ICs will be formalized after the remedial actions are completed." In the meantime, signage has been in place and the public informed. Each year, the site is inspection to ensure there have been no LUC violations.

3. From your perspective, what effect have remedial activities at the site had on the surrounding community? Are you aware of any ongoing community concerns regarding the site or its operation and administration? If yes, please explain.

Response: There have been multiple positive effects on the community. Many residents have been employed, rented equipment, and /or housing. Furthermore, there is less contaminated soil at the ground surface. This has reduced the potential for exposure.

4. Are you aware of any significant events, incidents, or activities that have occurred at the site, such as dumping, vandalism, trespassing, or emergency response from local authorities? If so, please give details.

Response: No.

5. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please describe purpose and results.

Response: Yes. I have conducted at least two site visits per year. Additionally, a Quality Assurance Representative has been reviewing the contractor's daily work for the last three years. I have briefed the Native village of Port Heiden; city of Port Heiden staff, and help several public meetings to inform them of the current work, future plans, and to hear their concerns.

6. Have there been any complaints, violations, or other incidents related to the site that required a response by your office? If so, please summarize the events and results of the responses.

Response: There were accusations made against one of the subcontractors that worked on-site. The prime contractor took care of any issues related to the accusations.

7. Are you aware of any problems encountered at the site which may require changes in the Record of Decision or remedial action performed? (Brief summary)?

Response: An ESD has already been signed to update the ROD. Another modification is expected to address any contamination that cannot be remediated and to potentially remove dieldrin as a CoC (and its associated LUC).

8. Have there been any significant changes in the site status or maintenance requirements that may affect the protectiveness or effectiveness of the selected remedy? Please describe changes and impacts.

Response: No.

9. Have there been opportunities to optimize the operation, maintenance, or sampling efforts at the site? Please describe changes and the resultant or desired cost savings or improved efficiency.

Response: Contractors have tried soil washing and "dig and haul" methods of remediation. Currently, "dig and haul" is the remediation method of choice.

10. Is there a site operations and maintenance (O&M) for the site, and if so, has the plan been updated?

Response: Not yet. Eventually an O&M plan for on-going groundwater MNA will be instituted.

11. Have annual site inspections and site inspection reports been completed by the 611th? Are copies of inspection reports available?

Response: Yes, and yes.

12. Do you feel well-informed about the site's activities and progress?

Response: Yes.

13. Do you have any comments, suggestions, or recommendations regarding the site?

Response: Since the area of the former RRS is so small, I would combine all sites at the RRS into just one – OT001. LF007 is far enough away to remain separate.

Attachment 5
Photographs Documenting Site Conditions

Photograph 1: OT001 and four unnumbered sites, facing east. Date taken: 7/18/2013

Photograph 2: OT001, former Composite Building concrete pad, facing southeast. Date taken: 7/18/2013

Photograph 3: OT001 - Uncovered PCB stockpile at the northeast end of OT001, facing northeast. Date taken: 7/18/2013

Photograph 4: OT001 - Uncovered PCB stockpile at the northeast end of OT001, facing north. Date taken: 7/18/2013

Photograph 5: WP002, facing east west. Date taken: 7/18/2013

Photograph 6: SS004 outfall wing wall, facing southeast. Date taken: 7/18/2013

Photograph 7: SS004 outfall wing wall, facing east. Date taken: 7/18/2013

Photograph 8: LF007, facing north. Date taken: 7/18/2013

Photograph 9: LF007. Central portion of LF007 facing downward toward area of subsidence. Date taken: 7/18/2013

Photograph 10: LF007. North side facing downward toward subsidence with exposed debris. Date taken: 7/18/2013

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Alaska Department of Environmental Conservation
Comments on the Draft Five-Year Review Report for Port Heiden RRS,
Port Heiden Alaska dated June 2014
Commenter: Louis Howard (ADEC) Comments Developed: August 4, 2014

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
1.	8	1	**Issues and Recommendations Identified in the Five Year Review** **Issue Category: Remedy Performance** **Recommendation:** Text states: "Assess soil excavation and stockpiling practices and implement any changes necessary so that cross contamination of PCB- contaminated soil does not occur." ADEC requests the text state: "Review and modify stockpile maintenance plans to ensure contaminated soil stockpiles are covered and contained in a manner that prevents exposure to, and migration of, PCB-contaminated soil. **Affect Current Protectiveness** No ADEC disagrees. The answer should be "Yes".	Agree. The text regarding stockpiling practices will be changed as requested. The current practice, as observed during the FYR site visit, is considered protective in the short term because the stockpiles were uncovered during active excavation. Long term protectiveness should be attained once the soil RA is complete (2015) and the contaminated soil stockpiles have been transported offsite for disposal.
2.	iv	7	**Issues and Recommendations Identified in the Five Year Review** **Issue Category: Remedy Performance** **Issue:** The text states: "The purpose of the five-year evaluation is to compile, analyze, and review all groundwater data collected to determine the effectiveness of natural attenuation."	Agree. The recommendations on pages 6-2 and 6-3 will be added to the five-year review summary form on page iv.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			ADEC requests the text be expanded to include recommendations on MNA sampling and analysis described on page 42 of pdf (pages 6-2 and 6-3).	
3.	1-1	1	**Introduction** Add footnote to UU/UE: EPA OSWER no. 9355.7-03B-P states: "Unlimited use and unrestricted exposure (UU/UE) means that the selected remedy will place no restrictions on the potential use of land or other natural resources. In general, if the selected remedy relies on restrictions of land and/or groundwater use by humans and/or ecological populations to be protective, then the use has been limited and a five-year review should be conducted. For example, if a site is cleaned up to an industrial-use level, and/or other types of uses are restricted (e.g., residential use), then, generally, UU/UE is not met."	Agree. This footnote will be added.
4.	4-7	4.3.2.1	**Evaluation and Compilation of Groundwater Data** The text states: "The Final 2012 Groundwater Monitoring Report (NVPH, 2013) was the only report available for this five-year review; however, it included a comparison of the 2012 groundwater analytical results with the previous 2 years."	The text will be revised to clarify that this was the only *groundwater* report available for review. Even though this was the only groundwater report available, it was the latest report and did have a summary of previous years' analytical results. An additional attempt will be made to identify other historical groundwater reports for review.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			This is unacceptable. ADEC requests the Air Force explain why all the groundwater monitoring reports and data aren't available for review by its contractor. They should be in the AF and ADEC site files. The FYR should include a review and summary of the groundwater data and monitored natural attenuation (MNA) effectiveness.	
5.	6-2	6.4	**Data Review** **2nd Bullet** The text states: "The report recommends quarterly groundwater monitoring to ascertain if there are seasonal groundwater flow variations. While seasonal flow variations could be possible, it appears as though there is an adequate network of monitoring wells that define the plume boundaries." The FYR could recommend using data-loggers to monitor groundwater elevation and potential flow direction changes.	The groundwater report did not provide a sufficient technical basis on why water levels would fluctuate. Contaminant concentrations have not been detected in up-gradient monitoring wells (historically non-detect), thereby indicating no significant contaminant migration caused by a (seasonal) fluctuating water table. This evidence provides the basis for recommending that quarterly groundwater monitoring to assess for seasonal groundwater flow variations is not warranted based on data collected through December 2012.
6.	6-4	6.6.1	**ERP Site OT001** The text states: "Five soil stockpiles were noted on various portions of the square-shaped pad and are presumed to have been stockpiled during ongoing soil RA activities that were being conducted at the time of the site inspection."	Comment acknowledged. The five soil stockpiles were removed following the July 17 and 18, 2013, site inspection. The five-year review text will be revised as follows:

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			The largest soil stockpile was located at the southwest corner of the gravel area. The stockpile was approximately 15 feet in height and approximately 60 feet around the base. It was partially vegetated." Vegetation growing in a stockpile usually means that it has been there for a long period of time (greater than two years). ADEC requests the Air Force treat this as a high priority and address this stockpile by properly treating and/or disposing of it at an approved facility as soon as possible. ADEC is unaware of any approved work plans which included long term stockpiles exceeding two years.	***Section 6.6.1, second paragraph:*** *A sentence will be added at the end of the second paragraph that reads:* "Each of these stockpiles were removed after the July 17 and 18, 2013 site inspection." ***Section 7.2.1, first paragraph:*** *The first paragraph will be revised as follows, added text in **blue**.* The stockpiles were likely not covered at the time of the site inspection as the soil RA was being conducted**, and were removed following the July 17 and 18, 2013 site inspection**. Nonetheless, USAF should take steps to ensure that cross contamination does not occur due to windblown spread of PCB-contaminated soil from uncovered stockpiles **during future soil excavation efforts**. If left unchecked, uncovered soil stockpiles could potentially represent a new exposure pathway at the site. ***Section 7.3, third paragraph:***

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
				Uncovered PCB-contaminated soil stockpiles were observed during the July 17, 2013, and July 18, 2013, site inspection. The stockpiles were likely not covered at the time of the site inspection as the soil RA was being conducted**, and were subsequently removed following the site inspection**.
7.	7-1	7.1	**Question A: Are the remedies functioning as intended by the Decision Documents?** *Answer: Yes or No.* There is no direct answer to the question: "Yes" or "No" Each question should be followed by Answer: Yes or Answer: No and then followed by text supporting the answer.	Agree. The text will be revised to clearly state "yes" or "no" when answering the Section 7 questions.
8.	7-2	7.2.1	**Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics** The text states: "Nontime-critical removal actions (NTCRA) have been underway since 2011 to remove this contamination." ADEC requests the Air Force elaborate on whether they are planning to complete the NTCRA and achieve UU/UE by 2015 or some other time period or state whether the Site Road needs to be added into a ROD or ESD.	The soil RA is currently planned to be completed in 2015. USAF will conduct a review of existing decision documents and will assess the need to modify or create an additional decision document to include the Site Road.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
9.	7-2	7.2.2	**Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedies still valid?** *Answer: Yes or No.* There is no direct answer to the question: "Yes" or "No" Each question should be followed by Answer: Yes or Answer: No and then followed by text supporting the answer. **Changes in ARARs** The text states: "There have been no changes in ARARs since the ROD was finalized." ADEC disagrees. Since the ROD was signed in February 2009 cleanup levels and toxicity values have changed for two contaminants of concern and for one contaminant. Also the Five-Year Review Guidance (OSWER No. 9355.7-03B-P) states: "Changes in the promulgated standards or "to be considereds" (TBCs) may impact the protectiveness of the remedy. Similarly, you should investigate the effect of significant changes in the risk parameters that were used to support the remedy selection, such as reference doses, cancer potency factors, and exposure pathways of concern." For an assumption based on toxicity and other contaminant characteristics; example questions would be:	The text will be revised to provide a clear answer to Question B. According to the ROD, the soil COCs at the site are as follows: PCBs, dieldrin, heptachlor epoxide, benzo(a)pyrene, benzo(a)anthracene, and dibenzo(a,h)anthracene. The COCs for groundwater are TCE and benzene. The current MCL for TCE is 0.005 mg/L, which is the same value as stated in the ROD. TCE is not listed as a COC for soil in the ROD. The toxicity value for TCE has changed since the ROD was finalized, although the MCL (the selected PRG) has not, and there is no change in the exposure scenario. As such, the change in toxicity value is not considered an issue, but should be assessed at the time of the next five-year review if a change to the MCL is promulgated or if other assumptions related to the exposure scenario have changed. The text will be revised to explain this change in the TCE toxicity value.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			Have toxicity factors for contaminants of concern at the site changed (e.g., Integrated Risk Information System (IRIS) evaluations? (See http://www.epa.gov/IRIS) Have other contaminant characteristics changed? Have ecological toxicity reference values and/or ecological "no observed adverse effect levels/lowest observed adverse effect" (NOAELs/LOAELs) levels changed. The flowchart presented in Appendix G, Exhibit G-4 (OSWER No. 93.55.7-03B-P), "Evaluating Changes in Toxicity and Other Contaminant Characteristics," shows the process you should use to evaluate the significance of changes in toxicity values and other contaminant characteristics when conducting a five-year review. You should first identify any site-specific, risk-based, cleanup levels and investigate relevant changes in contaminant characteristics. If the estimated risk for a contaminant has not changed, your analysis on this point should be complete. <u>Soil</u> The screening level for TCE used during the RI was 0.027 mg/kg. ADEC 18 AAC 75 Table B1 Method Two Migration to Groundwater (revised as of April 8, 2012): 0.020 mg/kg.	

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			The December 2012 EPA OEA[1] recommendations state that for TCE in groundwater at a HQ of 1, the not to be exceeded value in a residential land use scenario, is 3.4 ug/L. This value is a short-term noncancer risk not to be exceeded average 21-day exposure to women of reproductive age to prevent fetal cardiac malformations. Since there are no structures on site at the former RRS facility, this is hypothetical future risk under a residential land use scenario. The May 2005 RI noted that BLO-MW-01 had TCE at 5.6 ug/L. The 2013 Groundwater Monitoring Report noted that TCE was present in Drum Storage Area Well DSA-MW04 at levels up to 71.7 ug/L and DSA-MW02 at 506 ug/L. ADEC's Target Levels for Groundwater for TCE are 5.2 ug/L residential and 240 ug/L for commercial (ADEC Vapor Intrusion Guidance for Contaminated Sites, October 2012, Appendix G). Again, this is for future buildings and is a hypothetical risk since there are no current buildings at Port Heiden RRS. The effects of changes in standards used at the time of remedy selection that may impact the protectiveness of the remedy will need to be evaluated as part of the technical assessment of the five-year review at Port Heiden RRS.	

[1] EPA Region 10, OEA "Recommendations Regarding Trichloroethylene Toxicity in Human Health Risk Assessment", Joyce C. Kelly, Director, Office of Environmental Assessment (December 2012)

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			For COPCs with a new ADEC standard, cancer risks and non-cancer hazards will need to be calculated using Equations 1 and 2 from the ADEC Cleanup Levels Guidance for groundwater and surface water and Equations 3, 4, 7, and 8 for soils (ADEC, 2008). Note that Equations 3 and 4 (for soils) represent the ingestion pathway, and Equations 7 and 8 represent the inhalation pathway. Therefore, the pathway equation that resulted in the most conservative cleanup level will need to be used to estimate health risks. In order to evaluate whether the remedy remains protective, the risk/hazard calculations were compared to ADEC's risk management level of 1×10^{-5} for carcinogens and a hazard quotient of 1 for noncarcinogens. Discussions also note whether the risk falls within the U.S. Environmental Protection Agency (EPA) management decision risk range of 1×10^{-4} to 1×10^{-6} for carcinogens.	
10.	7-3	7.3	**Question C: Has any other information come into light that could call into question the protectiveness of the remedies?** *Answer: Yes or Answer: No.* There is no direct answer to the question: "Yes" or "No" Each question should be followed by Answer: Yes or Answer: No and then followed by text supporting the answer.	Agree. Section 7.3 will be revised to clearly answer Question C. The first paragraph of Section 7.3 will be revised as follows (red text will be deleted, **bold blue** text will be added). ~~Examples of other information that might call into question the protectiveness of the remedies include potential land use changes near the sites or other unexpected changes in site conditions or~~

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
				~~exposure pathways.~~ **Yes. In** 2009, additional PCB-contaminated soil quantities were identified at the site, and as a result, the disposal option was modified as described in the ESD (USAF, 2010a). Deficiencies with work performed during the 2009 field season were later corrected in 2011 (Weston, 2011).
11.	8-1	Table 8-1	**Issues identified during the First FYR** Text: "Several soil stockpiles were observed during the site inspection. Some of the stockpiles were not covered. High winds in the area have been known to transport PCB-contaminated soil to other parts of the site (NVPH, 2010)." **Affects Current Protectiveness?** No ADEC disagrees. The answer should be "Yes".	See response to comment number 1.
12.	10-2	10	**Protectiveness Statement** The text states: "In addition, soil stockpiling practices should be reviewed…" ADEC requests the text be modified: "In addition, soil stockpiling practices should be reviewed and modified to ensure contaminated soil stockpiles are contained in a manner that prevents exposure and cross contamination due to wind erosion or runoff of PCB-contaminated soil.	Agree. The text will be changed as requested.
13.	9-1	9	ADEC has reviewed the revised RTCs to ADEC's comments on the 1st 5YR. The responses are	Agree. Sections 6.4, 7.3, 7.4, 8 and 9 of the five-year review will be revised to

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			acceptable. However, it shall be noted that 1,4-Dioxane is being requested by ADEC to be monitored in the groundwater where trichloroethylene (TCE) or 1,1,1- trichloroethane (TCA) has been detected (historically or currently) in groundwater above Table C at Port Heiden RRS. The monitoring of 1,4-Dioxane should be noted in the text at Section 9 as a recommendation and follow-up action Table 9-1. BASIS for request: AFCEE research has found 1,4-dioxane at Air Force sites contaminated with TCE. The study found detections of 1,4-dioxane at sites with TCE, independent of TCA (Anderson, R. H., Anderson, J. K. and Bower, P. A. (2012), Co-occurrence of 1,4-dioxane with trichloroethylene in chlorinated solvent groundwater plumes at US Air Force installations: Fact or fiction. Integr Environ Assess Manag, 8: 731-737. doi: 10.1002/ieam.1306). "Surprisingly, 64.4% of all 1,4-dioxane detections were associated with TCE independently," the researchers say in the abstract. "Given the extensive data set, these results conclusively demonstrate for the first time that 1,4-dioxane is a relatively common groundwater co-contaminant with TCE." The study authors recommend site investigations consider 1,4-dioxane as a potential co-contaminant of TCE at groundwater plume sites. The study	include a recommendation that 1,4-dioxane should be added to the list of analytes for groundwater samples during two consecutive groundwater sampling events after 2014, and that analytical results from this event be used to assess if future analysis of 1,4-dioxane is warranted. Sampling for 1,4-dioxane will be conducted in a timely manner so that the analytical results will be available to review during the next FYR.

Cmt. No.	Pg. & Line	Sec.	Comment/Recommendation	Response
			explicitly warns that new discoveries of 1,4-dioxane contamination could delay cleanup completions and require more costly revisions to existing remedies, noting that there is strong evidence suggesting that 1,4-dioxane "will migrate much further than chlorinated solvents." ADEC has promulgated enforceable cleanup levels (not advisories) for 1,4-Dioxane in soil and groundwater (latest version 18 AAC 75 April 2012 Table B1 and Table C) effective since 2008 and has remained unchanged in 2012 revised regulations. Soil Under 40 inch Zone 540 mg/kg direct contact 0.21 mg/kg migration to groundwater 0.077 mg/L (77 µg/L) Table C groundwater cleanup level	

Flynn, Matthew/ANC

From: BARNACK, KEITH J GS-12 USAF AFCEC PACAF/OLAR <keith.barnack@us.af.mil>
Sent: Wednesday, August 13, 2014 10:03 AM
To: Flynn, Matthew/ANC
Subject: RE: Port Heiden ADEC comments 1st 5 year review-1,4-Dioxane comments

Just add as recommendation in the report; But include the comments/RTC sheet with my email accepting their recommendation in an appendix of the report.

// signed //

Keith J. Barnack
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-----Original Message-----
From: Matthew.Flynn@CH2M.com [mailto:Matthew.Flynn@CH2M.com]
Sent: Wednesday, August 13, 2014 8:58 AM
To: BARNACK, KEITH J GS-12 USAF AFCEC PACAF/OLAR
Cc: Brian.Wied@CH2M.com
Subject: RE: Port Heiden ADEC comments 1st 5 year review-1,4-Dioxane comments

Keith,

Do we need to add this as an ADEC comment and supply an RTC for review or is the USAF okay with us adding this recommendation to the report (using the same language that what we did for Sparrevohn) and the issuing final?

Matt

-----Original Message-----
From: BARNACK, KEITH J GS-12 USAF AFCEC PACAF/OLAR [mailto:keith.barnack@us.af.mil]
Sent: Wednesday, August 13, 2014 8:24 AM
To: Howard, Louis R (DEC)
Cc: Flynn, Matthew/ANC
Subject: RE: Port Heiden ADEC comments 1st 5 year review-1,4-Dioxane comments

Accepted.

// signed //

Keith J. Barnack
Restoration Project Manager
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-----Original Message-----
From: Howard, Louis R (DEC) [mailto:louis.howard@alaska.gov]
Sent: Wednesday, August 13, 2014 8:22 AM
To: BARNACK, KEITH J GS-12 USAF AFCEC PACAF/OLAR
Cc: Matthew.Flynn@CH2M.com
Subject: RE: Port Heiden ADEC comments 1st 5 year review-1,4-Dioxane comments

ADEC has reviewed the revised RTCs to ADEC's comments on the 1st 5YR. The responses are acceptable. However, it shall be noted that 1,4-Dioxane is being requested by ADEC to be monitored in the groundwater where trichloroethylene (TCE) or 1,1,1- trichloroethane (TCA) has been detected (historically or currently) in groundwater above Table C at Port Heiden RRS. The monitoring of 1,4-Dioxane should be noted in the text at Section 9 as a recommendation and follow-up action Table 9-1.

BASIS for request:
AFCEE research has found 1,4-dioxane at Air Force sites contaminated with TCE. The study found detections of 1,4-dioxane at sites with TCE, independent of TCA (Anderson, R. H., Anderson, J. K. and Bower, P. A. (2012), Co-occurrence of 1,4-dioxane with trichloroethylene in chlorinated solvent groundwater plumes at US Air Force installations: Fact or fiction. Integr Environ Assess Manag, 8: 731-737. doi: 10.1002/ieam.1306).

"Surprisingly, 64.4% of all 1,4-dioxane detections were associated with TCE independently," the researchers say in the abstract. "Given the extensive data set, these results conclusively demonstrate for the first time that 1,4-dioxane is a relatively common groundwater co-contaminant with TCE."

The study authors recommend site investigations consider 1,4-dioxane as a potential co-contaminant of TCE at groundwater plume sites. The study explicitly warns that new discoveries of 1,4-dioxane contamination could delay cleanup completions and require more costly revisions to existing remedies, noting that there is strong evidence suggesting that 1,4-dioxane "will migrate much further than chlorinated solvents."

ADEC has promulgated enforceable cleanup levels (not advisories) for 1,4-Dioxane in soil and groundwater (latest version 18 AAC 75 April 2012 Table B1 and Table C) effective since 2008 and has remained unchanged in 2012 revised regulations.

Soil Under 40 inch Zone
540 mg/kg direct contact
0.21 mg/kg migration to groundwater
0.077 mg/L (77 µg/L) Table C groundwater cleanup level

Louis Howard
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-----Original Message-----
From: BARNACK, KEITH J GS-12 USAF AFCEC PACAF/OLAR [mailto:keith.barnack@us.af.mil]
Sent: August 13, 2014 5:37 AM
To: Howard, Louis R (DEC)
Cc: Matthew.Flynn@CH2M.com
Subject: FW: Port Heiden ADEC comments 1st 5 year review

Louis: Revised RTCs attached. Any questions, please contact me. Thanks:

Keith

// signed //

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