



## ***Final Record of Decision***

*for*

Vehicle Maintenance Shop (SS002)

Fuel Storage Area (SS003)

Barrel Storage Area (SS006)

POL Site by Yukon River (SS008)

## **BEAR CREEK RADIO RELAY STATION, ALASKA (BEAR CREEK RRS)**

*Prepared By:*

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

**June 1, 2009**

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## Appendices

Appendix A – Proposed Plan for Final Actions for Five ERP Sites Bear Creek RRS

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## Acronyms

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFB	Air Force Base
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CDI	chronic daily intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CEC	Civil Engineer Squadron
CFR	Code of Federal Regulations
COC	chemical of concern
COPC	chemical of potential concern
CRP	Community Relations Plan
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DRO	Diesel-Range Organics
EPA	Environmental Protection Agency
EPC	exposure point concentration
ERP	Environmental Restoration Program
FS	Feasibility Study
GRO	Gasoline-Range Organics
HI	Hazard Index
HMTC	Hazardous Materials Testing Center
HQ	hazard quotient
IC	Institutional Control
msl	mean sea level
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
ORNL	Oak Ridge National Laboratories
PA	Preliminary assessment
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEL	Probable effects level
POC	point of contact
POL	Petroleum, oil, or lubricants
RAB	Restoration Advisory Board
RAIS	Risk Assessment Information System
RAO	remedial action objective
RBC	risk-based concentration
RBCL	risk-based cleanup level

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RfD	reference dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRO	Residual-Range Organics
RRS	Radio Relay Station
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SF	slope factor
SQB	Sediment quality benchmarks
SQG	Sediment Quality Guidelines
SQuiRTs	Screening Quick Reference Tables
SVOC	semi-volatile organic compound
TCE	Trichloroethene
TEL	Threshold effects level
TMB	Trimethylbenzene
TPH	total petroleum hydrocarbons
TSCA	Toxic Substances Control Act
UCL	Upper confidence limit
USAF	United States Air Force
USC	United States Code
VOC	volatile organic compound

*Units of Measurement*

mg/kg	milligrams per kilogram
mg/L	milligrams per liter
°F	Degrees Fahrenheit

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## 1.0 Declaration

### 1.1 Site Names and Location

*Facility Name:* Bear Creek Radio Relay Station Site (Bear Creek RRS), Alaska

*CERCLIS ID Number:* NOT APPLICABLE

*Site Names (Numbers):* Vehicle Maintenance Shop (SS002),  
Fuel Storage Area (SS003),  
Barrel Storage Area (SS006), and  
POL Site by the Yukon River (SS008).

The former Bear Creek RRS is located in central Alaska about 130 air miles west of Fairbanks near the community of Tanana. Tanana is located on the north bank of the Yukon River, approximately two miles west of the confluence of the Yukon and Tanana Rivers. Tanana is accessible by river and by air; there are no roads connecting Tanana to other regional communities.

The Bear Creek RRS facilities were located on 16.21 acres of land withdrawn from federal holdings for military purposes. The 16.21 acres were divided into three parcels: the Bear Creek RRS installation was constructed on a 14.69-acre parcel, the water collection system was located on a separate 0.92 acre parcel north of the installation, and the POL Site at the Yukon River was located on a 0.6-acre parcel on the north bank of the Yukon River.

Road access to the former Bear Creek RRS is provided by a gravel road beginning at the POL Site at the Yukon River about one mile east of Tanana. The gravel road travels approximately eight miles up the south side of a heavily forested ridge to the former installation site.

Groundwater has not been encountered above bedrock at the Bear Creek RRS and the migration to groundwater pathway is considered to be incomplete. However, shallow, unconfined groundwater has been encountered at the POL Site by the Yukon River. Residents near the Yukon River use groundwater as drinking water. The closest resident lives within 0.25-mile of the POL Site by the Yukon River.

The Yukon River borders the POL Site SS008. The river and its wetlands provide habitat for aquatic insects, shorebirds, and fish. The river also receives recreational use, primarily fishing and boating.

### 1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the Final Selected Remedies for the four Environmental Restoration Program (ERP) sites listed above at Bear Creek RRS, Alaska. This is an integrated ROD documenting final remedies selected under both the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Alaska State Laws and Regulations. This ROD is based on documents contained in the Administrative Record file for Bear Creek RRS, including but not limited to the 1993 Site Inspection of Bear Creek RRS, 1996 Demolition and Disposal of Air Force Facilities at Bear Creek RRS, 1999 Remedial Investigation (RI) Report for the Bear Creek RRS, 2000 Clean Sweep Environmental Survey Strategic Plan, and 2007 Remedial Investigation/Feasibility Study (RI/FS) at the Bear Creek RRS.

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### **1.2.1 Statement of Basis and Purpose-CERCLA**

There are no CERCLA hazardous substances identified as contaminants of concern (COCs) at the four subject sites. The only COCs are constituents of petroleum products (i.e., diesel-range organics [DRO]) and are therefore excluded as CERCLA hazardous substances under the CERCLA petroleum exclusion (42 USC 9601 (14)). As there are no CERCLA COCs, a no action response is the appropriate and selected remedy for these sites under CERCLA.

This ROD is issued by the United States Department of the Air Force (USAF) in accordance with and satisfying the requirements of the Defense Environmental Restoration Program (ERP), 10 *United States Code* (USC) 2701 et seq.; CERCLA 42 USC 9601 et seq.; Executive Order 12580, 52 *Federal Register* 2923 (23 January 1987); National Contingency Plan (NCP), and 40 *Code of Federal Regulations* 300. The U.S. Environmental Protection Agency (EPA) has been consulted consistent with the requirements of 10 USC 2705 and has chosen to defer to the Alaska Department of Environmental Conservation (ADEC) for regulatory oversight of the ERP at Bear Creek RRS. The State of Alaska concurs with the selected remedies (no action).

### **1.2.2 Statement of Basis and Purpose Under State of Alaska Regulations**

Because petroleum substances are COCs under State of Alaska laws and regulations, the four subject sites are being addressed under those applicable laws and regulations, including but not limited to Title 46 of the Alaska Statutes and regulations promulgated thereunder.

This ROD is issued by the USAF in accordance with and satisfying the requirements of the Alaska Oil and Hazardous Substance Pollution Control Act, 18 *Alaska Administrative Code* (AAC) 75. The State of Alaska concurs with the selected remedy (no further action).

## **1.3 Assessment of Sites**

### **1.3.1 Assessment Under CERCLA**

Response actions at the four sites addressed in this ROD are not necessary under CERCLA to protect public health or welfare or the environment.

### **1.3.2 Assessment Under Alaska State Regulations**

There is no action necessary under Alaska State authority to meet 18 AAC 75 cleanup levels at any of the four subject Bear Creek RRS ERP sites.

## **1.4 Description of Selected Remedy**

Vehicle Maintenance Shop (SS002), Fuel Storage Area (SS003), Barrel Storage Area (SS006), and POL Site by the Yukon River (SS008) are four of the seven ERP sites at Bear Creek RRS. No action under CERCLA and no action under Alaska State regulations for these four sites are consistent with the overall USAF cleanup goal of closing sites that do not pose unacceptable risk to human health or the environment and does not affect the cleanup strategy for the other Bear Creek RRS ERP sites.

### **1.4.1 Remedies Selected Under CERCLA**

No action is necessary under CERCLA to protect public health or welfare or the environment at any of the four sites.



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#### **1.4.2 Remedies Selected Under State of Alaska Regulations**

No action is necessary under Alaska State laws and regulations at any of the four sites except documentation of residual contamination remaining at Sites SS002, SS003, and SS008. The site status will become Cleanup Complete (in accordance with ADEC Draft Final Site Closure Policy and Procedures, dated October 16, 2008).

To address residual contamination at Sites SS002, SS003, and SS008, USAF will delineate the site boundaries and document residual contamination in the USAF Real Property Records. USAF will also inspect the abandoned fuel pipeline at Site SS003 (in conjunction with work at other Bear Creek ERP sites). If the pipeline is found to contain product, then the contents will be emptied and properly disposed of. During transfer of the land, USAF will notify the future land owners that there is residual POL on the site.

### **1.5 Statutory Determinations**

#### **1.5.1 CERCLA**

The selected remedy for the four Bear Creek RRS sites under CERCLA (no action) is protective of human health and the environment, complies with promulgated requirements that are applicable or relevant and appropriate, and is cost effective. There have been no CERCLA hazardous substances identified as COCs at the four subject Bear Creek RRS sites (SS002, SS003, SS006, and SS008).

Because there are no CERCLA hazardous substances above levels that allow for unrestricted use at any of the Bear Creek RRS sites addressed in this ROD, there is no statutory requirement for a five-year review.

#### **1.5.2 Remedies Required Under State of Alaska Regulations**

The selected remedy for the four Bear Creek RRS sites under State of Alaska Regulations (no action) complies with requirements under 18 AAC 75.325-390.

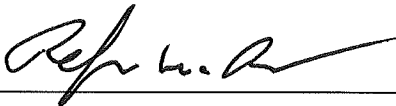
### **1.6 Data Certification Checklist**

In accordance with EPA guidance on preparing RODs (USEPA, 1999), this section is not applicable when documenting a No Action Decision when a CERCLA action is not necessary for the protection of human health or the environment.

## 1.7 Authorizing Signatures

This signature sheet documents the decision made for four sites: Vehicle Maintenance Shop (SS002), Fuel Storage Area (SS003), Barrel Storage Area (SS006), and POL Site by the Yukon River (SS008), at Bear Creek RRS, Alaska. By signing this declaration the ADEC concurs with the Air Force's selected remedies.

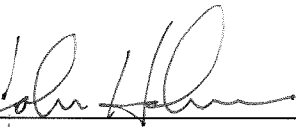
The decision may be reviewed and modified in the future if new information becomes available that indicates the presence of contaminants or exposures that may cause unacceptable risk to human health or the environment. If additional contaminants are discovered, USAF and ADEC will determine the compliance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



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

29 JUL 09

Date



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

7/30/2009

Date

## 2.0 Decision Summary

The Decision Summary identifies the Final Remedy selected for each of the four Environmental Restoration Program (ERP) sites addressed in this Record of Decision (ROD), explains how the remedy fulfills statutory and regulatory requirements, and provides a substantive summary of the Administrative Record file that supports the remedy selection decision.

### 2.1 Site Name, Location, and Description

#### 2.1.1 Site Names and Locations

*Site Names (Numbers) and ADEC Database Record Key Numbers:* Vehicle Maintenance Shop (SS002) – (198931X902546), Fuel Storage Area (SS003) - (198931X102544), Barrel Storage Area (SS006) – (198131X918201), and POL Site by the Yukon River (SS008) – (198131X918401).

*Site Location:* Bear Creek Radio Relay Station (RRS), Alaska

*Latitude and Longitude:* 65° 15' 14'' north, 151° 55' 18'' west

*Point of Contact (POC):* Mr. Steve Hunt – Project Manager  
Steve.Hunt@elmendorf.af.mil  
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Elmendorf AFB, AK 99506-2200

The former Bear Creek RRS is located in central Alaska, approximately 6 miles from the community of Tanana and about 130 air miles west of Fairbanks (**Figure 2-1**). Tanana is situated along the north bank of the Yukon River approximately two miles west of the confluence of the Yukon and Tanana Rivers. The population of Tanana is about 280, an estimate based upon the 2005 State Demographer census (Alaska Division of Community Advocacy database, 2005). Access to Tanana from other areas is by air or river only, as there are no roads connecting this area to other regional communities. The Bear Creek RRS property is connected to Tanana by six miles of gravel road leading north from the Yukon River and Tanana up to the ridge top.

The Bear Creek RRS facilities were located on 16.21 acres of land withdrawn from federal holdings for military purposes. The 16.21 acres were divided into three parcels: the Bear Creek RRS installation was constructed on a 14.69-acre parcel, the water collection system was located on a separate 0.92 acre parcel north of the installation, and the POL Site at the Yukon River was located on a 0.19-acre parcel on the north bank of the Yukon River.

Road access to the former Bear Creek RRS is provided by a gravel road beginning at the POL Site at the Yukon River about one mile east of Tanana. The gravel road travels approximately eight miles up the south side of a heavily forested ridge to the former installation site.

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As the lead agency for remedial activities, the United States Air Force (USAF) has conducted environmental restoration activities at Bear Creek RRS sites SS002, SS003, SS006, and SS008 in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) under the Defense Environmental Restoration Program (DERP) which was established by Section 211 of the Superfund Amendments and Reauthorization Act (SARA) of 1986.

As the support agency, the Alaska Department of Environmental Conservation (ADEC) provides primary oversight of the environmental restoration actions.

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

### 2.1.2 Site Descriptions

**Figure 2-2** provides an overview of the former Bear Creek RRS installation and POL Site by the Yukon River. **Figure 2-3** shows the layout of the ERP Sites at the former Bear Creek RRS. The four Bear Creek RRS ERP sites addressed in this ROD are described briefly below:

Vehicle Maintenance Shop (SS002): SS002 was the primary vehicle maintenance shop during the operation of the Bear Creek RRS installation. Typical wastes likely resulting from shop activities include diesel and gasoline fuel, transmission fluid (a potential source of polychlorinated biphenyls [PCBs]), brake fluid, lead-acid batteries, and engine parts (a potential source of metals). Spilled fuel from maintenance activities was collected in sand-lined floor drains and sumps. Although it was suspected that the floor drains and sumps may have connected into a dry well, no dry wells were found during any of the investigations or the demolition of the facility.

Fuel Storage Area (SS003): The Fuel Storage Area (SS003) consisted of two diesel aboveground storage tanks (ASTs) (a 220,500-gallon AST and a 12,285-gallon AST) contained within an earthen berm, a fuel distribution pipeline, and two fuel pumps. There was a drainage ditch at the western end of the berm to capture any overflow. These tanks supplied diesel for the Bear Creek RRS facility during active operations between 1956 and 1981.

Barrel Storage Area (SS006): The Barrel Storage Area was identified from historical aerial photographs showing a barrel storage area across the road and to the northwest of the Equipment Building (SS004) and interviews with Tanana residents who remember barrels stored in the area. The Barrel Storage Area was sampled as an “additional site for investigation” during the 1998-99 Remedial Investigation (RI) and was given an ERP site designation (SS006) in 2005.

POL Site by the Yukon River (SS008): The POL Site at the Yukon River (SS008) is a former petroleum, oil, and lubricant (POL) fuel storage system located on the north bluff of the Yukon River bank, about eight miles south of Bear Creek RRS and one mile east of Tanana. The former POL Site consisted of a 16,500-gallon gasoline AST, a 126,000-gallon fuel oil AST situated within an earthen containment berm, and the associated distribution pipelines extending from the ASTs to the river. During the time when Bear Creek RRS was active, the POL Site was used to store fuel offloaded from barges along the river.

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## **2.2 Site History and Enforcement Activities**

This section provides background information about Bear Creek RRS. Historical environmental investigations at Bear Creek RRS that led to the ROD are summarized in Section 2.6.1, and previous remedial activities performed are summarized in Section 2.6.2.

Bear Creek RRS was built in 1956 and 1957 and became active in January 1959. The station was part of the original White Alice Communication System. The purpose of the station was to relay radio information to and from Indian Mountain RRS, Kalakaket Creek RRS, and Pedro Dome RRS. With communication technology upgrades, the installation's mission was phased out in the late-1970s, and the installation was decommissioned in 1981.

While it was operational, the Bear Creek RRS included four White Alice scatter antennae, two smaller antennae, associated transmission framework, a water supply system, a solid waste disposal area, an equipment building and personnel dormitory, primary and temporary vehicle maintenance shops, a 40,000-gallon water AST, POL storage tank areas (SS003 and SS008), an airstrip, and other support facilities. The Air Force removed all the remaining structures as part of the Clean Sweep effort in 1996, and the entire site has been graded and covered with fill.

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

## **2.3 Community Participation**

### **2.3.1 Proposed Plan Community Participation**

The National Contingency Plan (NCP) Section 300.430(f)(3) establishes a number of public participation activities that the lead agency (USAF) must conduct following preparation of the Proposed Plan and review by the support agency (ADEC). Components of these items and documentation of how each component was satisfied for the Bear Creek RRS sites described in **Table 2-1** and **Table 2-2**.

**Table 2-1: Public Notification of Document Availability**

<b>Requirement:</b>	<b>Satisfied by:</b>
<p>Notice of availability of the Proposed Plan and Remedial Investigation/Feasibility Study must be made in a widely-read section of a major local newspaper.</p>	<p>Notice of Availability was published in the Fairbanks Daily News-Miner. In addition, an availability notice was sent to local and regional offices for posting locally.</p>
<p>Notice of availability should occur at least two weeks prior to the beginning of the public comment period.</p>	<p>Notice of Availability was sent to local and regional offices on July 7, 2007, for posting locally.</p> <p>The Notice of Availability was also published in the Fairbanks Daily News-Miner on July 15, 2007 and July 22, 2007.</p> <p>The public comment period began on July 9, 2007 and ran until September 15, 2007.</p>
<p>Notice of availability must include a brief abstract of the proposed plan which describes the alternatives evaluated and identifies the preferred alternative (National Oil and Hazardous Substances Pollution Contingency Plan Section 300.430(f)(3)(i)(A)).</p>	<p>Notice of Availability provided the required information.</p>
<p>Notice of availability consisted of the following information:</p> <ul style="list-style-type: none"> <li>• Site name and location</li> <li>• Date and location of public meeting</li> <li>• Identification of lead and support agencies</li> <li>• Alternatives evaluated in the detailed analysis</li> <li>• Identification of preferred alternative</li> <li>• Request for public comments</li> <li>• Public participation opportunities including:             <ul style="list-style-type: none"> <li>– Location of information repositories and Administrative Record file</li> <li>– Methods by which the public may submit written and oral comments, including a contact person</li> <li>– Dates of public comment period</li> <li>– Contact person for the community advisory group (e.g., Restoration Advisory Board) if applicable</li> </ul> </li> </ul>	

**Table 2-2: Public Comment Period Requirements**

<b>Requirement:</b>	<b>Satisfied by:</b>
Lead agency should make document available to public for review on same date as newspaper notification.	150 copies of the Proposed Plan were distributed to local and regional offices for public distribution on July 7, 2007, along with a Notice of Availability for posting locally.
Lead agency must ensure that all information that forms the basis for selecting the response action is included as part of the Administrative Record file and made available to the public during the public comment period.	The Administrative Record file for Bear Creek RRS is maintained on Elmendorf AFB. The file is also available on-line at www.adminrec.com (select DOD, then PACAF, then Alaska, then Bear Creek), although the most recent documents may not be available yet on the internet.
CERCLA § 177(a)(2) requires the lead agency to provide the public with a reasonable opportunity to submit written and oral comments on the Proposed Plan. NCP § 300.430(f)(3)(i) requires the lead agency to allow the public a minimum of 30 days to comment on the RI/FS and the Proposed Plan.	The Air Force provided a public comment period for the Proposed Plan from July 9, 2007 through September 15, 2007.
The lead agency must extend the public comment period by at least 30 additional days upon timely request.	The Air Force extended the public comment period by 34 days in response to a written request.
The lead agency must provide the opportunity for a public meeting to be held at or near the site during the public comment period. A transcript of this meeting must be made available to the public and be maintained in the Administrative Record for the site (pursuant to NCP § 300.430(f)(3)(i)(E)).	A Public Meeting on the Proposed Plan was offered to the community; however, the community did not request a public meeting.

**2.3.2 Bear Creek RRS Community Relations Activity Summary**

A **community relations plan** (CRP) was initially prepared for Bear Creek RRS in December 1998 (USAF, 1998), and then updated and revised in April 2002 (USAF, 2002). A CRP is prepared to promote communication between the USAF and the general public during environmental restoration activities at Bear Creek.

The Air Force has sponsored several **public meetings** in Tanana with community members and tribal leaders since 1998 regarding site restoration actions under the ERP. The meetings were held to introduce interested stakeholders to Air Force personnel and regulatory personnel and to discuss the future paths of environmental restoration at the former Air Force installation. The community has expressed an interest historically in forming a **restoration advisory board (RAB)** to serve as a forum for discussion and exchange of information between federal/state agencies regarding the cleanup program at Bear Creek RRS. Currently there is no RAB for the Bear Creek installation.

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As required by CERCLA, an **Administrative Record** has been established for Bear Creek RRS by the 611th Civil Engineer Squadron (CES) Environmental Restoration Section. The Administrative Record is located at 10471 20<sup>th</sup> Street, Suite 302 at Elmendorf AFB, Alaska. The USAF Community Relations Coordinator, Mr. Tommie Baker, is the point of contact for the Administrative Record. He can be reached at (907) 552-4506 or 1-(800) 222-4137, and by email at [tommie.baker@us.af.mil](mailto:tommie.baker@us.af.mil).

In addition, the Administrative Record is available on the internet at [www.adminrec.com](http://www.adminrec.com) (select DOD, then PACAF, then Alaska, then Bear Creek), although the most recent documents may not be available yet on the internet. The Administrative Record contains the information that has been used to support USAF decision-making and is accessible to the public.

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

A **statewide toll-free telephone number (800-222-4137)** is available throughout Alaska to enable interested individuals to contact the Air Force 611 CES Community Relations Coordinator at Elmendorf AFB. Interested individuals are encouraged to use this toll-free number to obtain information about the activities at Bear Creek RRS or the ERP process.

Several **fact sheets** have been distributed to community residents of Tanana regarding site restoration since 1998.

#### **2.4 Scope and Role of Operable Unit or Response Action**

The USAF, with concurrence from ADEC, has organized the environmental restoration work at Bear Creek RRS into the seven sites listed in **Table 2-3** and shown on **Figure 2-2**.

#### **2.5 Bear Creek RRS Environmental Characteristics**

Most of the following discussion is summarized from the detailed geology/water resources sections in the *Final Remedial Investigation/Feasibility Study Report for Bear Creek RRS sites SS007 and SS008, dated January 22, 2007* (USAF, 2007), which was itself a compilation summary of several previous study reports for the Bear Creek installation, including the September 1999 *Final Remedial Investigation Report for the Bear Creek Radio Relay Station, Alaska, Volume 1*.



**Table 2-3: Bear Creek RRS ERP Site Summary**

Site	Name	Environmental Concern	Status
SS002	Vehicle Maintenance Shop	No unacceptable risk at the site	CERCLA - No action State of Alaska - No Action; Cleanup Complete
SS003	Fuel Storage Area	No unacceptable risk at the site	CERCLA - No action State of Alaska - No Action; Cleanup Complete
SS006	Barrel Storage Area	No unacceptable risk at the site	CERCLA - No action State of Alaska - No Action; Cleanup Complete
SS008	POL site by the Yukon River	No unacceptable risk at the site	CERCLA - No action State of Alaska - No Action; Cleanup Complete
LF001	Solid Waste Disposal Area	Former permitted solid waste landfill for installation	Draft Proposed Plan in Progress
SS007	Borrow Pit	Commingled pesticide and petroleum contamination in soil	Draft Proposed Plan in Progress
SS004	Equipment Building	PCBs in soil	Draft Proposed Plan in Progress

*Note: Subject sites of this ROD are shown in bold blue font.*

### 2.5.1 Physiography and Climate

Bear Creek RRS is located in central Alaska, approximately 130 air miles west of Fairbanks. This area of central Alaska experiences a continental climate, characterized by seasonal temperature extremes and low precipitation levels. Typical of interior Alaska, the summers are short and warm and winters are long and cold. A mean annual precipitation level of 13.2 inches has been recorded in the Tanana area. Half of this occurs between June and August. The typical annual snowfall is about 50 inches, which generally occurs between October and March.

Typical daily summer temperatures recorded at Tanana (June to August) range from 43.1 degrees Fahrenheit (° F) to 70.4° F. Typical daily winter temperatures recorded at Tanana (November to February) range between -16.6° F and 9.1° F daily. Temperature extremes as high as 94° F and as low as -71° F have been recorded at Tanana (Alaska Division of Community Advocacy, 2005).

### 2.5.2 Geology

Bear Creek RRS is located within the unglaciated portions of the Yukon-Tanana Upland physiographic province. A major structural feature in the region is the Kaltag Fault system, which is located between the former installation location and the Yukon River and affects the course of the Yukon River in this area.

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Local bedrock at the main installation ridge top area, where all of the sites are located except SS008, is primarily composed of metamorphic assemblages of quartz-mica schist, quartzite, and phyllite; and is highly fractured due to the proximity of the Kaltag Fault. Soil borings installed at the area have typically encountered weathered bedrock between 2 to 10 feet below ground surface (bgs); with more competent, fractured bedrock between 10 to 20 feet bgs (USAF, 1999). The most common lithology described from these borings included interbedded layers of quartz-mica schist and weathered phyllite.

Site SS008 by the Yukon River is in an area of discontinuous permafrost and deep soil strata comprised mainly of well-drained, brown silty and gravelly loam where there is no permafrost. Bedrock has not been encountered at Site SS008.

### 2.5.3 Hydrogeology

Groundwater has not been encountered at the ridge top area of the former Bear Creek RRS installation. Attempts to install monitoring wells in this area have not been successful, and borings as deep as 41 feet bgs did not encounter a rechargeable groundwater source (USAF, 1999). Although water has been encountered in some soil borings at Bear Creek RRS, the water is considered “pore water” (defined as a discontinuous volume of water trapped in the pore spaces of subsurface soil and bedrock material) rather than groundwater. The pore water is not connected to any continuous groundwater, and when bailed out of the soil borings, insignificant recharge occurred. Based on these observations, groundwater is not considered to be a medium of potential environmental concern at this installation.

Groundwater is present at the Yukon River POL Site (SS008), which is located next to the Yukon River several miles downhill from the ridge top area. Monitoring wells have been installed successfully at this site. The groundwater table at SS008 ranges from 20 and 30 feet bgs. The groundwater recharge rate at SS008 is rapid, and the hydraulic gradient is fairly flat and seasonally influenced by the Yukon River. There is at least one private drinking water well located within 0.25 mile of SS008. However, most of the nearby residents haul their drinking water from the new washeteria in town (Tanana).

### 2.5.4 Surface Water Hydrology

The Yukon River is a significant surface water body in the area. The former installation area is located on a ridge 1,650 feet mean sea level (msl) above the Yukon River floodplains. The former POL site (SS008) is located along the north bank of the Yukon River bluffs and is within the river’s floodplain.

Surface water runoff from the main installation area likely occurs as seasonal overland flow to nearby creeks (Mission Creek, NC Creek, and Bear Creek), which discharge directly into the Yukon River a few miles downgradient. These creeks are known to have very low seasonal flow rates and are not a year round habitat for fish. Year round surface water bodies were not observed within a two-mile radius of the former installation area.

Site SS008 is near the Yukon River. In 2005, a dry drainage channel was observed in the woods adjacent to the former POL storage area. This drainage was dry at the time of the observations in 2005, but likely receives surface water runoff from the site during periods of high precipitation.

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### 2.5.5 Ecology

Typical vegetation for the area includes upland tussock tundra with herbs and various berry plants such as cranberries, blueberries, and bearberries interspersed with black spruce. The vegetation around much of the area consists of dense willow and alders.

Wildlife common to the area and observed locally include, but are not limited to, the Alaska marmot, arctic ground squirrel, black bear, brown bear, common shrew, dusky shrew, lynx, marten, meadow jumping mouse, moose, northern red-backed vole, pygmy shrew, singing vole, tundra vole, wolf, wolverine, and yellow-cheeked vole (University of Alaska-Fairbanks, 1998).

A large number of bird species have also been observed in the area. Frequently observed species include the Canada goose, American widgeon, spotted sandpiper, common snipe, alder flycatcher, bank swallow, black-capped chickadee, ruby crowned kinglet, Swainson's thrush, varied thrush, orange-crowned warbler, yellow warbler, slate-colored junco, and the common redpoll (Sauer, et al., 1997).

Year-round surface water bodies have not been observed within a two-mile radius of the former installation area. Based upon interviews with local residents and field observations, area creeks (Mission Creek, NC Creek, and Bear Creek) are known to have very low seasonal flow rates and are not a year round habitat for fish. However, species of fish known to inhabit the Yukon River include salmon, burbot, sheefish, rainbow trout, northern pike, whitefish, and blackfish.

The environment around Bear Creek RRS is not believed to be classified as critical habitat as defined by 50 Code of Federal Regulations [CFR] 424.02; however, the area is assumed to be classified as a sensitive environment (USAF, 1995). According to the U.S. Fish and Wildlife Service, there are two American peregrine falcon nests and one bald eagle nest within 15 miles and 6 miles of the installation, respectively (ADFG, 2003). The bald eagles are protected under the Eagle Protection Act.

## 2.6 Summary of Soil Characterization/Remediation Activities at the Four Subject ERP Sites

### 2.6.1 Site Characterization Activities

Beginning with a 1981-1982 hazardous materials inspection and continuing through a 2007 Remedial Investigation/Feasibility Study (RI/FS), USAF has conducted investigations of the Bear Creek RRS area to determine if former installation operations caused environmental impacts. Historical site investigation and restoration events for the subject ERP sites are summarized below. Detailed investigation results for each site are discussed in Sections 2.7.4 through 2.7.7.

- *Equipment and Hazardous Waste Removals.* In 1981 and 1982, USAF inspected Bear Creek and other former White Alice installations. Hazardous and toxic materials and wastes and most moveable equipment were shipped off-site to Elmendorf Air Force Base (AFB).
- *Soil Removals.* In 1984, USAF performed a follow-up inspection and found soil containing PCBs in the vicinity of the Vehicle Maintenance Shop (SS002) and the

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Equipment Building (SS004) (note that Site SS004 is not addressed in this ROD). In 1985, about 20 cubic yards of PCB-contaminated soil (fifty three 55-gallon drums) were removed from Sites SS002 and SS004.

➤ *Preliminary Assessment, Bear Creek Radio Relay Station (HMTC, 1989).*

The Preliminary Assessment (PA) was performed by the Hazardous Material Technical Center (HMTC) in June 1988. The work scope included a site visit, a records search, and the acquisition of available geologic, hydrologic, meteorologic, land use, and critical habitat data from federal, state, and local agencies. HMTC reported that the electrical equipment, batteries, fuels, and PCB-contaminated soil and equipment had been removed from Bear Creek RRS. Although there were no visible signs of contamination evident at Bear Creek RRS, further investigation was recommended.

➤ *Preliminary Assessment, Bear Creek Radio Relay Station (USAF [ENSR], 1993a).*

In 1992 and 1993, ENSR performed a second PA at Bear Creek RRS. Appendix 2 to the PA report (ENSR, 1993a) includes documentation of the 1985 USAF PCB cleanup activities. The PA recommended further investigation due to the high PCB concentrations found during the 1984-1985 USAF activities at Bear Creek RRS.

➤ *Site Investigation, Bear Creek Radio Relay Station (USAF [ENSR], 1993b).*

In 1992 and 1993, ENSR performed a Site Investigation (SI) at Bear Creek RRS. In August 1992, ENSR collected several soil samples from the Vehicle Maintenance Shop (SS002) and Fuel Storage Area (SS003), along with samples from the Equipment Building (SS004) and Solid Waste Disposal Area (LF001), which are not addressed in this ROD. The Barrel Storage Area (SS006) was discovered during the 1993 SI. The sample results suggested petroleum hydrocarbon and PCB contamination; sample results are discussed in Sections 2.7.4 through 2.7.6 of this ROD. The SI recommended further investigation.

➤ *Initial Site Investigation Bear Creek Radio Relay Station POL Site (USAF, 1996a).*

In 1996, USAF performed an Initial SI at the Bear Creek RRS POL Site to assess potential petroleum contamination and provide recommendations based on the findings. The SI included site reconnaissance and soil sampling. Sample results suggested petroleum hydrocarbon contamination within the POL bermed area only. Sampling details and results are discussed in Section 2.7.7. The SI recommended further investigation.

➤ *Remedial Investigation Report for the Bear Creek Radio Relay Station (USAF [Radian], 1999).*

The RI included site reconnaissance, field screening, soil sampling, groundwater and surface water sampling (at SS008 only), and surveying of sample points. A phased approach was used for sampling activities. Field reconnaissance and a review of historical information were used to identify field screening locations, and field screening results were used to identify locations for collecting samples for laboratory analysis. Sampling details and results are discussed in Sections 2.7.4 through 2.7.7.

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- *Remedial Investigation/Feasibility Study Report for Bear Creek RRS Sites SS007 and SS008 (USAF, 2007).*

A Remedial Investigation was performed in 2005 at the POL Site on the Yukon River (SS008) and Borrow Pit Area (SS007), with an RI/FS report produced in 2007. The RI included surface and subsurface soil sampling at both sites, groundwater sampling at SS008, and sediment sampling in the Yukon River downgradient from SS008. RI results generally concluded that remedial action was not required at SS008 but was recommended for Site SS007. The FS evaluated two remedial alternatives for Site SS007, which is not part of this ROD. Sampling details and results for Site SS008 are discussed in Section 2.7.7 of this ROD.

## 2.6.2 Remedial Activities Performed

Several phases of remedial activities have been performed at Bear Creek RRS. In 1985, USAF removed PCB-contaminated soil and debris from the vicinity of the Vehicle Maintenance Shop (SS002). In 1996 and 1997, all remaining structures were removed under Operation Clean Sweep, and areas of the Bear Creek RRS were graded, covered with 18 inches of fill, and reseeded (USAF, 1996b and USAF, 1997). In 2000, erosion control work (e.g., repairing erosion channels, adding an additional six to twelve inches of soil fill, and reseeded) was performed across the Bear Creek RRS (USAF, 2000).

The remedial activities specific to each subject ERP site are summarized in the following sections.

### 2.6.2.1 Vehicle Maintenance Shop (SS002)

PCB-contaminated soil was removed from an area in front of the Vehicle Maintenance Shop in 1985 (Area C on **Figure 2-4**). Results from a post-excavation composite soil sample from Area C showed PCB concentrations below the 1 milligram per kilogram (mg/Kg) ADEC Method Two cleanup level protective of residential use.

In 1996, the Vehicle Maintenance Shop was demolished as part of Operation Clean Sweep. During the demolition of the shop, asbestos was segregated into regulated and non-regulated portions. Regulated material was removed and transported to Galena, Alaska, for disposal, and non-regulated asbestos-containing material was buried with other demolition waste in a permitted landfill east of the installation.

In 1997, the Vehicle Maintenance Shop was covered with about 18 inches of soil, graded, and reseeded.

The 1998-99 RI field personnel noted that the soil placed in 1997 was showing signs of erosion, and that the reseeded done in 1997 was mostly unsuccessful. Therefore, in 2000, erosion channels were repaired, and the site was covered with an additional six to twelve inches of soil and reseeded.

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#### 2.6.2.2 Fuel Storage Area (SS003)

In 1985, USAF abandoned in-place a buried fuel pipeline that ran southwest from the fuel tanks toward the northeast corner of the equipment building. No stained soil was observed around the pipeline.

In 1996, USAF drained, cleaned, demolished, and removed the ASTs and removed the earthen berm as part of Operation Clean Sweep. About 18 inches of clean soil was placed over the site in 1997, and the entire area was graded and reseeded.

The 1998-99 RI field personnel noted that the soil placed in 1997 was showing signs of erosion, and that the reseeded done in 1997 was mostly unsuccessful. Therefore, in 2000, erosion channels were repaired, and the site was covered with an additional six to twelve inches of soil and reseeded.

#### 2.6.2.3 Barrel Storage Area (SS006)

No remedial activities have occurred at the Barrel Storage Area (SS006).

#### 2.6.2.4 POL Site by the Yukon River (SS008)

In 1996, the ASTs, distribution pipeline, and earthen containment berm were demolished and removed as part of Operation Clean Sweep. In 1997, approximately 18 inches of clean soil was spread over the site and the entire area graded.

### **2.7 Nature and Extent of Contamination**

This section of the ROD establishes that there are no CERCLA COCs at the four Bear Creek RRS ERP sites addressed in this ROD by comparing investigation results to applicable regulatory cleanup levels. The regulatory framework establishing applicable cleanup levels is discussed below, followed by a summary of environmental investigation results.

#### 2.7.1 Regulatory Framework

The state of Alaska has promulgated soil and groundwater cleanup levels in 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations (revised as of October 9, 2008) (ADEC, 2008a). Surface water standards are provided in 18 AAC 70 Alaska Water Quality Standards (as amended through July 1, 2008) (ADEC, 2008b). These regulations are discussed in further detail below.

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

Method Two tabulated soil cleanup levels are provided in 18 AAC 75.341 Table B1 and B2 (Under 40-inch precipitation zone) (hereinafter referred to as ADEC Method Two cleanup

levels) for protection of three exposure pathways: migration to groundwater, outdoor inhalation, and direct contact (ingestion and dermal contact)<sup>1</sup>. The Method Two cleanup levels are protective for unlimited use and unrestricted exposure<sup>2</sup> and are appropriate for use at Bear Creek RRS except when media- and site-specific cleanup levels were calculated under Method Three. The migration to groundwater pathway is not considered a complete exposure pathway at Bear Creek RRS, because groundwater has not been encountered at Sites SS002, SS003, and SS006 and there is no evidence of groundwater contamination at Site SS008.

The ADEC Method Two soil cleanup level (for a residential use scenario) for PCBs is 1 milligram per kilogram (mg/Kg), which is consistent with the Toxic Substances Control Act (TSCA; 40 CFR 761). TSCA allows cleanup of surface soil PCBs to 1 mg/Kg in high occupancy areas (which includes a residential scenario) for no further restrictions on the site.

Cleanup levels for the Bear Creek sites are summarized below.

- ADEC Method Two soil cleanup levels (lower of the ingestion/direct contact or outdoor inhalation pathways) were selected as cleanup levels for Sites SS002, SS003, SS006, and, for everything except Diesel Range Organics (DRO) in soil at SS008.
- A site-specific ADEC Method Three cleanup level of 2,500 mg/Kg (calculated in the 2005-06 RI) was selected for DRO in soil at SS008.

Groundwater: Tabulated groundwater cleanup levels provided in ADEC 18 AAC 75.345 Table C (hereinafter referred to as ADEC Table C cleanup levels) are appropriate for use at Site SS008. As discussed previously, groundwater has not been encountered at the main Bear Creek RRS installation. The ADEC Table C cleanup levels are considered protective for drinking water.

Surface Water: Surface water criteria provided in ADEC 18 AAC 70 (Alaska Water Quality Standards [ADEC, 2008b]) are appropriate for surface water at Bear Creek RRS. These levels are protective of human health (water supply and water recreation uses) and the environment (aquatic life and wildlife propagation).

Sediments: Although there are no sediment cleanup levels established in regulation, Alaska water quality regulations (18 AAC 70) state that sediment contamination may not cause adverse effects on aquatic life. ADEC has also published a Technical Memorandum entitled Sediment Quality Guidelines (SQG) (ADEC, 2004), which provides guidance for evaluating chemicals of concern (COC) in sediment. The Technical Memorandum recommends screening sediment sample results against TEL (Threshold Effects Level) and PEL (Probable Effects Level) values, as published in the National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQiRTs) (Buchman, 1999). In the event that TEL/PEL values are not listed

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<sup>1</sup> For bulk hydrocarbons (i.e., GRO, DRO, and RRO), Method Two cleanup levels are provided for the migration to groundwater, inhalation, and ingestion pathways. Throughout this ROD, when text refers to both bulk hydrocarbons and individual chemicals, the ingestion and direct contact pathways will be referenced as ingestion/direct contact, where the "ingestion" pathway is applicable to bulk hydrocarbons listed in Table B2, and the "direct contact" pathway is applicable to individual chemicals listed in Table B1.

<sup>2</sup> Method Two soil cleanup levels are considered protective of human health; ecological protectiveness is evaluated on a site-by-site basis. The ecological risk evaluation indicated that contamination from the subject sites has not adversely affected the environment, nor would it be expected to do so in the future.

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for a COC, “then alternative published screening levels may be proposed and reviewed by the department on a site-specific basis.” One source of alternative published screening levels is Oak Ridge National Laboratories (ORNL), which has published Sediment Quality Benchmarks (SQBs) (Jones et al, 1997).

### 2.7.2 Naturally-Occurring Metals

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

Sample results for metals in soil, groundwater, surface water, and sediment were evaluated using the multiple lines of evidence approach to evaluate which metals potentially represent contamination and which metals reflect natural conditions.

Based on the multiple lines of evidence approach, the following conclusions were reached about metals at Bear Creek RRS (USAF, 2007).

- Some fuel contains lead; therefore, lead is considered a potential contaminant at Bear Creek RRS. However, lead was not detected above its residential ADEC Method Two cleanup level in any representative soil samples collected from the four subject Bear Creek RRS ERP sites, so lead is not a contaminant of concern for these sites.
- Elevated levels of arsenic in soil were considered to be naturally-occurring. Arsenic is frequently detected at elevated levels across Alaska. Specifically at Bear Creek RRS, arsenic has been consistently detected at concentrations above the ADEC Method Two cleanup level. Furthermore, there is no evidence of USAF use of chemicals containing arsenic at Bear Creek RRS.
- Chromium in soil was considered to be naturally-occurring. At Bear Creek RRS, chromium has been consistently detected at concentrations near and slightly above the most conservative ADEC Method Two cleanup level<sup>3</sup>. The pattern of chromium detections at Bear Creek RRS is consistent with naturally-occurring chromium, i.e., no hot spots of elevated chromium detections that would suggest contamination from human sources.

### 2.7.3 Data Screening Process

To determine the nature and extent of contamination at the Bear Creek RRS ERP sites, analytical results from all previous site investigation activities were screened against soil, groundwater,

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<sup>3</sup> Chromium(III) occurs naturally in the environment and is an essential nutrient. Chromium (VI) and chromium(0) are generally produced by industrial processes. The metal chromium, which is the chromium(0) form, is used for making steel. Chromium(VI) and chromium(III) are used for chrome plating, dyes and pigments, leather tanning, and wood preserving. ADEC has promulgated Method Two cleanup levels for chromium (VI) (i.e., 26 mg/Kg for migration to groundwater and 300 mg/Kg for ingestion) and chromium (III) (i.e., >10<sup>6</sup> mg/Kg for migration to groundwater and 150,000 mg/Kg for ingestion). Laboratory analysis does not differentiate between chromium (VI) and chromium (III); therefore, to be conservative, the lower (chromium (VI)) cleanup level was used for screening sample results.



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surface water, or sediment screening levels. Screening levels were established in accordance with ADEC regulations discussed in Section 2.7.1 and are explained below.

- Soil results were screened against 1/10 of the ADEC Method Two inhalation or ingestion/direct contact cleanup levels. In accordance with the ADEC Cumulative Risk Guidance (ADEC, 2008c), analytes detected above 1/10 of the ADEC Method Two inhalation and ingestion/direct contact soil cleanup levels should be retained for cumulative risk calculations.
- Groundwater results were screened against 1/10 of the Table C groundwater cleanup levels.
- Surface water results were screened against 18 AAC 70 water quality standards.
- Sediment results were screened against NOAA TEL/PEL screening levels for sediments.

Analytical results screening levels were considered to represent potential contamination and were included in cumulative risk calculations (see Section 2.8.3). Based on the screening process described above, the following analytes were considered to represent potential contamination at one or more Bear Creek RRS sites.

- Soil: DRO, gasoline-range organics (GRO), residual-range organics (RRO), volatile organic compounds (VOCs-1,3,5-trimethylbenzene [TMB] and naphthalene), semi-volatile organic compounds (SVOCs-naphthalene), and PCBs (Note: arsenic and chromium were not considered naturally-occurring metals, not potential contamination, as explained in Section 2.7.2)
- Groundwater: none
- Surface Water: none
- Sediment: none

The following sections of this ROD present detailed investigation summaries for each site. These investigation summaries support the conclusion that there are no CERCLA COCs at any of the subject sites of this ROD and that petroleum hydrocarbons have not been detected above ADEC Method Two or, for DRO at Site SS008, Method Three cleanup levels protective of human health.

#### 2.7.4 Former Vehicle Maintenance Shop (SS002)

##### 2.7.4.1 Contamination Extent

Based on the 1985 excavation confirmation results and 1998 RI sample results, the soil at Site SS002 is considered to meet ADEC Method Two cleanup levels protective of the inhalation and ingestion/direct contact pathways (**Figure 2-4**).

##### 2.7.4.2 Investigation Summary

Soil samples were collected from SS002 during environmental investigations in 1992 and 1998. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 2-4**. There is some residual petroleum contamination at Site SS002 that is above ADEC Method Two cleanup levels protective of the migration to groundwater pathway (i.e., 250

mg/Kg DRO); however, this residual contamination does not pose any risk to human health or the environment. The area of residual contamination at SS002 and SS003 is shown on **Figure 2-4** for documentation purposes.

In 1992, two surface soil samples were collected from the floor drains and sumps within the vehicle maintenance shop and analyzed for DRO, VOCs, and metals (USAF, 1993). Although lead and DRO were detected in both samples at concentrations exceeding ADEC Method Two cleanup levels, these samples are not representative of current site conditions, because the floor drains and sumps from which the samples were collected were later demolished and removed with the vehicle maintenance shop.

In 1998, twenty soil screening samples were collected below the soil placed in 1997 and field-screened for total petroleum hydrocarbons (TPH), PCBs, and/or pesticides (USAF, 1999). Based on the soil screening results, seven soil borings were advanced, and fifteen soil samples (plus duplicates) were collected from the borings. Three additional surface (i.e., below soil placed in 1997) soil samples were collected. The samples were analyzed for DRO, GRO, RRO, VOCs, SVOCs, metals, PCBs, and pesticides. Soil sample results for all analytes detected above 1/10 of the ADEC Method Two (inhalation or ingestion/direct contact pathway) cleanup levels are displayed in **Table 2-4**<sup>4</sup>. As shown in **Table 2-4**, all soil sample results from the 1998-99 RI were below ADEC Method Two cleanup levels (inhalation and ingestion/direct contact pathways).

**Table 2-4: Vehicle Maintenance Shop (SS002) 1998 RI Soil Sample Summary**

	ADEC Method Two Cleanup Level* (mg/Kg)	Number of Samples**	Number of Detections	Number Detect. Above Cleanup Level	Maximum Detection (mg/Kg)
DRO	10,250	22	11	0	10,000
GRO	1,400	22	9	0	910
RRO	10,000	22	<i>All below 1/10 of Method 2 Cleanup Level</i>		
VOC (1,3,5-TMB)	42	22	6	0	4.8
VOC (1,2,4-TMB)	49	22	6	0	8.7
VOC (Naphthalene)	28	22	9	0	16
SVOC (Naphthalene)	28	22	9	0	18
Pesticides	<i>various</i>	10	<i>All below 1/10 of Method 2 Cleanup Level</i>		
PCBs	1 (Residential)	22	<i>Not Detected</i>		
Metals	<i>various</i>	22	<i>All below 1/10 of Method 2 Cleanup Level or naturally-occurring</i>		

\* Lower of outdoor inhalation or injection/direct contact pathway cleanup levels.

\*\* Number of samples includes field duplicates.

Although there is no groundwater present at Bear Creek RRS (as discussed in Section 2.5.3), transient pore water was encountered during the installation of soil borings at SS002. The pore water represents a discontinuous volume of water trapped in the pore spaces of subsurface soil and bedrock material. USAF attempted to collect pore water samples from a thin (less than 1-foot thick) saturated interval observed in three of the soil borings (at depths of approximately 25, 19, and 16 feet bgs) by leaving the soil borings open for 30 minutes and allowing water to seep into them. Only one soil boring (MFSB-06) contained enough water to collect a pore water

<sup>4</sup> 1992 sample results are not shown in Table 2-4, because the samples were collected from floor drains that were subsequently demolished and removed with the Vehicle Maintenance Shop.

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sample after 30 minutes. The pore water sample was analyzed for GRO, DRO, RRO, PCBs, pesticides, BTEX, VOCs, and SVOCs. It contained elevated concentrations of DRO (58 mg/L) and several VOCs (i.e., benzene at 0.012 mg/L and trichloroethene (TCE) at 0.016 mg/L). Since the pore water is not connected to a permanent or continuous groundwater body, there is no migration or exposure risk associated with the pore water. The pore water does not pose an unacceptable risk to human health or the environment.

## 2.7.5 Former Fuel Storage Area (SS003)

### 2.7.5.1 Contamination Extent

Based on the 1998 sample results, there is no contamination above ADEC Method Two cleanup levels protective of the inhalation and ingestion/direct contact pathways at Site SS003 (**Figure 2-4**). There is some residual petroleum contamination at Site SS003 that is above ADEC Method Two cleanup levels protective of the migration to groundwater pathway (i.e., 250 mg/Kg DRO); however, this residual contamination does not pose any risk to human health or the environment. The area of residual contamination at SS002 and SS003 is shown on **Figure 2-4** for documentation purposes.

### 2.7.5.2 Investigation Summary

Soil samples were collected from SS003 during environmental investigations in 1992 and 1998. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 2-4**.

In 1992, six surface soil samples from SS003 were analyzed for DRO (USAF, 1993). Low concentrations of DRO were detected in five of the six samples (maximum concentration of 640 mg/Kg); in the sixth sample, collected outside the tank berm near a fuel pump, DRO were detected at 31,000 mg/Kg.

In 1998, eighteen soil screening samples were collected below the 1997 clean soil cover and field-screened for TPH or pesticides or both (USAF, 1999). Based on the 1992 sample results and 1998 screening results, five soil borings were drilled to collect 12 soil samples for laboratory analysis. In addition, two surface (below the 1997 soil cover) soil samples were collected from hand auger locations. Soil samples were analyzed for fuels, metals, PCBs, VOCs, SVOCs, and pesticides. The maximum DRO detection was 4,200 mg/Kg (versus the ADEC Method Two cleanup level of 10,250 mg/Kg). Soil sample results for all analytes detected above 1/10 of their ADEC Method Two cleanup levels are displayed in **Table 2-5**<sup>5</sup>. As shown in **Table 2-5**, all soil sample results from the 1998-99 RI were below ADEC Method Two cleanup levels.

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<sup>5</sup> 1992 sample results are not shown in Table 2-5, because the samples were analyzed by an outdated method that is not directly comparable to the current analytical method (AK102 for DRO).

**Table 2-5: Former Fuel Storage Area (SS003) 1998 RI Soil Sample Summary**

	ADEC Method Two Cleanup Level* (mg/Kg)	Number of Samples	Number of Detections	Number Detect. Above Cleanup Level	Maximum Detection (mg/Kg)
DRO	10,250	15	10	0	4200M
GRO	1,400	9	7	0	360M
RRO	10,000	15	<i>All below 1/10 of Method 2 Cleanup Level</i>		
VOC (1,2,4-TMB)	49	9	4	0	5.1J
VOC (Naphthalene)	28	9	6	0	7.2
SVOC (Naphthalene)	28	9	3	0	23
Pesticides	<i>various</i>	3	<i>All below 1/10 of Method 2 Cleanup Level</i>		
Metals	<i>various</i>	15	<i>All below 1/10 of Method 2 Cleanup Level or naturally-occurring</i>		

\* Lower of outdoor inhalation or ingestion/direct contact pathway cleanup levels.

M = matrix effect may be present

## 2.7.6 Former Barrel Storage Area (SS006)

### 2.7.6.1 Contamination Extent

Based on the 1998 sample results, there is no contamination above ADEC Method Two cleanup levels (protective of the inhalation and ingestion/direct contact pathways) at site SS006.

### 2.7.6.2 Investigation Summary

In 1998, a soil sampling grid was established across the Barrel Storage Area, and 24 surface soil screening samples were field-screened for TPH, PCBs, and pesticides (USAF, 1999). Based on two positive field-screening results for PCBs, two soil borings were drilled. Two surface and two subsurface soil samples were collected for laboratory analysis for GRO, DRO, RRO, benzene, toluene, ethylbenzene, and xylenes (BTEX), PCBs, VOCs, SVOCs, and metals. The surface soil samples were also analyzed for pesticides. No sample results exceeded 1/10 of the ADEC Method Two soil cleanup levels, except chromium, which was detected in one sample at 31 mg/Kg (just exceeding 1/10 of the ADEC Method Two cleanup level of 300 mg/kg) and was interpreted to reflect naturally-occurring conditions.

## 2.7.7 POL Site by the Yukon River (SS008)

### 2.7.7.1 Contamination Extent

Based on the 1998 and 2005 sample results, there is no contamination above applicable cleanup levels at site SS008 (**Figure 2-6**). In soil, the exposure point concentration (EPC<sup>6</sup>) for DRO is below the ADEC Method Three DRO cleanup level of 2,500 mg/Kg, and concentrations of all other analytes are below Method Two cleanup levels. There is some residual petroleum contamination at Site SS008 that is above ADEC Method Two cleanup levels protective of the migration to groundwater pathway (i.e., 250 mg/Kg DRO); however, this residual contamination does not pose any risk to human health or the environment. The area of residual contamination at SS008 is shown on **Figure 2-5** for documentation purposes.

<sup>6</sup> The EPC was calculated from the 95% Upper Confidence Level (UCL) of the mean DRO concentration detected in 1998 and 2005, as discussed below in Section 2.7.7.2.

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In groundwater, concentrations of all analytes are below Table C cleanup levels.

#### 2.7.7.2 Investigation Summary-Soil

Soil samples were collected from SS008 during environmental investigations in 1996, 1998, and 2005. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 2-6**. Soil sample results for all analytes detected above 1/10 of the ADEC Method Two cleanup level are displayed in **Table 2-6**.

In 1996, nine surface and shallow subsurface soil samples were collected at the former POL Site and analyzed by EPA Method 8100M for DRO and Method 8015M for GRO (USAF, 1996a). Four soil samples were collected from within the bermed POL area, three samples were collected from an apparent borrow pit east of the POL site, and two samples were collected along the Yukon River downgradient of the site. The maximum DRO detection was 3,107 mg/Kg in a sample directly below the former 3,000-barrel AST. All other sample results were below the ADEC Method Three cleanup level of 2,500 mg/Kg for DRO. GRO were detected in only one soil sample below the ADEC Method Two cleanup level of 1,400 mg/Kg.

In 1998, a soil sampling grid was established across the former POL Site (USAF, 1999). The grid was centered on the former 3,000-barrel fuel oil AST. Twenty-five surface soil samples were field-screened for TPH and pesticides. Field-screening results for TPH and/or pesticides were positive in three of the twenty-five samples. To obtain laboratory confirmation of the field-screening results, follow-up soil samples were collected from two surface soil (hand-auger) locations and four soil borings. One of the surface samples was analyzed for pesticides, the other was analyzed for GRO, DRO, RRO, BTEX, VOCs, SVOCs, and metals. Eight subsurface soil samples were analyzed for GRO, DRO, RRO, BTEX, VOCs, SVOCs, and metals; four of the samples were also analyzed for pesticides.

The maximum DRO result was 5,800 mg/Kg in a sample collected at a depth of 3 to 4 feet bgs underneath the former 3,000-barrel AST (located within the bermed area). A deeper sample (15-16.5 feet bgs) from the same soil boring showed only trace levels of DRO, indicating that hydrocarbon contamination had not migrated to this depth. No other DRO results exceeded the ADEC Method Three cleanup level.

In 2005, 16 soil borings were advanced at the former POL Site (USAF, 2007). A total of 28 subsurface soil samples were collected and analyzed for GRO, DRO, RRO, VOCs, and lead. Three surface soil samples were also collected from a drainage area to the west of the former POL site and analyzed for GRO, DRO, RRO, VOCs, and lead. One sediment sample was collected from the Yukon River sediments and analyzed for lead, polynuclear aromatic hydrocarbons (PAHs), and VOCs.

The maximum DRO detection was 354 mg/Kg (located within the bermed area). No contamination was detected above the ADEC site-specific Method Three cleanup level for DRO or ADEC Method Two soil cleanup levels for all other analytes.

In the 2007 RI, the 95 percent upper confidence limit (UCL) of the mean DRO concentration (793 mg/Kg) was calculated from the 1998 and 2005 sample results<sup>7</sup> to determine a

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<sup>7</sup> The 1996 DRO data were not included in the UCL calculations because the 1996 analytical method is now considered outdated and not directly comparable to the current analytical method.

representative exposure point concentration (EPC) for DRO in soil at SS008. The EPC of 793 mg/Kg is below the 2,500 mg/Kg Method Three cleanup level for DRO.

**Table 2-6: POL Site by the Yukon River (SS008) Soil Sample Summary**

	Applicable Cleanup Level (1) (mg/Kg)	Number of Samples	Number of Detections	Number Above Applicable Cleanup Level	Maximum Detection (mg/Kg)
<b>1996 Soil Samples</b>					
DRO	2,500	9	9	1	3,107
GRO	300	9	1	0	68.3
<b>1998 Soil Samples</b>					
DRO	2,500	10	5	1	5,800M*
GRO	300	10	1	0	120M
RRO	10,000	10	<i>All below 1/10 of Method Two Cleanup Level</i>		
VOCs	<i>various</i>	10	<i>All below 1/10 of Method Two Cleanup Level</i>		
SVOCs	<i>various</i>	10	<i>All below 1/10 of Method Two Cleanup Level</i>		
Pesticides	<i>various</i>	5	<i>All below 1/10 of Method Two Cleanup Level</i>		
Metals	<i>various</i>	10	<i>All below 1/10 of Method Two Cleanup Level or Naturally-Occurring</i>		
<b>2005 Soil Samples</b>					
DRO	2,500	31	3	0	354*
GRO	300	31	<i>All below 1/10 of Method Two Cleanup Level</i>		
RRO	10,000	31	<i>All below 1/10 of Method Two Cleanup Level</i>		
Lead	400	31	<i>All below 1/10 of Method Two Cleanup Level</i>		
VOCs	<i>various</i>	31	<i>None Detected</i>		

(1) ADEC Method Three Cleanup Level of 2,500 mg/Kg for DRO; For all other analytes, ADEC Method Two Cleanup Level (protective of migration to groundwater, inhalation, and ingestion/direct contact pathways).

\* A 95% Upper Confidence Limit (UCL) of the mean DRO concentration (793 mg/Kg) was calculated for the 1998 and 2005 samples. The 95% UCL (793 mg/Kg) is considered the exposure point concentration for DRO at SS008.

\*\*Metals detections are considered to represent naturally-occurring conditions.

M = matrix effect may be present

F=detected concentration is below method reporting limit (MRL) but above method detection limit (MDL)

### 2.7.7.3 Investigation Summary-Groundwater

Groundwater samples were collected from SS008 in 1998 and 2005. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 2-6**. Groundwater sample results for all analytes detected above 1/10 of the ADEC Table C cleanup level are displayed in **Table 2-7**.

In 1998, all four soil borings encountered groundwater between 19.5 feet bgs and 23.5 feet bgs (USAF, 1999). Two monitoring wells were installed and sampled for GRO, DRO, RRO, BTEX, VOCs, SVOCs, and metals. None of the groundwater results (except metals, which are considered to represent naturally-occurring conditions) exceeded 1/10 of the ADEC Table C groundwater cleanup levels (**Table 2-7**).

In 2005, three of the 16 soil borings were converted into monitoring wells (USAF, 2007). The three new and two existing monitoring wells were sampled for GRO, DRO, RRO, VOCs, and

lead. None of the groundwater results exceeded 1/10 of the ADEC Table C cleanup levels (**Table 2-7**).

**Table 2-7: POL Site by the Yukon River (SS008) Groundwater Sample Summary**

	ADEC Table C Cleanup Level (mg/L)	Number of Samples	Number of Detections	Number Detect. Above Cleanup Level	Maximum Detection (mg/L)
<b>1998 Groundwater Results</b>					
GRO	2.2	2			All below 1/10 of Cleanup Level
DRO	1.5	2			All below 1/10 of Cleanup Level
RRO	1.1	2			All below 1/10 of Cleanup Level
VOCs	various	2			None Detected
SVOCs	various	2			All below 1/10 of Cleanup Level
Pesticides	various	2			All below 1/10 of Cleanup Level
Metals	various	2			All below 1/10 of Cleanup Level or Naturally-Occurring
<b>2005 Groundwater Results</b>					
DRO	1.5	5			None Detected
GRO	1.3	5			None Detected
RRO	1.1	5			None Detected
VOCs	various	5			None Detected
PAHs	various	5			None Detected
Lead	15	5			All below 1/10 of Cleanup Level

\*Metals detections are considered to represent naturally-occurring conditions.

F=detected concentration is below method reporting limit (MRL) but above method detection limit (MDL)

#### 2.7.7.4 Investigation Summary-Surface Water and Sediment Sampling

In 1998, two sediment and surface water samples were collected from a gravel pit adjacent to the Former POL Site by the Yukon River (USAF, 1999). The samples were analyzed for DRO, RRO, VOCs, SVOCs, pesticides, and metals. None of the sediment or surface water results exceeded sediment benchmark screening levels or ADEC water quality standards<sup>8</sup>.

In 2005, one sediment sample was collected from the north bank of the Yukon River adjacent to the Former POL Site by the Yukon River (USAF, 2007). The sample was field screened and submitted for laboratory analysis for VOCs, lead, and PAHs. No PAHs or VOCs were detected in the sample, and lead was detected at 5.04 mg/Kg (versus the 35 mg/Kg TEL sediment screening level).

## 2.8 Current and Potential Future Land and Resource Uses

### 2.8.1 Land Use

USAF uses the former Bear Creek RRS for environmental restoration purposes only. The facility has been abandoned for many years and has no designated land use. Local residents have

<sup>8</sup> One surface water detection, bis(2-ethylhexyl) phthalate at 0.015 milligrams per liter (mg/L), exceeded the water quality standard of 0.006 mg/L. However, bis(2-ethylhexyl)phthalate is a plasticizer that is a common laboratory contaminant and would be an unusual contaminant to find at a POL storage area, so the detection is not considered to be representative of site conditions.

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unrestricted access to the former Bear Creek RRS lands for subsistence and recreational purposes.

USAF has identified Bear Creek RRS to be “excess to their needs” and plans to relinquish control of the property. Because USAF does not plan to retain control of Bear Creek RRS, residential (unrestricted) land use is assumed as the future land use scenario.

## 2.8.2 Ground and Surface Water Uses

As discussed in Sections 2.5.3 and 2.5.4, groundwater and surface water have not been encountered at the former Bear Creek RRS. However, both groundwater and surface water (the Yukon River) are present near Site SS008.

There is no evidence of groundwater contamination associated with Site SS008. There are several private drinking water wells between Site SS008 and the town of Tanana, and the town of Tanana uses groundwater for its public water supply.

There is no evidence of surface water contamination associated with Site SS008. Surface water is used for aquatic life and wildlife propagation. The surface water is not currently being used as for water supply purposes, and there are no plans to develop surface water as a drinking water source (although all surface water that has not been otherwise classified is considered a potential water supply source by the state of Alaska [per 18 AAC 70]).

## 2.8.3 Conceptual Exposure Model

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

Potentially complete current and future exposure pathways are summarized below and shown on a graphic Human Health Conceptual Site Model (CSM) for Sites SS002, SS003, SS006, and SS008 (**Figure 2-6**). Although access to the former Bear Creek RRS is unrestricted, and local residents use the area for recreation and subsistence purposes, the “ingestion of wild foods” exposure pathway is not considered complete. In accordance with the ADEC CSM guidance (ADEC, 2005), the ingestion of wild foods pathway is only of concern with contaminants that have the potential to bioaccumulate (i.e., progressively build up over time in the food chain). None of the chemicals of potential concern at the subject sites are included in the list of bioaccumulative compounds provided in Appendix A of the CSM Guidance.

- Current land use (recreational and subsistence use): Only one potentially complete exposure pathway (outdoor air inhalation). There is no surface soil contamination; the four subject sites have all been covered with approximately 18 inches of clean fill. There is no complete exposure pathway to subsurface soil contamination under recreational and subsistence use scenarios. There is no complete exposure pathway to groundwater. Groundwater has not been encountered at Sites SS002, SS003, or SS006, and no groundwater contamination was detected at Site SS008.



- Potential future land use (residential or industrial use): Exposure to subsurface soil contamination (ingestion, inhalation, and dermal contact) would be possible during inadvertent or intentional excavation activities.

## 2.9 Summary of Site Risks

This section summarizes the human health and ecological risk evaluations that have been performed at the four Bear Creek RRS ERP sites addressed in this ROD. The individual risk posed by each chemical, and cumulative risk posed by all chemicals detected at each site, are below published risk levels. No cleanup is required to protect human health or the environment at the subject sites. Human Health Risk Assessment

Potential risk due to contamination at the subject Bear Creek ERP sites was evaluated in the 1999 and 2007 RI reports, and the risk evaluations were updated (during preparation of the Proposed Plan) for each subject site of this ROD to evaluate whether potential exposure pathways are complete and whether cumulative risks from multiple chemicals are above threshold levels. In accordance with ADEC regulations (18 AAC 75.325(g)) and Cumulative Risk Guidance (ADEC, 2008c), the cumulative effects of exposure to all contaminants detected at a site must be evaluated to ensure that the risk standards are not exceeded.

Individual detected chemical concentrations and total (cumulative) risk posed by all chemicals at each subject site were compared to published risk levels considered acceptable to ADEC. The published risk levels used for comparison with existing contamination levels are human health risk-based levels promulgated by the State of Alaska for soil based upon residential uses. The use of such promulgated standards for risk assessment is specifically allowed by NCP and EPA guidance (OSWER # 9355.0, *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*, April 1991).

**Chemicals of Concern:** Chemicals associated with unacceptable risk at a site are considered chemicals of concern (COCs). To determine whether there are any COCs at the four subject ERP sites, chemicals of potential concern (COPCs) were identified in accordance with ADEC Cumulative Risk Guidance (ADEC, 2008c). Per the guidance, all analytes detected at concentrations greater than 1/10 of the ADEC Method Two soil cleanup levels (inhalation and ingestion/direct contact pathways) are considered chemicals of potential concern and must be included in cumulative risk calculations. COPCs for one or more of the four subject Bear Creek RRS sites included DRO, GRO, RRO, 1,3,5-TMB, 1,2,4-TMB, and naphthalene in soil.

As discussed below under Risk Characterization, the individual risk posed by each chemical and cumulative risk posed by all chemicals detected at each site are below published risk levels. Since the chemical concentrations detected at the subject ERP sites do not pose unacceptable risk to human health, there are no COCs.

**Exposure Assessment:** This section documents the populations and exposure pathways that were quantitatively evaluated in the risk assessment.

As discussed in Section 2.8.3, the only complete exposure pathway based on current land use is inhalation of chemicals in soil by recreational/subsistence users. However, based on potential residential future land use, complete exposure pathways for future land use include inhalation and ingestion/direct contact of chemicals in soil by future residents and construction workers.

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The published ADEC risk-based concentrations (RBCs) used in the cumulative risk evaluation for the four subject Bear Creek RRS ERP sites are based on conservative default exposure assumptions (residential use and exposure parameters) that are protective of unlimited use and unrestricted exposure.

**Toxicity Assessment:** This section describes the carcinogenic and noncarcinogenic toxicity criteria used to calculate the potential risk for each COPC. RBCs published by ADEC (ADEC, 2008c) were used to characterize risk for 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and naphthalene. RBCs were calculated for DRO and RRO using Equations 16 and 17 in ADEC's Cleanup Level Guidance (ADEC, 2008d) with chemical-specific input parameters from Table 4 of the Cleanup Levels Guidance.

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

**Risk Characterization:** This section of the risk assessment combines the results of the exposure assessment with the toxicity criteria identified for the COCs. Carcinogenic risks and noncarcinogenic impacts for each COC are presented for all populations and media of interest, including both current and future land use settings (in the case of the six subject sites, there is no difference between current and future land use assumptions). Cumulative risks for all relevant pathways and populations are also described.

For carcinogens, risks are generally expressed as the incremental probability of an individual's likelihood of developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

Where:

Risk = a unitless probability (e.g.,  $2 \times 10^{-5}$ ) of an individual's likelihood of developing cancer

CDI = chronic daily intake averaged over 70 years (mg/Kg-day)

SF = slope factor, expressed as (mg/Kg-day)<sup>-1</sup>.

These risks are probabilities that usually are expressed in scientific notation (e.g.,  $1 \times 10^{-6}$  or  $1 \times 10^{-6}$ ). An excess lifetime cancer risk of  $1 \times 10^{-6}$  indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposure is  $10^{-4}$  to  $10^{-6}$ ; ADEC's threshold risk level is  $10^{-5}$ . ADEC Method Two criteria equate to a risk level of  $10^{-5}$  for residential exposure.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a daily individual intake that an individual may be exposed to that is

not expected to cause any deleterious effect. The ratio of site-related daily intake to the RfD is called a hazard quotient (HQ).

The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI/RfD}$$

Where: CDI = chronic daily intake

RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

An HQ < 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely.

The Hazard Index (HI) is generated by adding the HQs for all COCs at a site that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which an individual may reasonably be exposed. An HI < 1 indicates that adverse effects are unlikely from additive exposure to site chemicals. An HI > 1 indicates that site-related exposures may present a risk to human health.

## 2.9.2 Cumulative Risk Results

The cumulative risk results for the Former Vehicle Maintenance Shop (Site SS002) are presented in **Table 2-8**. As shown in **Table 2-8**, the individual risk posed by each chemical and cumulative risk posed by all chemicals detected at Site SS002 are below published risk levels<sup>9</sup>.

**Table 2-8: Former Maintenance Shop (SS002) Risk Summary**

	Max. Detected (mg/Kg)	RBC (mg/kg)	Exposure Pathway	HQ	Risk
DRO	10,000	10,139	Ingestion	1.0	
DRO	10,000	19,917	Inhalation	0.5	
1,3,5-Trimethylbenzene	4.8	5070	Direct Contact	0.0009	
1,3,5-Trimethylbenzene	4.8	43	Inhalation	0.1	
1,2,4-Trimethylbenzene	8.7	5070	Direct Contact	0.0017	
1,2,4-Trimethylbenzene	8.7	49	Inhalation	0.2	
Naphthalene	18	120	Inhalation	0.2	
Naphthalene	18	1,400	Direct Contact	0.013	
<i>Naphthalene</i>	18	28	<i>Inhalation (Cancer)</i>		6.E-06
	Cumulative HI ( <b>Threshold Level = 1</b> )			0.5	
	Cumulative Risk ( <b>Threshold Level = 10<sup>-3</sup></b> )				6.E-06

Notes:

RBC = Risk-based concentration

HQ = Hazard quotient

*Carcinogenic risk is italicized*

<sup>9</sup> Note that the noncancer risk due to all chemicals was summed in Table 2-9, without regard to the chemicals' target organ(s). The risk calculations were not separated by target organ, because the cumulative risk was below the published risk level without separation by target organ.

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No cumulative risk calculations were necessary or performed for Sites SS003, SS006, or SS008, because only one analyte at each site (i.e., DRO at SS003, naturally-occurring chromium at SS006, and DRO at SS008) was detected above 1/10 of its ADEC Method Two inhalation or ingestion/direct contact cleanup level but below its ADEC Method Two inhalation or ingestion/direct contact cleanup level.

#### 2.9.2.1 Basis for Action

Since the cumulative risk analysis showed no unacceptable risk to human health (using conservative default assumptions), no action is required at the subject sites of this ROD to protect public health or welfare.

### 2.9.3 Summary of Ecological Risk Assessment

Ecological risk was evaluated as part of the 1999 Bear Creek RI. The ecological risk evaluations did not find unacceptable ecological risk associated with chemicals present at the four subject ERP sites (SS002, SS003, SS006, and SS008).

In the 1999 RI report, the 1998 sample results were screened against ecological screening criteria to evaluate the potential for adverse health effects at the sites. For the four subject sites of this ROD, no analytes exceeded the ecological risk-based criteria.

## 2.10 Remedial Action Objectives

The overall objectives of Bear Creek 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. Remedial Action Objectives (RAOs) are the specific goals that the remedial action is designed to achieve (USEPA, 1988).

### 2.10.1 CERCLA

There are no CERCLA hazardous substances identified as COCs at the four subject sites, and no action is the appropriate remedy selected under CERCLA. Therefore, no RAOs were needed or developed under CERCLA.

### 2.10.2 State of Alaska Regulations

There were no petroleum hydrocarbons detected above applicable ADEC Method Two or Three cleanup levels at any of the four subject sites of this ROD, and petroleum detections do not pose unacceptable risk to human health or the environment. Therefore, no RAOs were needed or developed under State of Alaska Regulations for these sites.

## 2.11 Description of Alternatives

In accordance with EPA guidance on the preparing Records of Decision (USEPA, 1999), this Section is not applicable when documenting a No Action Decision when a CERCLA action is not necessary for the protection of human health or the environment.

## **2.12 Summary of Comparative Analysis of Alternatives**

In accordance with EPA guidance on the preparing Records of Decision (USEPA, 1999), this Section is not applicable when documenting a No Action Decision when a CERCLA action is not necessary for the protection of human health or the environment.

## **2.13 Principal Threat Wastes**

In accordance with EPA guidance on preparing Records of Decision (USEPA, 1999), this Section is not applicable when documenting a No Action Decision when a CERCLA action is not necessary for the protection of human health or the environment.

## **2.14 Selected Remedy**

### **2.14.1 Remedies Selected Under CERCLA**

No action is necessary under CERCLA to protect public health or welfare or the environment at any of the four sites addressed in this ROD.

### **2.14.2 Remedies Selected Under State of Alaska Regulations**

No action is necessary under Alaska State laws and regulations at any of the four sites except documentation of residual contamination remaining at Sites SS002, SS003, and SS008. The site status will become Cleanup Complete.

To address residual contamination at Sites SS002, SS003, and SS008, USAF will delineate the site boundaries and document residual contamination in the USAF Real Property Records. . USAF will also inspect the abandoned fuel pipeline at Site SS003 (in conjunction with work at other Bear Creek ERP sites). If the pipeline is found to contain product, then the contents will be emptied and properly disposed of. During transfer of the land, USAF will notify the future land owners that there is residual POL on the site.

## **2.15 Statutory Determinations**

### **2.15.1 CERCLA**

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

The selected remedy (no action) is protective of human health and the environment and complies with federal environmental laws and regulations, because there have been no CERCLA hazardous substances identified as COCs at the four subject Bear Creek RRS sites (SS002, SS003, SS006, and SS008).

The CERCLA requirements for cost-effectiveness and utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable are not applicable for a no-action final remedy.

Because there are no CERCLA hazardous substances identified as COCs at any of the four subject ERP sites, there is no statutory requirement for a five-year review.

### 2.15.2 Remedies Required Under State of Alaska Regulations

Petroleum hydrocarbons, which are exempt from CERCLA but considered hazardous substances under State of Alaska laws and regulations, are not present at concentrations above levels protective of unrestricted use allowed by Alaska regulations. There is no remedy required under 18 AAC 75.325-390.

#### 2.15.2.1 Protection of Human Health and the Environment

The four ERP sites addressed in this ROD do not pose unacceptable risk to human health or the environment; therefore, no remedy is necessary.

#### 2.15.2.2 Compliance with Alaska State Regulations

The chemical-specific, location-specific, and action-specific Alaska regulations applicable to the four ERP sites are listed in **Table 2-9**.

**Table 2-9: Action-Specific and Chemical-Specific Alaska State Regulations**

Citation	Description	Rationale
<b>Action-Specific</b>		
Alaska Oil and Other Hazardous Substance Pollution Control Regulations (as amended through October 9, 2008) 18AAC75.325(i) – Site Cleanup Rules	States that prior approval is required for disposal of soil or groundwater from a site that is subject to the site cleanup rules; or for which the ADEC has issued a written determination.	Any future activities involving excavation of site soil must receive ADEC approval prior to disposal of the excavated soil.
<b>Chemical-Specific</b>		
Alaska Oil and Other Hazardous Substance Pollution Control Regulations (as amended through October 9, 2008) 18 AAC 75.340 -.350 – Soil and Groundwater Cleanup Levels	Defines cleanup levels for hazardous substances in soil and groundwater.	The remedies must meet cleanup levels specified in 18 AAC 75.340-.350.
Toxic Substance Control Act (TSCA) (40 CFR 761)	Requires cleanup of surface soil PCBs to 1 mg/Kg in high occupancy areas (which includes a residential scenario) for no further restrictions on the site	The remedies must meet PCB cleanup levels specified in 40 CFR 761.

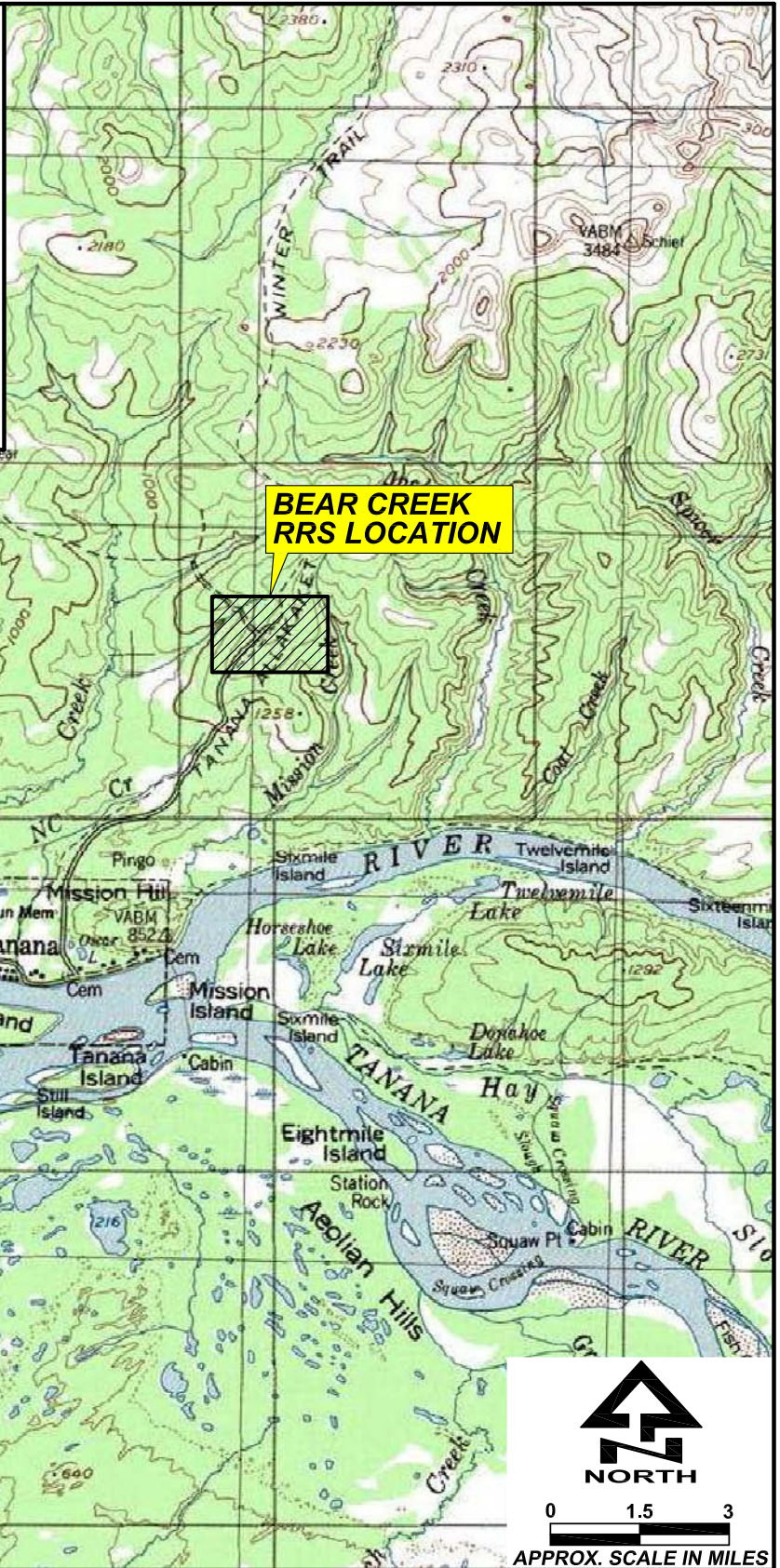
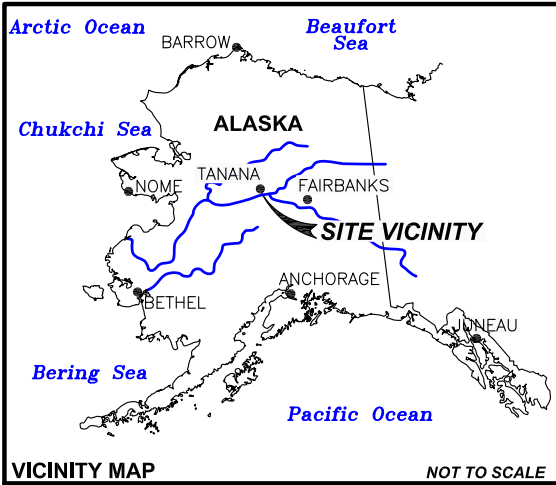
## 2.16 Documentation of Significant Changes

There are two changes from the remedies presented in the Proposed Plan that may be considered significant.

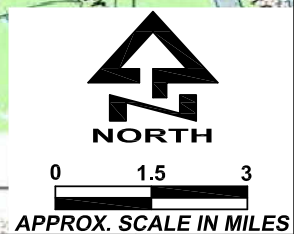
1. In the Proposed Plan, Institutional Controls (ICs) were proposed for Site SS008 to address soil contamination remaining at the site above the most stringent ADEC cleanup

levels (i.e., ADEC Method Two migration to groundwater pathway cleanup levels), in accordance with ADEC site closure policy at the time. However, since the Proposed Plan was issued, DEC has revised its site closure policy. Current DEC policy does not require ICs when remaining contamination does not pose a risk to human health or the environment.

2. The Proposed Plan stated that there was no contamination above cleanup levels at Site SS004 and therefore proposed no further action at this site. However, after publication of the Proposed Plan, it was discovered that PCBs are present in Site SS004 subsurface soil at concentrations between 1 mg/Kg and 10 mg/Kg. This information was found in the 1997 Clean Sweep soil excavation report, which is missing from the Administrative Record. Therefore Site SS004 was removed from this ROD and will be addressed in a separate Proposed Plan and ROD.



PATH: V:\Project Drawings\Paug-Vik\Bear-Creek\08\_BC ROD FILE: 78-025-ROD-F2-1.DWG PLOTTED: 11/17/08.



DATE	NOV. 2008
CHKD	J.P.
DRAWN	C.E.H.
PROJ. NO	5148.010

611TH AIR SUPPORT GROUP  
611TH CIVIL ENGINEER SQUADRON  
ELMENDORF AFB, ALASKA

**BEAR CREEK RRS  
LOCATION MAP**

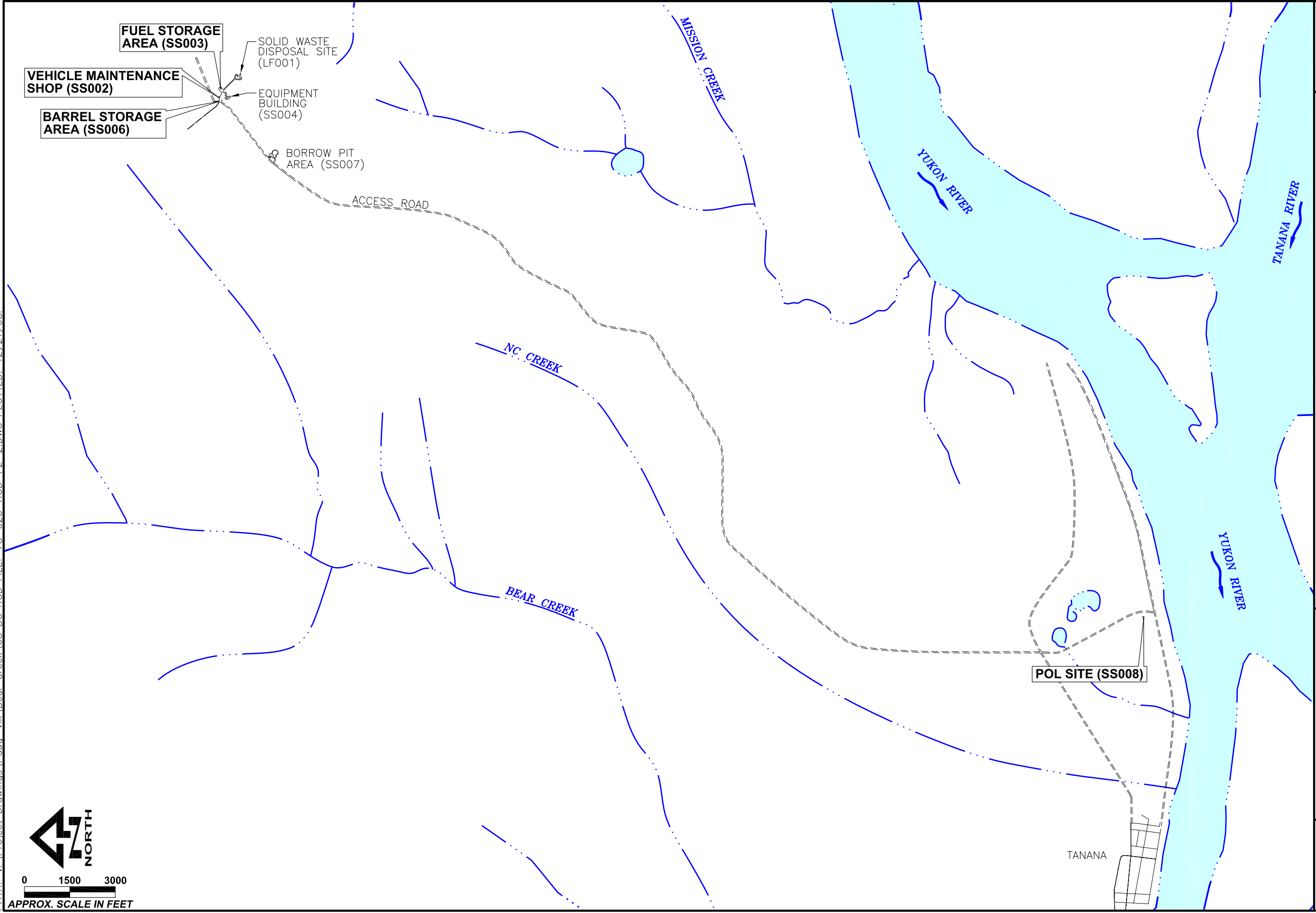
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RECORD OF DECISION FOR 4 SITES  
Bear Creek RRS, Alaska

FIGURE  
**2-1**



PATH: V:\Project Drawings\Paug-Vik\Bear\_Creek\08 BC ROD FILE: 78-025-ROD-F2-2.DWG PLOTTED: 12/21/08.



FIGURE

2-2

**BEAR CREEK RRS AND POL SITE BY THE  
YUKON RIVER**

RECORD OF DECISION FOR 4 SITES  
Bear Creek RRS, Alaska



611TH AIR SUPPORT GROUP  
611TH CIVIL ENGINEER SQUADRON  
ELMENDORF AFB, ALASKA

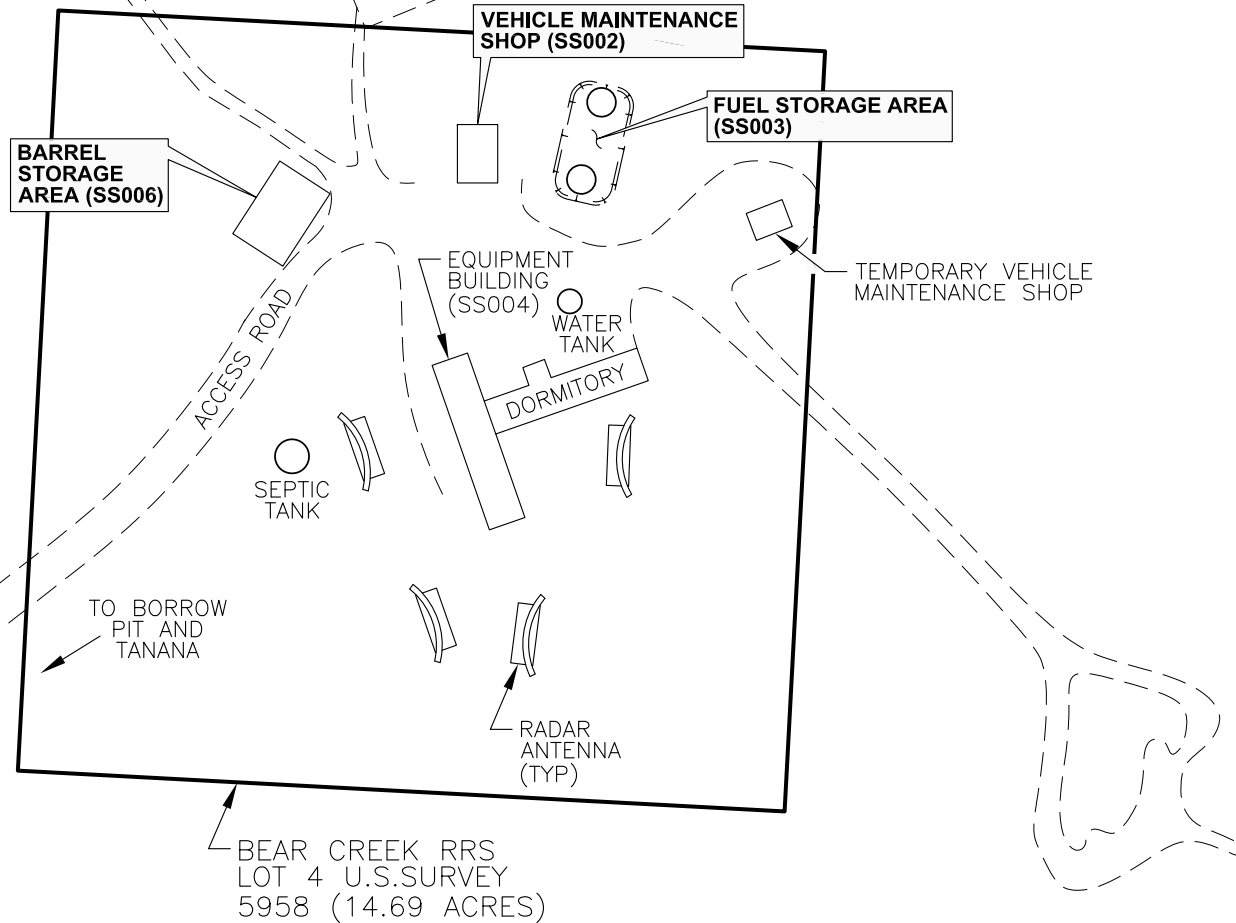
DATE  
DEC. 2008

CHKD  
J.P.

DRAWN  
C.E.H.

PROJ. NO  
5148.010

NOTE: ALL STRUCTURES REMOVED BETWEEN 1996 AND 1998.



DATE  
DEC. 2008  
CHKD  
J.P.  
DRAWN  
C.E.H.  
PROJ. NO  
5148.010



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ELMENDORF AFB, ALASKA

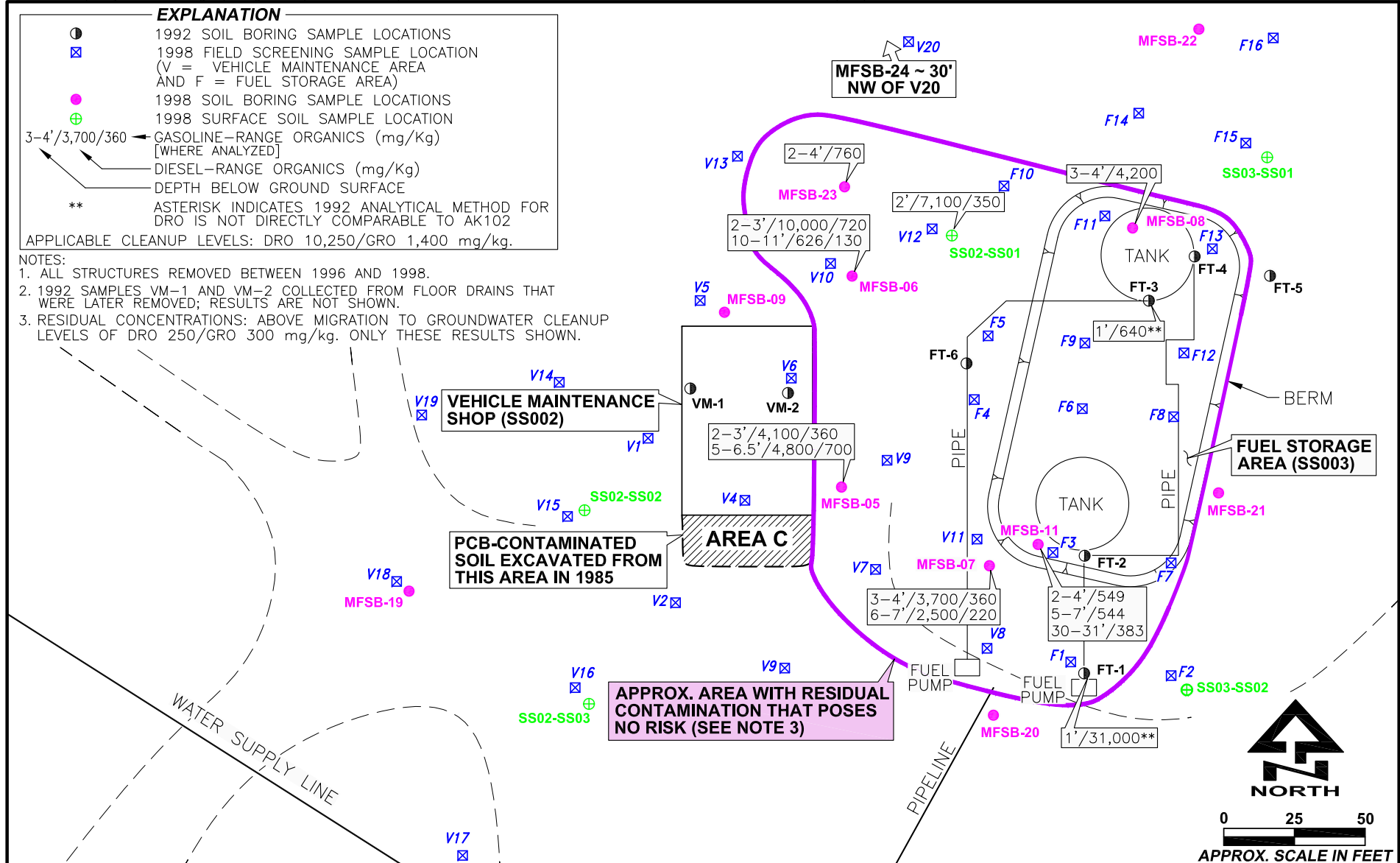
### ERP SITE LOCATIONS

RECORD OF DECISION FOR 4 SITES  
Bear Creek RRS, Alaska

FIGURE

2-3

0 100 200  
APPROX. SCALE IN FEET



DATE  
DEC. 2008

CHKD  
J.P.

DRAWN  
C.E.H.

PROJ. NO  
5148-010



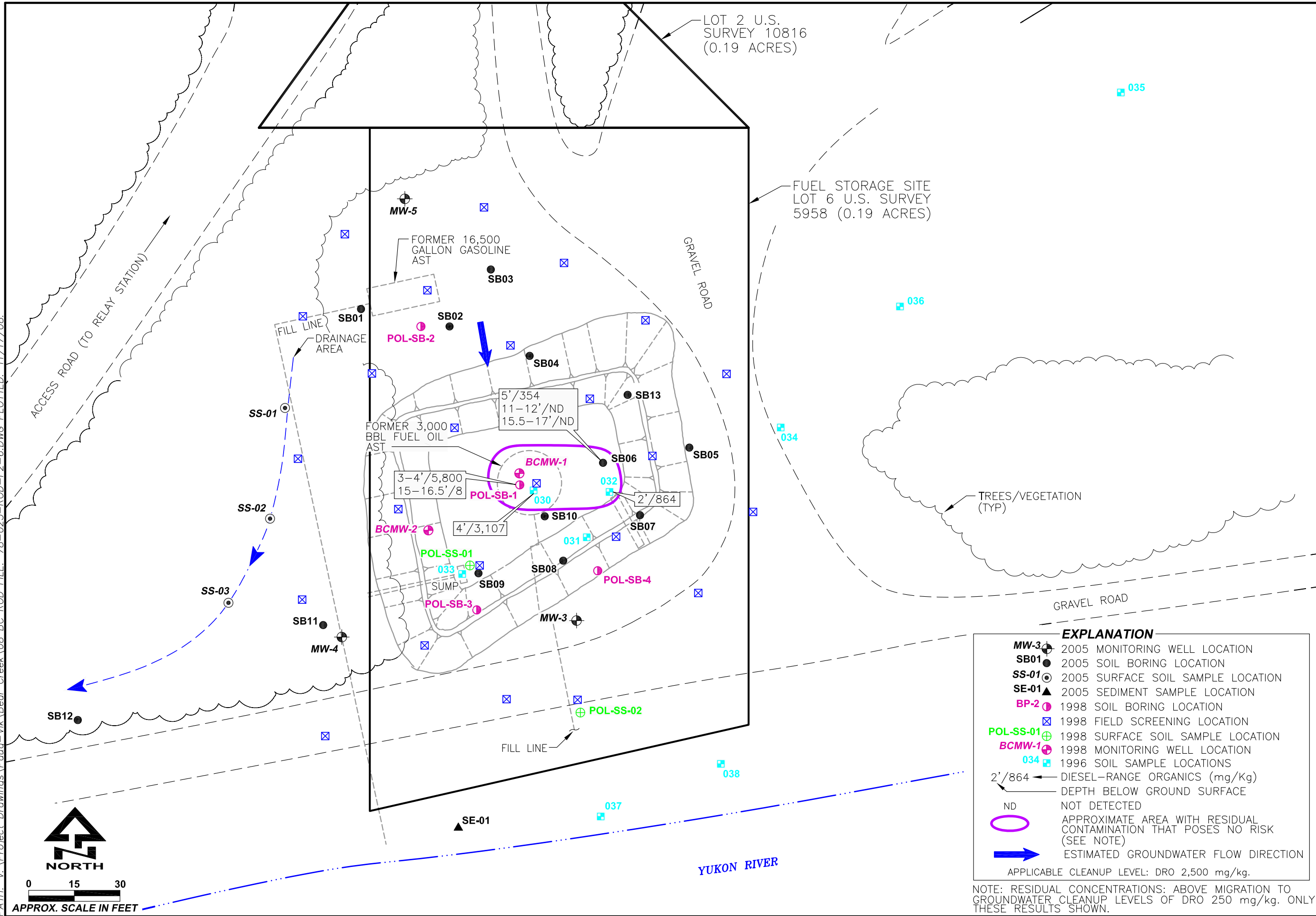
611TH AIR SUPPORT GROUP  
611TH CIVIL ENGINEER SQUADRON  
ELMENDORF AFB, ALASKA

**VEHICLE MAINTENANCE SHOP (SS002) AND  
FUEL STORAGE AREA (SS003)**

RECORD OF DECISION FOR 4 SITES  
Bear Creek RRS, Alaska

FIGURE  
**2-4**

PATH: V:\Project Drawings\Paug-Vik\Bear Creek\08 BC ROD FILE: 78-025-ROD-F2-6.DWG PLOTTED: 11/17/08.



**EXPLANATION**

MW-3	2005 MONITORING WELL LOCATION
SB01	2005 SOIL BORING LOCATION
SS-01	2005 SURFACE SOIL SAMPLE LOCATION
SE-01	2005 SEDIMENT SAMPLE LOCATION
BP-2	1998 SOIL BORING LOCATION
☒	1998 FIELD SCREENING LOCATION
POL-SS-01	1998 SURFACE SOIL SAMPLE LOCATION
BCMWS-1	1998 MONITORING WELL LOCATION
034	1996 SOIL SAMPLE LOCATIONS
2'/864	DIESEL-RANGE ORGANICS (mg/Kg)
	DEPTH BELOW GROUND SURFACE
ND	NOT DETECTED
○	APPROXIMATE AREA WITH RESIDUAL CONTAMINATION THAT POSES NO RISK (SEE NOTE)
➔	ESTIMATED GROUNDWATER FLOW DIRECTION

APPLICABLE CLEANUP LEVEL: DRO 2,500 mg/kg.

NOTE: RESIDUAL CONCENTRATIONS: ABOVE MIGRATION TO GROUNDWATER CLEANUP LEVELS OF DRO 250 mg/kg. ONLY THESE RESULTS SHOWN.



FIGURE  
**2-5**

**POL SITE (SS008)  
HISTORICAL SAMPLING LOCATIONS**

RECORD OF DECISION FOR 4 SITES  
Bear Creek RRS, Alaska

611TH AIR SUPPORT GROUP  
611TH CIVIL ENGINEER SQUADRON  
ELMENDORF AFB, ALASKA

DATE: NOV. 2008  
CHKD: J.P.  
DRAWN: C.E.H.  
PROJ. NO: 5148-010

# HUMAN HEALTH CONCEPTUAL SITE MODEL

Site: FIGURE 2-6: Bear Creek RRS Sites: SS002, SS003, SS006, and SS008

Completed By: Jane Paris

Date Completed: October 2008

**Follow the directions below. Do not consider engineering or land use controls when describing pathways.**

**(1)** Check the media that could be directly affected by the release.

**(2)** For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Briefly list other mechanisms or reference the report for details.

**(3)** Check exposure media identified in (2).

**(4)** Check exposure pathways that are complete or need further evaluation. The pathways identified must agree with Sections 2 and 3 of the CSM Scoping Form.

**(5)** Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, or "C/F" for both current and future receptors.

Media	Transport Mechanisms
<input type="checkbox"/> Surface Soil (0-2 ft bgs)	<input checked="" type="checkbox"/> Direct release to surface soil <i>check soil</i> <input type="checkbox"/> Migration or leaching to subsurface <i>check soil</i> <input type="checkbox"/> Migration or leaching to groundwater <i>check groundwater</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Runoff or erosion <i>check surface water</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____
<input checked="" type="checkbox"/> Subsurface Soil (2-15 ft bgs)	<input type="checkbox"/> Direct release to subsurface soil <i>check soil</i> <input type="checkbox"/> Migration to groundwater <i>check groundwater</i> <input checked="" type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Other (list): _____
<input type="checkbox"/> Ground-water	<input type="checkbox"/> Direct release to groundwater <i>check groundwater</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Flow to surface water body <i>check surface water</i> <input type="checkbox"/> Flow to sediment <i>check sediment</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____
<input type="checkbox"/> Surface Water	<input type="checkbox"/> Direct release to surface water <i>check surface water</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Sedimentation <i>check sediment</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____
<input type="checkbox"/> Sediment	<input type="checkbox"/> Direct release to sediment <i>check sediment</i> <input type="checkbox"/> Resuspension, runoff, or erosion <i>check surface water</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____

Exposure Media

Exposure Pathways

soil

groundwater

air

surface water

sediment

biota

<input checked="" type="checkbox"/> Incidental Soil Ingestion	F			F				
<input checked="" type="checkbox"/> Dermal Absorption of Contaminants from Soil	F			F				
<input type="checkbox"/> Ingestion of Groundwater								
<input type="checkbox"/> Dermal Absorption of Contaminants in Groundwater								
<input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water								
<input checked="" type="checkbox"/> Inhalation of Outdoor Air	F	F	C/F	F	C/F	F		
<input type="checkbox"/> Inhalation of Indoor Air								
<input type="checkbox"/> Inhalation of Fugitive Dust								
<input type="checkbox"/> Ingestion of Surface Water								
<input type="checkbox"/> Dermal Absorption of Contaminants in Surface Water								
<input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water								
<input type="checkbox"/> Direct Contact with Sediment								
<input type="checkbox"/> Ingestion of Wild Foods								

**Current & Future Receptors**

Residents (adults or children)	Commercial or Industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
--------------------------------	----------------------------------	---	----------------------	-----------------------------------	-----------------------	-------

### **3.0 Responsiveness Summary**

This section provides a summary of the public comments regarding the *Proposed Plan for Final Actions for Five ERP Sites Bear Creek RRS*. A public review and comment period was open for the *Proposed Plan for Final Actions for Five ERP Sites* from July 9 through September 15, 2007.

#### **3.1 Stakeholder Comments and Lead Agency Responses**

During the 64-day open public comment period, the only comment received was from a stakeholder who requested in writing that the public comment period be extended from 30 days to 60 days. The USAF responded to this request and held open the public comment period for 64 days.

No other comments were received either orally or in writing by the USAF (personal communication, Tommie Baker 611 CES/CEVR, October 5, 2007).

## 4.0 References

- Alaska Department of Environmental Conservation (ADEC), 2004. Sediment Quality Guidelines, Technical Memorandum. March 2004
- ADEC, 2005. Policy Guidance on Developing Conceptual Site Models. November 30, 2005.
- ADEC, 2008a. 18 AAC 75 Oil and Hazardous Substances Pollution Control Regulations, Revised as of October 9, 2008.
- ADEC, 2008b. 18 Alaska Administrative Code (AAC) 70 Water Quality Standards, as amended through July 1, 2008.
- ADEC, 2008c. Cumulative Risk Guidance. June 9, 2008.
- ADEC, 2008d. Cleanup Levels Guidance. June 9, 2008.
- Alaska Department of Fish and Game (ADFG), 2003. Web Site last updated October 24, 2003. [http://www.wildlife.alaska.gov/division\\_info/site\\_index.cfm](http://www.wildlife.alaska.gov/division_info/site_index.cfm)
- Buchman, 1999. *National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables*. October 1999.
- Hazardous Materials Technical Center (HMTTC), 1989. *Preliminary Assessment, Bear Creek Radio Relay Station, Alaska*.
- Sauer JR, Hines JE, Gough G, Thomas I and B G Peterjohn. *The North America Breeding Bird Survey Results and Analysis. Version 96.4. Patuxent Wildlife Research Center, Laurel MD*. 1997.
- United States Air Force (USAF), 1985. Bear Creek Daily Log, 5099th CEOS, Site Cleanup at Bear Creek Radio Relay Station, Alaska.
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- USAF [ENSR], 1993a. Site Investigation, Bear Creek Radio Relay Station, Alaska.
- USAF, 1996a. Initial Site Investigation, Bear Creek Radio Relay Station POL Site, Tanana, Alaska.
- USAF, 1996b. Demolition and Disposal of Air Force Facilities at Bear Creek RRS located at Tanana, Alaska.
- USAF, 1997. Field and Analytical Report for 1997 Clean Sweep Activities at Bear Creek RRS Station, Tanana, Alaska, Draft. (USAF, 1997).

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USAF [Radian], 1999. Remedial Investigation Report for the Bear Creek Radio Relay Station.

USAF, 2000. Final Draft Year 2000 Clean Sweep Environmental Survey Strategic Plan.

USAF [Paug-Vik], 2007. Final Report 2005 Remedial Investigation/Feasibility Study for Sites: POL Site on the Yukon River (SS008) and the Borrow Pit (SS007).

United States Environmental Protection Agency (USEPA), 2003. Resource Conservation and Recovery Act (RCRA) (40 CFR 261 and 18 AAC 62; Listed and Characteristic Wastes). Updated July 2003. <http://www.epa.gov/region5/defs/html/rcra.htm>

USEPA, 1980. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 USC §§ 9601-9675). December 1980. <http://www.epa.gov/superfund/action/law/cercla.htm>.

USEPA, 1994. National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300). <http://www.epa.gov/oilspill/ncpover.htm>

USEPA, 2005. Toxic Substance Control Act (TSCA) (40 CFR 761). Updated May 2005. <http://www.epa.gov/region5/defs/html/tsc.htm>

USAF, 1997. Field and Analytical Report for 1997 Clean Sweep Activities at Bear Creek RRS Station, Tanana, Alaska, Draft (USAF, 1997).

University of Alaska – Fairbanks (UAF). Mammal Collection Database. 1998.



## **Appendix A:**

Proposed Plan for Final Actions at Five ERP Sites at the Bear Creek RRS



# PROPOSED PLAN

## FINAL ACTIONS FOR FIVE ERP SITES

### BEAR CREEK RRS



COMMENT PERIOD: July 9 through August 14, 2007

611 CES/CEVR Installation Restoration Program, 10471 20<sup>th</sup> Street, Suite 302, Elmendorf Air Force Base, Alaska 99506-2200

## INTRODUCTION

This *Proposed Plan*<sup>1</sup> discusses the final actions proposed for five (5) *Environmental Restoration Program (ERP)*<sup>2</sup> sites located at the former Bear Creek Radio Relay Station (RRS) near Tanana, Alaska (Figure 1). The five subject sites are listed below:

- Vehicle Maintenance Shop (SS002),
- Fuel Storage Area (SS003),
- Equipment Building (SS004),
- Barrel Storage Area (SS006), and
- POL Site by the Yukon River (SS008).

Results from the most recent site investigation activities (1999 and 2005) show that no unacceptable potential risk to human health or the environment is posed by the five subject sites. Therefore, the *United States Air Force (USAF)* is proposing no action at these five sites under its *CERCLA* authority.

As discussed in the Regulatory Basis box (on this page), petroleum is excluded from *CERCLA* but is regulated under Alaska State Law. Petroleum detections at the five subject sites are below levels allowed by Alaska regulations and do not pose unacceptable potential risk to human health or the environment. However, because petroleum detections at one of the sites (SS008) are above levels allowing unrestricted use under Alaska State regulations, *Institutional Controls (ICs)* are proposed for this site. The final actions proposed by USAF

under Alaska State regulations are: conditional closure with an IC for site SS008 and unconditional closure for the other four subject sites (SS002, SS003, SS004, and SS006).

USAF provided an opportunity for *EPA* to comment on this Proposed Plan; *EPA* declined to comment. The State of Alaska concurs with the actions proposed in this Plan.

### PURPOSE OF PROPOSED PLAN

USAF, in coordination with the Alaska Department of Environmental Conservation (*ADEC*), has issued this Proposed Plan in accordance with *CERCLA* and *National Contingency Plan (NCP)* requirements. The purpose of the Proposed Plan is to supplement the *remedial investigation (RI)* reports and provide the public with a reasonable opportunity to comment on the proposed action and participate in the final remedy selection.

### REGULATORY BASIS

THIS PLAN IS ISSUED IN ACCORDANCE WITH AND SATISFIES THE REQUIREMENTS OF THE COMPREHENSIVE ENVIRONMENTAL RESTORATION, COMPENSATION AND LIABILITY ACT (*CERCLA*, AT 42 USC §§ 9601 *ET. SEQ.*), AS FURTHER IMPLEMENTED BY THE NATIONAL CONTINGENCY PLAN (NCP, AT 40 CFR PART 300). THE ERP IS AUTHORIZED IN THE DEFENSE ENVIRONMENTAL RESTORATION PROGRAM (10 USC §§ 2701 *ET. SEQ.*) AS THE ENVIRONMENTAL RESTORATION PROGRAM THE AIR FORCE USES TO TAKE *CERCLA* RESPONSE ACTIONS AND SATISFY ITS *CERCLA* LEAD AGENCY FUNCTIONS AS DELEGATED BY EXECUTIVE ORDER 12580.

PETROLEUM, INCLUDING CRUDE OIL OR ANY FRACTION THEREOF, IS SPECIFICALLY EXCLUDED FROM *CERCLA*. CONTAMINATION FROM PETROLEUM IS REGULATED UNDER ALASKA STATE LAW.

THE PLAN ALSO MEETS ALL REQUIREMENTS OF ALASKA STATE LAW AND REGULATIONS, INCLUDING BUT NOT LIMITED TO TITLE 46 OF THE ALASKA STATUTES AND REGULATIONS PROMULGATED THEREUNDER.

<sup>1</sup> For convenience to the reader, the terms in *bold italic* are defined in the Glossary at the end of this publication.

<sup>2</sup> The *ERP* is the United States Air Force's (*USAF*) program modeled after the *Environmental Protection Agency's (EPA's)* Superfund environmental cleanup program.

## Proposed Plan Final Actions for Five ERP Sites Bear Creek RRS, Alaska

Proposed actions presented in this Plan can change in response to public comment or new information.

Following consideration of public comments received on this plan, USAF will prepare a *Record of Decision (ROD)* to document the final remedy selected for the subject ERP sites. The ROD will contain a summary of responses to public comments received.

### ORGANIZATION OF PROPOSED PLAN

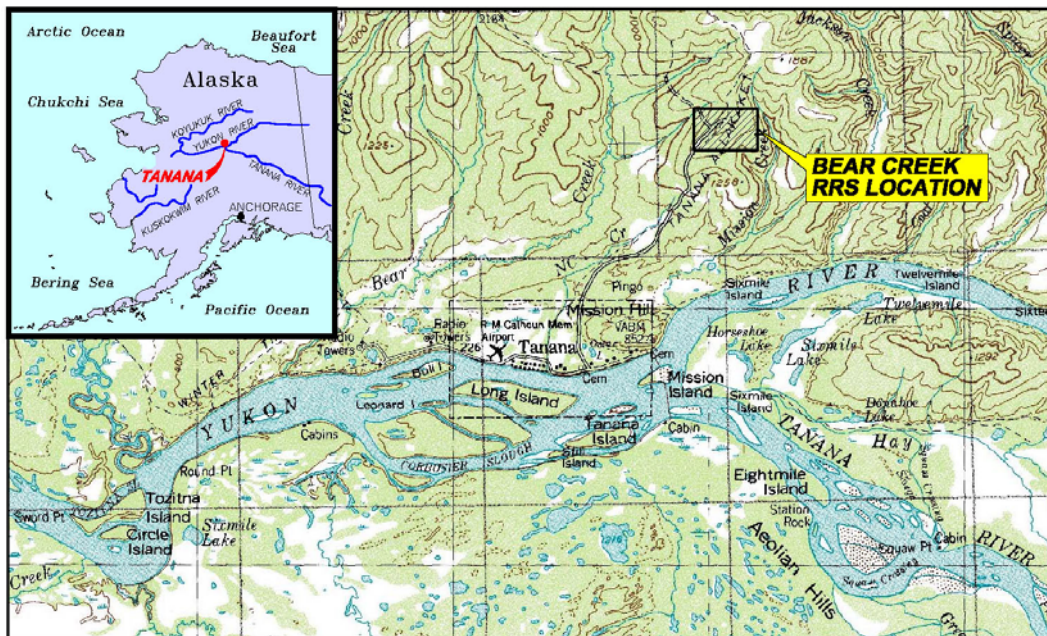
The rest of this Proposed Plan discusses how the USAF and ADEC determined the final actions appropriate for the subject sites (i.e. no action under CERCLA; and conditional closure with an IC or unconditional closure under Alaska regulations). General information relevant to all of the subject sites is followed by individual information summaries for each site addressed in this Plan.

## BEAR CREEK RRS BACKGROUND

### LOCATION

The former Bear Creek RRS is located in central Alaska about 130 air miles west of Fairbanks near the community of Tanana (**Figure 2**). Tanana is

**Figure 1: Bear Creek Location Map**



**How You Can Participate**

You are encouraged to comment on this Proposed Plan. A pre-addressed comment form is attached at the end of this Proposed Plan. The public comment period begins July 9, 2007 and ends on August 14, 2007. If you have any questions, the USAF Community Relations Coordinator may be contacted at the following address:

**Mr. Tommie Baker**  
**611 CES/CEVR**  
**10471 20<sup>th</sup> Street, Suite 302**  
**Elmendorf AFB, Alaska 99506-2200**  
**Toll Free: 1-800-222-4137**  
**Direct Line: 1-907-552-4506**  
**email: Tommie.Baker@ELMENDORF.af.mil**

This Proposed Plan is also available on the following website:  
[http://www.state.ak.us/dec/spar/csp/sites/bear\\_creek.htm](http://www.state.ak.us/dec/spar/csp/sites/bear_creek.htm)

located on the north bank of the Yukon River, approximately two miles west of the confluence of the Yukon and Tanana Rivers. Tanana is accessible by river and by air; there are no roads connecting Tanana to other regional communities.

The Bear Creek RRS facilities were located on 16.21 acres of land withdrawn from federal holdings for military purposes. The 16.21 acres were divided into three parcels: the Bear Creek RRS installation was constructed on a 14.69-acre parcel, the water collection system was located on a separate 0.92 acre parcel north of the installation, and the POL Site at the Yukon River was located on a 0.6-acre parcel on the north shore of the Yukon River.

Road access to the former Bear Creek RRS is provided by a gravel road beginning at the POL Site at the Yukon River about

**Proposed Plan Final Actions for Five ERP Sites  
Bear Creek RRS, Alaska**

one mile east of Tanana. The gravel road travels approximately eight miles up the south side of a heavily forested ridge to the former installation site.

**ENVIRONMENTAL SETTING**

The former Bear Creek RRS lies within the continental climate zone, which is characterized by low precipitation and extreme seasonal temperatures. The geology, surface water, and groundwater resources at the former Bear Creek RRS and the POL site at the Yukon River are discussed separately below.

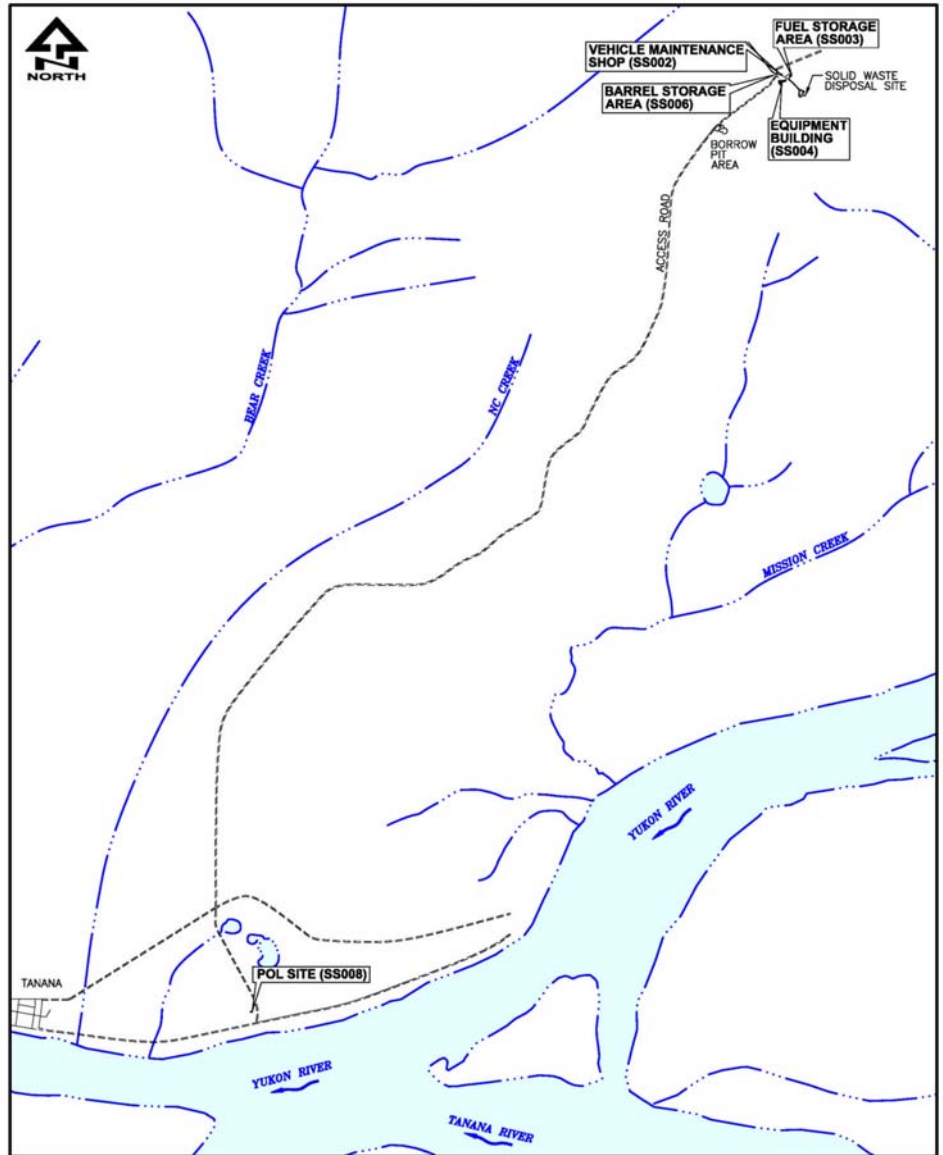
The former Bear Creek RRS is located at an elevation of approximately 1,650 feet at the top of a ridge. The geology is characterized by 3 to 15 feet of soil overlying bedrock. The shallow bedrock is fractured with increasing competence with depth. The bedrock is primarily composed of schist, quartzite, and phyllite and is highly fractured due to the proximity of the Kaltag Fault, an east-west trending fault traversing the area between ridge top and the Yukon River.

There are no significant lakes or streams within the immediate area of the former RRS. Surface water runoff from precipitation and snowmelt likely flows into nearby creeks. The headwaters of several creeks (Mission Creek, NC Creek, and Bear Creek) are located approximately 3,500 feet to 10,000 feet downhill from the former installation and discharge directly into the Yukon River. These creeks have low seasonal flow rates and are not year-round fish habitat.

Groundwater has not been encountered near the main installation area. During installation

operations, drinking water was obtained from a surface water collection system north of the installation area. Historically, soil borings installed as deep as 50 feet bgs did not encounter groundwater<sup>3</sup> before encountering competent bedrock.

**Figure 2: Bear Creek RRS and POL Site Layout**



<sup>3</sup> Some soil borings encountered localized intervals of saturated soil between bedrock fractures. The saturated soil zones were characterized as pore water, because they occur only intermittently (after precipitation events) and are not part of a larger or continuous groundwater zone.

## Proposed Plan Final Actions for Five ERP Sites Bear Creek RRS, Alaska

The former POL Site on the Yukon River is located on a bluff approximately 500 feet north of the Yukon River bank. Soil borings from this area show unconsolidated deposits down to a depth of 40 feet bgs (i.e. interbedded sands, silts, and gravels). Groundwater is present in the unconsolidated deposits between 20 and 30 feet bgs and is subject to the seasonal influences of the Yukon River.

### **HISTORICAL USE**

Bear Creek RRS was built in 1956 and 1957 and became active in January 1959. The station was part of the original *White Alice Communication System*. The purpose of the station was to relay radio information to and from Indian Mountain RRS, Kalakaket Creek RRS, and Pedro Dome RRS. With communication technology upgrades, the installation's mission was phased out in the late-1970s, and the installation was decommissioned in 1981.

While it was operational, the Bear Creek RRS included four White Alice scatter antennae, two smaller antennae, associated transmission framework, a water supply system, a solid waste disposal area, an equipment building and personnel dormitory, primary and temporary vehicle maintenance shops, a 40,000-gallon water *aboveground storage tank (AST)*, two *petroleum, oils, and lubricant (POL)* storage tank areas (SS003 and SS008), an airstrip, and other support facilities. The Air Force removed all the remaining structures as part of the Clean Sweep effort in 1996, and the entire site has been graded and covered with fill.

### **SITE RESTORATION HISTORY**

Beginning with a 1981-1982 hazardous materials inspection and continuing through a 2005-2006 *Remedial Investigation (RI)*, USAF has conducted investigations of the Bear Creek RRS area to determine if former installation operations caused environmental impacts. Historical site investigation and restoration events for the subject Bear Creek RRS ERP sites are summarized below, and the site locations are shown on **Figure 3**.

- In 1981 and 1982, USAF inspected Bear Creek and other former White Alice

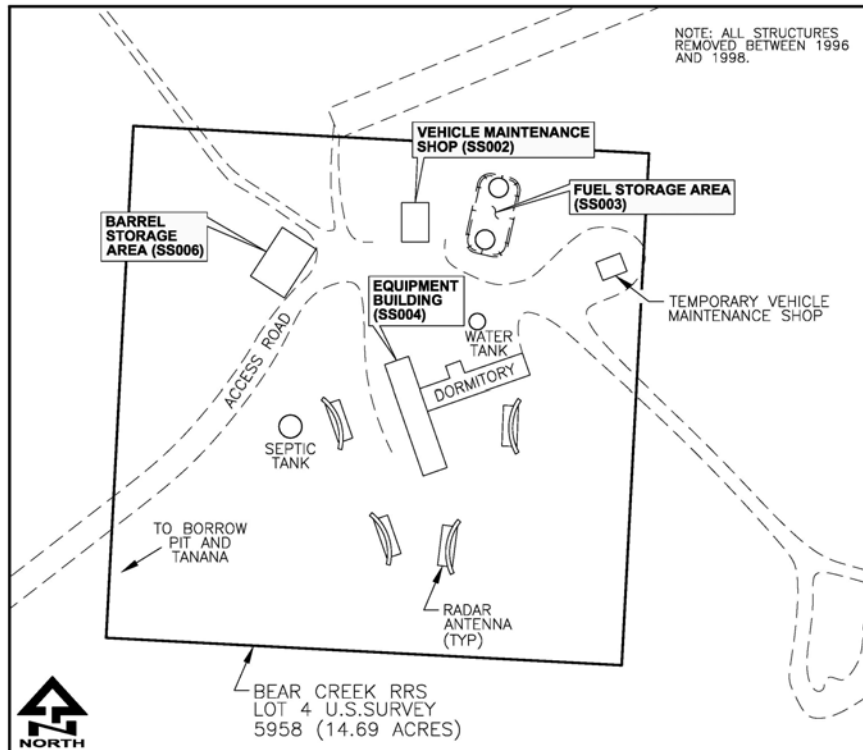
installations. Hazardous and toxic materials and wastes and most moveable equipment were shipped off-site to Elmendorf AFB.

- In 1984, USAF performed a follow-up inspection and found several areas of soil containing *polychlorinated biphenyls (PCBs)*. An unknown volume of PCB-contaminated soil was removed from the site and reportedly buried in a pit located approximately 0.25 miles east of the RRS.
- In summer 1985, 53 drums of PCB-contaminated soil and approximately 5 drums of PCB-contaminated debris were removed from the site and shipped to Elmendorf AFB for disposal.
- In 1988, a *Preliminary Assessment (PA)* recommended site investigation work to evaluate possible contamination associated with the vehicle maintenance facility (SS002) and fuel storage area (SS003).
- In 1992, several soil samples were collected from the subject sites in a second PA. Sample results suggested petroleum hydrocarbon and PCB contamination; further investigation was recommended.
- In 1996 and 1997, all remaining structures were removed under the Clean Sweep project, and the site was graded and covered with 18 inches of fill.
- In 1997, additional soil screening was performed for PCBs at the Equipment Building, and contaminated areas were excavated.
- In 1998, the former Bear Creek RRS ERP sites were investigated in an RI (report date 1999).
- In 2005, the POL Site on the Yukon River (SS008) and Borrow Pit Area (SS007) were investigated in a follow-up RI (report date 2006).

All of the reports are available in the *Administrative Record* (access information is provided on page 18 of this Plan). The key reports

Proposed Plan Final Actions for Five ERP Sites  
Bear Creek RRS, Alaska

Figure 3: Bear Creek RRS ERP Sites



**GROUNDWATER AND SURFACE WATER USE**

As discussed on page 3, there is no groundwater or surface water present at the former Bear Creek RRS. However, both groundwater and surface water (the Yukon River) are present near the former POL Site by the Yukon River (SS008).

The Yukon River is the third largest river in North America and is navigable throughout its entire course in Alaska. It is home to several species of salmon that are harvested for commercial and subsistence uses. There are several private drinking water wells between the former POL site and the town of Tanana, and the town of Tanana uses groundwater for its public water supply.

**OVERALL SITE RESTORATION OBJECTIVES**

documenting conditions at the subject sites are listed below; investigation results for each subject site are summarized on pages 9 to 18 of this Plan.

- *Remedial Investigation Report for the Bear Creek Radio Relay Station, Alaska. Final.* (USAF [Radian], September 1999).
- *2005 Remedial Investigation/Feasibility Study for Sites: POL Site on the Yukon River (SS008) and Borrow Pit Area (SS007) at the Bear Creek Radio Relay Station, Alaska. Draft.* (USAF [Paug-Vik], April 2006).

**CURRENT AND FUTURE LAND USE**

USAF uses the former Bear Creek RRS for environmental restoration purposes only. The facility has been abandoned for many years and has no designated land use. Local residents have unrestricted access to the former Bear Creek RRS lands for subsistence and recreational purposes.

The overall objectives of environmental site restoration at the Bear Creek RRS are to ensure that conditions at each site are protective of human health and the environment and to comply with state and federal regulations. Federal and state regulations that are potentially relevant to establishing remediation goals and cleanup levels are summarized below.

**FEDERAL REGULATIONS**

The NCP states that remediation goals must establish acceptable exposure levels that are protective of human health and the environment. The following considerations for determining protectiveness are potentially applicable to the subject sites of this Plan:

- Acceptable maximum exposure levels for carcinogens are concentration levels that represent an excess lifetime cancer risk to an individual between 1 in 10,000 and 1 in

## Proposed Plan Final Actions for Five ERP Sites Bear Creek RRS, Alaska

1,000,000. Cancer risk is explained on page 8 of this plan.

- Groundwater and surface water that are potential drinking water sources should attain *Maximum Contaminant Levels (MCLs)* or *Maximum Contaminant Level Goals (MCLGs)* established under the Safe Drinking Water Act and water quality criteria established under the Clean Water Act.
- Potential threats to the environment should be evaluated.
- Federal and state environmental laws must be met.

### ALASKA STATE REGULATIONS

The state of Alaska has promulgated *cleanup levels* in 18 AAC 75 (Oil and Hazardous Substances Pollution Control Regulations). Tabulated soil cleanup levels are provided in ADEC 18 AAC 75.341 Method Two Table B1 and B2 (Under 40-inch precipitation zone)<sup>4</sup> for three exposure pathways: migration to groundwater, inhalation, and ingestion. The ADEC Method Two soil cleanup levels may be applied at any contaminated site in Alaska and are considered protective for unlimited land use and unrestricted access<sup>5</sup>. ADEC 18 AAC 75.345 Table C provides tabulated groundwater cleanup levels<sup>6</sup>. The ADEC Table C groundwater cleanup levels apply to all groundwater in Alaska that is or may be a potential drinking water source and are considered protective for all groundwater uses, including drinking water.

ADEC 18 AAC 75.341 Method Three (hereinafter

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<sup>4</sup> Throughout this Plan, these cleanup levels are referred to as ADEC Method Two soil cleanup levels.

<sup>5</sup> Method Two soil cleanup levels are considered protective of human health; ecological protectiveness is evaluated on a site-by-site basis. The ecological risk evaluation (discussed on page 9 of this Plan) indicated that contamination from the subject sites has not adversely affected the environment, nor would it be expected to do so in the future.

<sup>6</sup> Throughout this Plan, these cleanup levels are referred to as ADEC Table C groundwater cleanup levels.

referred to as ADEC Method Three) allows calculation of site-specific cleanup levels that are considered protective of human health and the environment.

If the cleanup level applied to a site is higher than the ADEC Method Two soil cleanup level or Table C groundwater cleanup level, the State of Alaska may require ICs to restrict the site from unprotected uses.

Since there is no groundwater at the former Bear Creek RRS, the applicable ADEC Method Two soil cleanup levels are the lower of the inhalation or ingestion pathway cleanup levels.

Since groundwater is present at the former POL Site on the Yukon River (SS008), the applicable ADEC Method Two soil cleanup levels are the lowest of the migration to groundwater, inhalation, and ingestion pathway cleanup levels. For *Diesel-Range Organics (DRO)* in soil, a site-specific ADEC Method Three cleanup level of 2,500 *milligrams per kilogram (mg/Kg)* was calculated in the 2005-06 RI.

To determine whether site conditions comply with state regulations, USAF compared site sample results with levels established in state regulations. For the five sites discussed in this Plan, USAF found that site sample results did not exceed levels allowed by state regulations.

### NATURALLY-OCCURRING METALS

Metals occur naturally in soil, and it can be difficult to differentiate natural background levels from metals concentrations due to human activity. USAF has taken a “multiple lines of evidence” approach to evaluate which metals may be present at elevated concentrations due to human activity. Although metals contamination due to USAF historical activity is considered unlikely (except for lead, which is a component of fuel, batteries, and paint), all metals, except arsenic, were carried through the risk evaluation process. Arsenic is

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<sup>7</sup> Three lines of evidence considered were: (1) Air Force use of chemicals containing the metal of interest; (2) local background concentration data, and (3) regional and statewide naturally-occurring metals studies.

## Proposed Plan Final Actions for Five ERP Sites Bear Creek RRS, Alaska

naturally-occurring and not considered a potential contaminant at Bear Creek RRS, because of the following considerations:

- At Bear Creek RRS, as in many places in Alaska, naturally-occurring arsenic was consistently detected at concentrations near and above ADEC Method Two cleanup levels;
- The arsenic detections were fairly uniform across the installation; and
- There is no reasonable scenario for USAF generation of arsenic at Bear Creek RRS.

### EVALUATION OF SITE RISKS

In accordance with the NCP's requirement for baseline risk assessment (40 CFR § 300.400 (d)) to characterize current and potential threats to human health and the environment, potential risk due to contamination at the subject Bear Creek ERP sites was evaluated in the 1999 and 2006 RI reports. The risk evaluations were updated for each site in this Plan to evaluate whether cumulative risks from multiple chemicals are above thresholds and whether potential exposure pathways are complete. The risk evaluation methodology is described in the next section.

USAF found that exposure to contamination at the five sites discussed in this Plan does not pose unacceptable potential risk to human health or the environment. Cumulative risk calculation results are presented individually in each site summary on pages 9 to 18.

#### **HUMAN HEALTH RISK EVALUATION METHODOLOGY**

In order for contamination at a site to pose a risk or threat to people or animals, they must be exposed to the contamination (i.e., there must be a complete exposure pathway). Potential risk is calculated by a several-step process. First, in the exposure evaluation, potentially complete exposure pathways are identified for receptors (people or animals) to be affected by contamination. The data evaluation step determines the amount of chemical

a person or animal may be exposed to, and the species-specific toxicity of the chemicals is considered in the toxicity evaluation. Finally, potential risk to the receptors is calculated.

#### **Exposure Evaluation and Data Assessment**

The cumulative risk evaluations performed for the Bear Creek RRS sites during preparation of this Proposed Plan used ADEC default exposure assumptions (residential use and exposure parameters). Complete exposure pathways included inhalation and ingestion of chemicals in soil by residents.

#### **Threshold Risk Levels and Risk-Based Concentrations**

Potential cancer risks from chemical exposure are expressed as the probability of one additional incidence of cancer in a population as a result of exposure to chemicals at a site. For example, the threshold risk considered allowable by ADEC is one additional incidence of cancer in a population of 100,000 people. This cancer risk is expressed as  $10^{-5}$ . EPA considers allowable cancer risks between  $10^{-4}$  and  $10^{-6}$  (between one in ten thousand and one in a million).

Non-cancer hazards are expressed as a threshold ratio of the dose ingested or absorbed as a result of exposure to a site-related chemical divided by the safe toxicological dose. This ratio is called the *hazard quotient (HQ)*. The sum of HQs for multiple chemicals is the *Hazard Index (HI)*. For both the ADEC and EPA, the maximum allowable HI is one (1).

A *risk-based concentration (RBC)* is the calculated maximum concentration of a chemical that results in risk less than  $10^{-5}$  and HQ less than 1. The RBC is considered a safe concentration based on an expected level of exposure to chemicals at a specific site. RBCs calculated for residential use are considered safe for all other activities and exposure levels. RBCs for this risk evaluation came from the following sources:

- RBCs and toxicity values for bulk hydrocarbons (*gasoline-range organics [GRO]*), *diesel-range organics (DRO)*, and



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*residual-range organics [RRO]*) were calculated using default exposure assumptions provided in Appendix C of the ADEC 2004 Cleanup Levels Guidance.

- RBCs and toxicity values for individual chemicals (except PCBs) were taken from Appendix B of the ADEC 2002 Cumulative Risk Guidance.
- RBCs for PCBs were calculated using toxicity and chemical-specific factors for the highest-risk PCBs from the Department of Energy's Risk Assessment Information System.

### Cancer and Noncancer Risk Calculations

HQ and Cancer Risk estimates were calculated by dividing the maximum detected concentration by the RBC and multiplying the result by the target risk or HQ ( $10^{-5}$  and 1 respectively).

### Cumulative Risk Calculations

As discussed on page 6, the ADEC Method Two soil cleanup levels and Table C groundwater cleanup levels are considered safe for all human exposure. However, they do not account for cumulative risk from exposure to multiple contaminants at a site. When multiple chemicals are detected at a site, State of Alaska regulations require evaluating the cumulative potential risk. The maximum contaminant concentrations are compared to 1/10 of the lowest of the ingestion or inhalation Method Two soil cleanup level or Table C groundwater cleanup level. If maximum concentrations are above this screening level, the potential for cumulative risk must be evaluated. In accordance with ADEC's Cumulative Risk Guidance, bulk hydrocarbons are not included in cumulative HI, although a stand-alone HQ was calculated for bulk hydrocarbons when they were detected above 1/10 of their inhalation or ingestion Method Two cleanup levels.

## HUMAN HEALTH RISK EVALUATION RESULTS

### 1999 Risk Evaluation

In the 1999 RI report, the 1998 sample results were

screened against human health risk-based criteria (primarily the ADEC Method Two soil and groundwater cleanup levels) to evaluate the potential for adverse health effects from contaminants at the sites.

Although preliminary screening criteria were exceeded for three detections, no further risk evaluation was determined to be necessary for the reasons described below:

- In soil, manganese detected in one surface and one subsurface soil sample (at SS003 and SS004) only marginally exceeded the most cautious preliminary screening level. The screening level was taken from EPA Region 9 Preliminary Remediation Goals, because ADEC has not established a cleanup level for manganese in soil. The detections are interpreted to represent naturally-occurring manganese.
- In surface water at the POL Site, bis(2-ethylhexyl)phthalate in one sample exceeded the screening level. Bis(2-ethylhexyl)phthalate is a plasticizer that is a common laboratory contaminant and would be an unusual contaminant to find at a POL storage area, so the detection is interpreted to represent sample cross-contamination.

### Cumulative Risk Results

During preparation of this Proposed Plan, detected chemical concentrations were compared to published risk levels (RBCs) considered acceptable to ADEC, and cumulative risk posed by all chemicals at each site was evaluated. The published risk levels are human health risk-based levels promulgated by the State of Alaska for soil based upon residential uses. The use of such promulgated standards for risk assessment is specifically allowed by NCP and EPA guidance (OSWER # 9355.0, *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*, April 1991).

The cumulative risk evaluation concluded that the subject sites of this Proposed Plan do not pose unacceptable potential risk to human health. Site-specific risk evaluation results are presented

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individually in each site summary on pages 9 to 18 of this Plan.

**ECOLOGICAL RISK EVALUATION**

In the 1999 RI report, the 1998 sample results were screened against ecological screening criteria to evaluate the potential for adverse health effects at the sites. For the five subject sites of this Proposed Plan, only two analytes (manganese and cobalt) in one sample (at site SS004) marginally exceeded the ecological risk-based criteria. There is no known source for manganese or cobalt at the RRS site, and because of the limited distribution and frequency of detections, the 1998-99 RI determined that the manganese and cobalt detections represent somewhat elevated naturally-occurring conditions. Furthermore, the limited distribution of elevated manganese and cobalt detections suggests that the metals are unlikely to represent actual risk to the environment.

Overall, the ecological risk evaluations concluded that the subject sites of this Proposed Plan do not pose unacceptable potential risk to the surrounding ecosystems.

**VEHICLE MAINTENANCE SHOP  
(SS002)**

**Site Description**

SS002 was the primary vehicle maintenance shop during the operation of the Bear Creek RRS installation. Typical wastes likely resulting from site activities include diesel and gasoline fuel, transmission fluid (a potential source of PCBs), brake fluid, lead-acid batteries, and engine parts (a potential source of metals). Spilled fuel from maintenance activities was collected in sand-lined floor drains and sumps.

No dry wells were found during any of the investigations or the demolition of the facility.

**Cleanup Actions To-Date**

PCB-contaminated soil was removed from an area in front of the vehicle maintenance shop in 1984 and 1985 (Area C on **Figure 4**). Results from post-excavation soil screening samples showed PCB concentrations below the 1 mg/Kg ADEC Method Two (residential) cleanup level.

In 1996, the vehicle maintenance shop was demolished as part of Operation Clean Sweep. During the demolition of the shop, asbestos was segregated into regulated and non-regulated portions. Regulated material was removed and transported to Galena, Alaska, for disposal, and non-regulated asbestos-containing material was buried with other demolition waste in a permitted landfill east of the installation.

In 1997, the vehicle maintenance shop (SS002) was covered with about 18 inches of soil, graded, and reseeded.

The 1998-99 RI field personnel noted that the soil placed in 1997 was showing signs of erosion, and that the reseeded done in 1997 was mostly unsuccessful. Therefore, in 2000, erosion channels

**Table 1: Vehicle Maintenance Shop (SS002) 1998 RI Soil Sample Summary**

	ADEC Method Two Cleanup Level	Number of Samples	Number Detections	Number Detect. Above Cleanup Level	Maximum Detection
DRO	10,250	22	11	0	10,000
GRO	1400	22	9	0	910
VOC (1,3,5-TMB)	38.3	21	6	0	4.8
VOC (Naphthalene)	120	21	9	0	16
SVOC	120	21	9	0	18
Pesticides	<i>various</i>	<i>All below 1/10 of Method 2 cleanup level</i>			
PCBs	1 (Residential)	<i>All below 1/10 of Method 2 cleanup level</i>			
Metals (Chromium)	300	22	22	0	31

were repaired, and the site was covered with an additional six to twelve inches of soil and reseeded.

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**Summary of Site Conditions**

Current Site Conditions: Based on 1998 soil sample results, there is no contamination above ADEC Method Two cleanup levels at the former Vehicle Maintenance Shop (SS002).

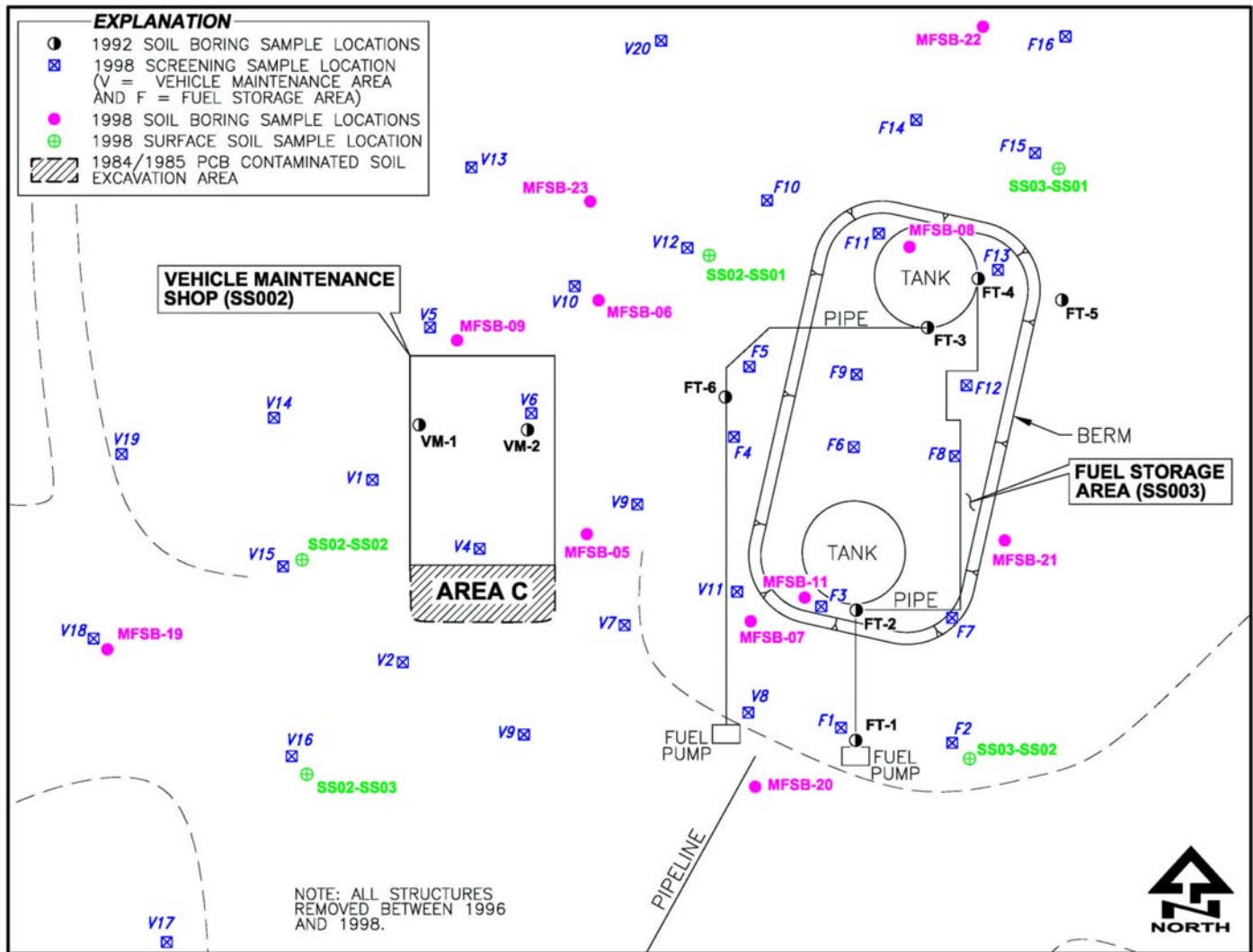
Investigation Summary: Soil samples were collected from SS002 during environmental investigations in 1992 and 1998. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 4**.

In 1992, two surface soil samples were collected from the floor drains and sumps within the vehicle maintenance shop and analyzed for DRO, volatile

organic compounds (VOCs), and metals. Although lead and DRO were detected in both samples at concentrations exceeding ADEC Method Two cleanup levels, these samples are not representative of current site conditions, because the floor drains and sumps from which the samples were collected were later demolished and removed with the vehicle maintenance shop.

In 1998, twenty soil screening samples were collected below the soil placed in 1997 and field-screened for total petroleum hydrocarbons (TPH), PCBs, and/or pesticides. Based on the soil screening results, fifteen soil samples were collected from seven soil borings, and three surface

**Figure 4: Vehicle Maintenance Shop (SS002) and Fuel Storage Area (SS003)**



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(e.g., below soil placed in 1997) soil samples were collected. The samples were analyzed for fuels, metals, PCBs, and pesticides. As shown in Table 1, all soil sample results from the 1998-99 RI were below ADEC Method Two cleanup levels.

Although there is no groundwater at Bear Creek RRS, a water sample was collected from pore water seepage into one soil boring (MFSB-06). The pore water sample was analyzed for DRO, GRO, VOCs, *semi-volatile organic compounds (SVOCs)*, and pesticides. Pore water analytical results showed concentrations of some analytes above ADEC Table C cleanup levels (i.e., DRO at 58 *milligrams per liter [mg/L]*, benzene at 0.012 mg/L, *trichloroethene (TCE)* at 0.016 mg/L, and dieldrin at 0.00009 mg/L). However, the pore water represents a discontinuous volume of water trapped in the pore spaces of subsurface soil and bedrock material. Since it is not connected to a permanent or continuous groundwater body, there is no migration or exposure risk associated with the pore water. The pore water does not pose an unacceptable risk to human health or the environment.

**Summary of Site Risks**

As shown in Table 2, cumulative risk due to contaminants detected at the former Vehicle Maintenance Shop (SS002) is below threshold risk levels. Contamination levels detected at SS002 do not pose an unacceptable risk to human health.

**Table 2: Former Vehicle Maintenance Shop (SS002) Risk Summary**

	Max. Detected (mg/Kg)	RBC (mg/kg)	Exposure Pathway	HQ	Risk
DRO	10,000	10,139	Ingestion	1.0	
DRO	10,000	19,917	Inhalation	0.5	
1,3,5-Trimethylbenzene	5	5,070	Ingestion	0.0009	
1,3,5-Trimethylbenzene	5	38	Inhalation	0.1	
Naphthalene	18	120	Inhalation	0.2	
Naphthalene	18	2,030	Ingestion	0.009	
Chromium	31	304	Ingestion	0.1	
Cumulative HI (Threshold Level = 1)				0.4	
Cumulative Risk (Threshold Level = 10 <sup>-6</sup> )					

**Proposed Remedy**

Under CERCLA, no further action is proposed at the former Vehicle Maintenance Shop (SS002), because the site does not pose unacceptable potential risk to human health or the environment.

Under Alaska State regulations, unconditional site closure is proposed for the Vehicle Maintenance Shop (SS002), because contamination at the site is below levels allowed in Alaska State regulations, and the site does not pose unacceptable potential risk to human health or the environment.

**FUEL STORAGE AREA (SS003)**

**Site Description**

The Fuel Storage Area (SS003) consisted of two diesel ASTs (a 220,500-gallon AST and a 12,285-gallon AST) contained within an earthen berm, a fuel distribution pipeline, and two fuel pumps (Figure 4). There was a drainage ditch at the western end of the berm to capture any overflow. These tanks supplied diesel for the Bear Creek RRS facility between 1956 and 1981.

**Cleanup Actions To-Date**

In 1985, USAF abandoned in-place a buried fuel pipeline that ran southwest from the fuel tanks toward the northeast corner of the equipment building. No stained soil was observed around the pipeline.

In 1996, USAF drained, cleaned, demolished, and removed the ASTs and removed the earthen berm as part of Operation Clean Sweep. About 18 inches of clean soil was placed over the site in 1997, and the entire area was graded and reseeded.

The 1998-99 RI field personnel noted that the soil placed in 1997 was showing signs of erosion, and that the reseeded done in 1997 was mostly unsuccessful. Therefore, in 2000, erosion channels were repaired, and the site was covered with an additional six to twelve

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inches of soil and reseeded.

### **Summary of Site Conditions**

Current Site Conditions: Based on 1998 soil sample results, there is no contamination above ADEC Method Two soil cleanup levels at the former Fuel Storage Area (SS003).

Investigation Summary: Soil samples were collected from SS003 during environmental investigations in 1992 and 1998. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 4**.

In 1992, six surface soil samples from SS003 were analyzed for DRO. Low concentrations of DRO were detected in five of the six samples (maximum concentration of 640 mg/Kg); in the sixth sample, collected outside the tank berm near a fuel pump, DRO were detected at 31,000 mg/Kg.

In 1998, eighteen soil screening samples were collected below the 1997 clean soil cover and field-screened for TPH or pesticides or both. Based on the 1992 sample results and 1998 screening results, five soil borings were drilled to collect 12 soil samples for laboratory analysis. In addition, two surface (below the 1997 soil cover) soil samples were collected from hand auger locations. Soil samples were analyzed for fuels, metals, PCBs, VOCs, SVOCs, and pesticides. The maximum DRO detection was 4,200 mg/Kg (versus the ADEC Method Two cleanup level of 10,250 mg/Kg); no other samples exceeded 1/10 of the ADEC Method Two cleanup levels.

### **Summary of Site Risks**

Since only one analyte (DRO) was detected above 1/10 of its ADEC Method Two cleanup level, no cumulative risk calculations were necessary. Contamination levels detected at SS003 do not pose an unacceptable potential risk to human health.

### **Proposed Remedy**

Under CERCLA, no further action is proposed at the former Fuel Storage Area (SS003), because the site does not pose unacceptable potential risk to human health or the environment.

Under Alaska State regulations, unconditional site closure is proposed for Site SS003, because contamination at the site is below levels allowed in Alaska State regulations and the site does not pose unacceptable potential risk to human health or the environment.

## **EQUIPMENT BUILDING (SS004)**

### **Site Description**

During the time when the Bear Creek RRS was active, SS004 was an equipment building and dormitory complex; the equipment building was used to store electrical equipment and other materials at the installation. Most of the salvageable electrical equipment (e.g. capacitors and transformers) and packaged hazardous material from the equipment building was shipped to Elmendorf AFB in 1981 and 1982. This electrical equipment used oil that contained PCBs.

### **Cleanup Actions To-Date**

Between 1984 and 1997, a series of soil sample events and subsequent excavations were performed to delineate and remove PCB-contaminated soil from the vicinity of the former Equipment Building. The cleanup events are summarized below, but the soil sample results are not discussed in detail, because they were superseded by each successive sampling/excavation event. A comprehensive soil sampling event performed in 1998 (and discussed in the following section) represents the current site conditions.

- In 1984, several areas of PCB-contaminated soil were found outside the doors of the equipment building, and an unknown volume of PCB-contaminated soil was excavated, placed into drums, and transported off-site for disposal.
- In 1985, PCB-contaminated soil in Areas A, B, and D (**Figure 5**) was excavated, placed into 53 drums, and transported to Elmendorf AFB for disposal, along with other PCB-contaminated debris. After

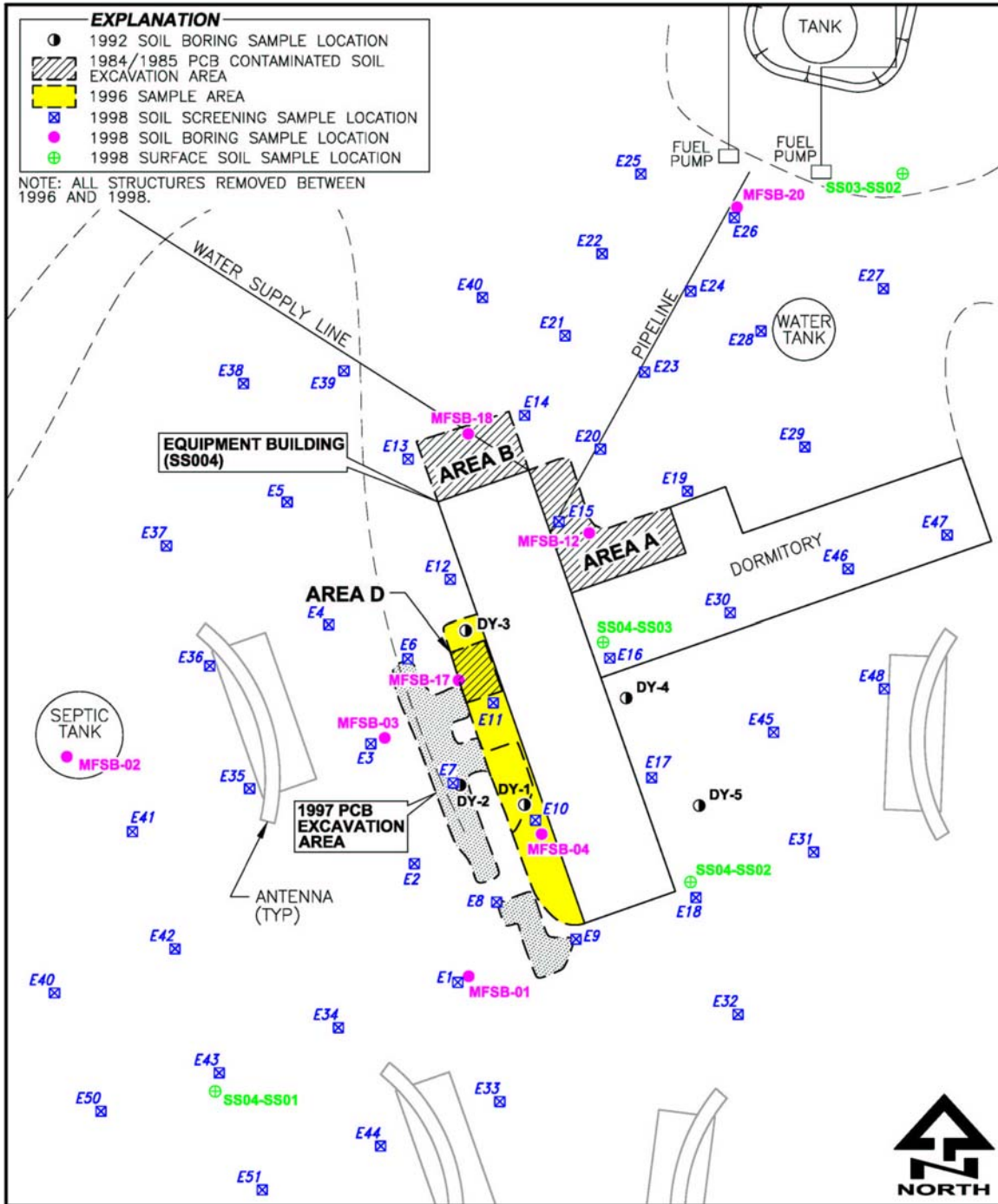
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excavation, each site was backfilled with clean soil.

- In 1996, the equipment building was demolished. Prior to demolition, floor tiles were

or tiles were drummed and shipped to Elmendorf AFB for disposal. Debris that may have contained asbestos was segregated into regulated and non-regulated portions. Regulated material was

**Figure 5: Equipment Building (SS004)**



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removed and transported to Galena, Alaska, for disposal at the Campion asbestos landfill, and non-regulated asbestos containing material was buried with other demolition waste in a permitted landfill east of the installation. The concrete floor and foundation remain in place.

- In 1997, a sequential solvent technology was used to wash PCB contamination (discovered by PCB wipe sampling) from the concrete floor. PCB-contaminated floor tiles, decontamination solvent, and soil were transported off-site for disposal.
- In 1997<sup>8</sup>, additional PCB-contaminated soil found along the western side of the equipment building was excavated and removed from the site (Figure 5).
- In 2000, due to the poor success of previous reseeded efforts and erosion occurring at the site, erosion channels were repaired, and the equipment building foundation was covered with two feet of soil and reseeded. The rest of SS004 was covered with an additional six to twelve inches of soil and reseeded.

### Summary of Site Conditions

Current Site Conditions: Based on 1998 soil sample results, there is no contamination remaining above ADEC Method Two soil cleanup levels at the former Equipment Building (SS004).

Investigation Summary: Soil samples were collected from SS004 in 1984, 1985, 1992, 1996, 1997, and 1998. Since the contamination detected in the 1984 through 1997 sample events was excavated and removed from the site (as discussed in the previous section), those results are not discussed below. The 1998 soil sample event is summarized below, and locations of the 1994 through 1997

excavations and the 1998 soil samples are shown in Figure 5.

In 1998, a sample grid was established across Site SS004, and fifty soil screening samples were collected below the soil placed in 1997 and field-screened for TPH, pesticides, and/or PCBs. Field-screening results showed PCB, TPH, or pesticides at several locations; therefore, additional samples were collected for laboratory confirmation. A total of seven soil borings were drilled in the locations of field-screening detections, and fourteen soil samples were analyzed for fuels, metals, PCBs, VOCs, SVOCs, and pesticides. An additional three surface soil samples were collected and analyzed for the same parameters. PCBs were detected in two of the 17 soil samples, at estimated concentrations of 0.07 mg/kg and 0.12 mg/kg, both of which are below the 1 mg/kg ADEC Method Two cleanup level for residential use. No other analytes were detected at concentrations above 1/10 of the ADEC Method Two cleanup levels.

### Summary of Site Risks

Since only one analyte (PCBs) was detected slightly above 1/10 of the ADEC Method Two cleanup levels, no cumulative risk calculations were necessary. Contamination levels detected at SS004 do not pose an unacceptable risk to human health.

### Proposed Remedy

Under CERCLA, no further action is proposed at the former Equipment Building (SS004), because the site does not pose unacceptable potential risk to human health or the environment.

Under Alaska State regulations, unconditional site closure is proposed for Site SS004, because contamination remaining at the site is below levels allowed in Alaska State regulations and the site does not pose unacceptable potential risk to human health or the environment.

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<sup>8</sup> PCBs were detected at 1,000 mg/Kg in 1992 sample DY-1 (Figure 5). Follow-up sampling was performed in 1996, and, to guide the 1997 excavation, 88 surface soil samples were field-screened for PCBs. Figure 5 shows the outlines of the 1997 PCB-contaminated soil excavation.

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## **BARREL STORAGE AREA (SS006)**

### **Site Description**

The Barrel Storage Area was identified from historical aerial photographs showing a barrel storage area across the road and to the northwest of the Equipment Building (SS004) (see [Figure 2](#)) and interviews with Tanana residents who remember barrels stored in the area. The Barrel Storage Area was sampled as an “additional site for investigation” during the 1998-99 RI and was given an ERP site designation (SS006) in 2005.

### **Cleanup Actions To-Date**

None

### **Summary of Site Conditions**

Current Site Conditions: Based on 1998 soil sample results collected for the 1998-99 RI, there is no contamination above ADEC Method Two soil cleanup levels at the former Barrel Storage Area (SS006).

Investigation Summary: In 1998, a soil sampling grid was established across the Barrel Storage Area, and 24 surface soil screening samples were field-screened for TPH, PCBs, and pesticides. Based on two positive field-screening results for PCBs, two soil borings were drilled. Two surface and two subsurface soil samples were collected for laboratory analysis for GRO, DRO, RRO, BTEX, PCBs, VOCs, SVOCs, and metals. The surface soil samples were also analyzed for pesticides. No sample results exceeded 1/10 of the ADEC Method Two soil cleanup levels, except chromium, which was detected in one sample at 31 mg/Kg (just exceeding 1/10 of the ADEC Method Two cleanup level of 300 mg/kg) and was interpreted to reflect naturally-occurring conditions.

### **Summary of Site Risks**

Since only one analyte (chromium) was detected slightly above 1/10 of the ADEC Method Two cleanup levels, no cumulative risk calculations were necessary. Contamination levels detected at SS006 do not pose an unacceptable risk to human health.

### **Proposed Remedy**

Under CERCLA, no further action is proposed at the former Barrel Storage Area (SS006), because the site does not pose unacceptable potential risk to human health or the environment.

Under Alaska State regulations, unconditional site closure is proposed for Site SS006, because contamination at the site is below levels allowed in Alaska State regulations and the site does not pose unacceptable potential risk to human health or the environment.

## **POL SITE AT THE YUKON RIVER (SS008)**

### **Site Description**

The POL Site at the Yukon River (SS008) is a former POL fuel storage system located on the north shore bluff of the Yukon River about eight miles south of Bear Creek RRS and one mile east of Tanana ([Figure 2](#)). The former POL Site consisted of a 16,500-gallon gasoline AST, a 126,000-gallon fuel oil AST situated within an earthen containment berm, and the associated distribution pipelines extending from the ASTs to the river. During the time when Bear Creek RRS was active, the POL Site was used to store fuel offloaded from barges along the river.

### **Cleanup Actions To-Date**

In 1996, the ASTs, distribution pipeline, and earthen containment berm were demolished and removed as part of Operation Clean Sweep. In 1997, approximately 18 inches of clean soil was spread over the site and the entire area graded.

### **Summary of Site Conditions**

Current Site Conditions: Concentrations of all analytes in soil and groundwater are below applicable cleanup levels at this site, as summarized below.

- Concentrations of all analytes in SS008 soil, except DRO, are below Method Two cleanup levels.

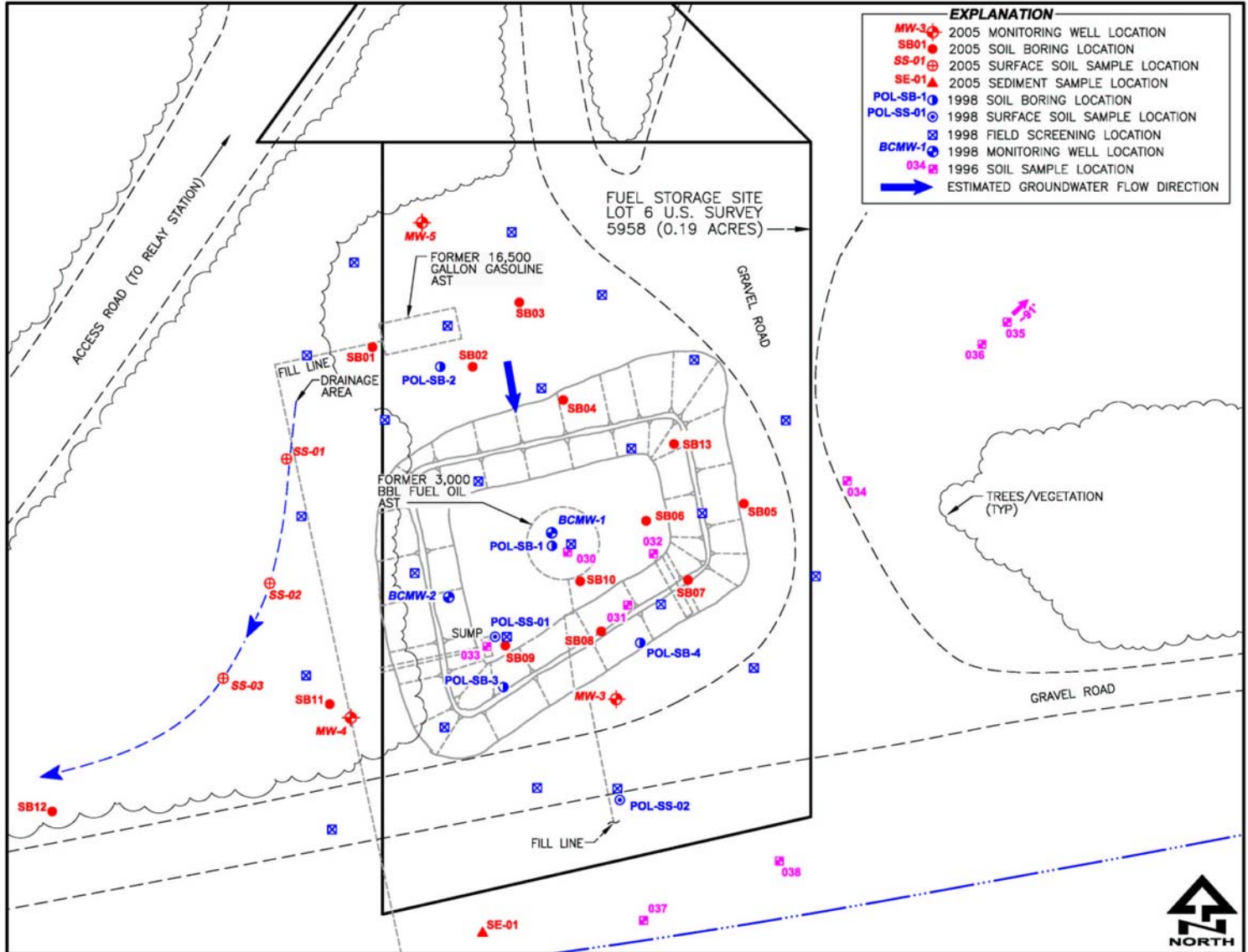


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- For DRO at SS008, a site-specific ADEC Method Three cleanup level of 2,500 mg/Kg was calculated (discussed on page 7 of this Plan). The 95% upper confidence limit (UCL) of the mean DRO concentration in SS008 soil (calculated from the 1998 and 2005 sample results<sup>9</sup>) was 793 mg/Kg,

which is below the 2,500 mg/Kg Method Three cleanup level.

**Figure 6: POL Site by the Yukon River (SS008)**



<sup>9</sup> The 1996 DRO data were not included in the UCL calculations, because the 1996 analytical method is now considered outdated and not directly comparable to the current analytical method.

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Investigation Summary: Soil samples were collected from SS008 during environmental investigations in 1996, 1998, and 2005. Groundwater samples were collected from SS008 in 1998 and 2005. The environmental investigations are summarized briefly below, and sample locations are shown on **Figure 6**.

In 1996, nine surface and shallow subsurface soil samples were collected at the former POL Site and analyzed for DRO and GRO. The maximum DRO detection was 3,107 mg/Kg in a sample directly below the former 3,000-barrel AST. All other sample results were below the ADEC site-specific Method Three cleanup level of 2,500 mg/Kg for DRO.

In 1998, a soil sampling grid was established across the former POL Site. The grid was centered on the former 3,000-barrel fuel oil AST. Twenty-five surface soil samples were field-screened for TPH and pesticides. Field-screening results for TPH and/or pesticides were positive in three of the twenty-five samples. To obtain laboratory confirmation of the field-screening results, followup soil samples were collected from two surface soil (hand-auger) locations and four soil borings. One of the surface samples was analyzed for pesticides, the other was analyzed for GRO, DRO, RRO, BTEX, VOCs, SVOCs, and metals. Eight subsurface soil samples were analyzed for GRO, DRO, RRO, BTEX, VOCs, SVOCs, and metals; four of the samples were also analyzed for pesticides.

The maximum DRO result was 5,800 mg/Kg in a sample collected at a depth of 3 to 4 feet bgs underneath the former 3,000-barrel AST (located within the bermed area). A deeper sample (15-16.5 feet bgs) from the same soil boring showed only trace levels of DRO, indicating that hydrocarbon contamination had not migrated to this depth. No other analytes exceeded the ADEC Method Two cleanup levels.

All four soil borings encountered groundwater between 19.5 feet bgs and 23.5 feet bgs. Two monitoring wells were installed and sampled for GRO, DRO, RRO, BTEX, VOCs, SVOCs, and metals. None of the groundwater results exceeded

ADEC Table C groundwater cleanup levels.

Two sediment and surface water samples were collected from an adjacent gravel pit. The samples were analyzed for DRO, RRO, VOCs, SVOCs, pesticides, and metals. None of the sediment or surface water results exceeded sediment benchmark screening levels or ADEC water quality standards<sup>10</sup>.

In 2005, 16 soil borings were advanced at the former POL Site, and three of the borings were converted into monitoring wells. A total of 28 subsurface soil samples were collected and analyzed for GRO, DRO, RRO, VOCs, and lead. Three surface soil samples were also collected from a drainage area to the west of the former POL site and analyzed for GRO, DRO, RRO, VOCs, and lead. One sediment sample was collected from the Yukon River sediments and analyzed for lead, *polynuclear aromatic hydrocarbons (PAHs)*, and VOCs.

The maximum DRO detection was 354 mg/Kg (located within the bermed area). No contamination was detected above the ADEC site-specific Method Three cleanup level for DRO or ADEC Method Two soil cleanup levels for all other analytes.

Three new groundwater monitoring wells were installed in 2005. The three new and two existing monitoring wells were sampled for GRO, DRO, RRO, VOCs, and lead. No sample results exceeded 1/10 of the ADEC Table C cleanup levels

### Summary of Site Risks

Since only one analyte (DRO) was detected above 1/10 of the ADEC Method Two inhalation or ingestion cleanup level, and no analytes were detected above 1/10 of the ADEC Table C groundwater cleanup levels, no cumulative risk calculations were necessary. Contamination levels

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<sup>10</sup> One surface water detection, bis(2-ethylhexyl) phthalate at 0.015 mg/L, exceeded the water quality standard of 0.006 mg/L. However, bis(2-ethylhexyl)phthalate is a plasticizer that is a common laboratory contaminant and would be an unusual contaminant to find at a POL storage area, so the detection is assumed not to be representative of site conditions.

**Proposed Plan Final Actions for Five ERP Sites  
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detected at SS008 do not pose an unacceptable risk to human health.

**Proposed Remedy**

Under CERCLA, no further action is proposed at the former POL Site by the Yukon River (SS008), because the site does not pose unacceptable potential risk to human health or the environment.

Under Alaska State regulations, the remedy proposed for the former POL Site by the Yukon River (SS008) is conditional closure with an IC to document that DRO concentrations in soil exceed ADEC Method Two cleanup levels for unrestricted land use. The purpose of the IC is to help prevent the future handling of petroleum-contaminated soil inconsistent with state of Alaska regulations (e.g., excavation and deposition into a water body).

The IC will consist of a notice in USAF Real Property records stating that, DRO concentrations in soil exceed the ADEC Method Two cleanup level for unrestricted land use, and that disturbance of soil at SS008 will be prohibited without prior approval from ADEC.

USAF proposes to implement the IC by the following actions:

- USAF will survey the former POL Site (SS008) boundaries to obtain a property description suitable for recording purposes.
- USAF will document the IC in its Real Property records and in the Record of Decision for SS008 (which will be available in the Administrative Record). The Air Force Real Property records will contain a map indicating IC locations.
- USAF will notify ADEC prior to making any major changes to the IC. The 611th Civil Engineer Squadron/Civil Engineer (CES/CE) is the point of contact for the IC.

**PUBLIC PARTICIPATION REQUEST**

USAF and ADEC would like community members to review and comment on the recommendations in this Proposed Plan. The final decision for the sites

will be made after the end of the 30-day comment period (July 6 through August 8, 2007).

After consideration of comments, USAF will publish the decision for each site in a ROD. All comments received by the USAF will be summarized in the Responsiveness Summary section of the ROD.

You can send your comments in writing or by email to:

**Mr. Tommie Baker, USAF Community Relations, toll free at (800) 222-4137; or by email at [tommie.baker@elmendorf.af.mil](mailto:tommie.baker@elmendorf.af.mil)**

If requested by the community, a Public Meeting will be held on the information presented in this Proposed Plan and comments may also be presented at that meeting.

For your convenience, a pre-addressed comment form has been included at the end of this publication.

If you have questions, please contact the USAF Community Relations Coordinator.

**If you would like more information about this project:**

A complete record of all information related to the Bear Creek RRS ERP sites is stored in the *Administrative Record* located at Elmendorf Air Force Base. The *Administrative Record* is available on the internet at [www.adminrec.com](http://www.adminrec.com), although the most recent documents may not yet be available on the internet. Alternatively, access to the *Administrative Record* is available by appointment (contact Tommie Baker, USAF Community Relations Coordinator, at (907) 552-4506 to make an appointment).

A detailed description of site conditions can be found in the September 1999 RI report, entitled *Remedial Investigation Report for the Bear Creek Radio Relay Station, Alaska*. The RI report is contained in the *Administrative Record*.

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## GLOSSARY OF TERMS

**Administrative Record** - A file that contains information used by the USAF to decide on the cleanup for an ERP site. This file is available for public review.

**Alaska Department of Environmental Conservation (ADEC)** - the lead regulatory agency for Bear Creek RRS.

**AST** - Above ground storage tank.

**bgs** - Below ground surface.

**Benzene** - A colorless, volatile, inflammable, carcinogenic liquid (C<sub>6</sub>H<sub>6</sub>) used in a variety of chemical products, including motor fuel. Compounds containing benzene are called aromatic compounds.

**CERCLA** - Comprehensive Environmental Restoration, Compensation and Liability Act

**Cleanup level** - The concentration of a hazardous substance that may be present within a specified medium (i.e., soil, groundwater, or surface water) without posing an unacceptable risk to human health, safety, welfare, or the environment. ADEC provides tabulated cleanup levels in 18 AAC 75 that are applicable to contaminated soil and groundwater sites in Alaska.

**Diesel-range organics (DRO)** - A mixture of organic compounds found in diesel fuel, jet fuel, and heating oil. Polynuclear aromatic hydrocarbons (PAHs), such as naphthalene, are included in this range. DRO are generally less volatile and less soluble than GRO.

**EPA** - United States Environmental Protection Agency.

**Environmental Restoration Program (ERP)** - The USAF's CERCLA program.

**Feasibility Study (FS)** - An evaluation of potentially applicable remediation goals and remedial actions to address contamination at a site.

**Gasoline-range organics (GRO)** - A mixture of organic compounds found in gasoline.

**Hazard index (HI)** - A summation of the hazard quotients for all chemicals to which an individual is exposed. A hazard index value of 1.0 or less than 1.0 indicates that no adverse human health effects (noncancer) are expected to occur.

**Hazard quotient (HQ)** - A comparison of an estimated chemical intake (dose) with a reference dose level below which adverse health effects are unlikely. The hazard quotient is expressed as the ratio of the estimated intake

to the reference dose. The value is used to evaluate the potential for noncancer health effects, such as organ damage, from chemical exposures.

**Hazardous substance** - A chemical that presents an imminent and substantial danger to the public health or welfare if it is released to the atmosphere, surface water, groundwater, or land surface. Regulatory definitions can be found in CERCLA § 101(14) and 102 and in the NCP40 CFR § 300.5, and in Alaska Statute (AS) 46.03.826 and AS 46.09.900. Petroleum hydrocarbons are specifically excluded from the CERCLA definition but included in the Alaska Statute definition.

**Institutional control (IC)** - Any type of physical, legal, or administrative mechanism to restrict the use of, or limit access to, real property to prevent exposure to contaminants above permissible levels. The intent of the controls is to protect human health, the environment, and the integrity of an engineering remedy by limiting the activities that may occur at a particular site. Common examples of ICs include physical barriers to a site (e.g., fences and signs) and land use restrictions (e.g., restricting the installation of drinking water wells).

**Maximum Contaminant Limit (MCL)** - The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable regulatory drinking water standards established in the Safe Drinking Water Act. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

**Maximum Contaminant Limit Goal (MCLG)** - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are health-based levels established in the Safe Drinking Water Act that do not consider best available treatment technology and are not enforceable regulatory standards.

**Milligram per Kilogram (mg/Kg)** - A solid concentration measurement. One milligram of a substance in 1 kilogram of soil, which is also equal to a concentration of 1 *ppm* for that substance in soil (see definition for parts per million).

**Milligram per liter (mg/L)** - A liquid concentration measurement. One milligram of a substance in 1 liter of water.

**National Contingency Plan (NCP)** - The regulations that provide the structure and procedures for responding to discharges of oil and hazardous substances, as directed by CERCLA.

**Preliminary Assessment (PA)** - An initial investigation

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of a potentially contaminated site that includes a review of the site's history and may also include on-site or off-site reconnaissance to determine whether a release may require additional investigation or action.

**Parts per million (ppm)** - A unit of measure used to express extremely low concentrations of chemicals in media such as soil or water. As an analogy, one ounce of a chemical in a million ounces of soil is 1 ppm and is also equivalent to 1 second of time in a period of 11 1/2 days. Equivalent units for 1 ppm can be expressed as 1 mg/Kg (soil).

**Polynuclear (or Polycyclic) Aromatic Hydrocarbons (PAHs)** - A class of very stable organic molecules made up of only carbon and hydrogen (benzene rings). They occur naturally in crude oil and refined products (such as diesel fuel) and also occur as products of incomplete combustion. Some PAHs are highly carcinogenic (e.g., benzo(a)pyrene).

**Polychlorinated biphenyls (PCBs)** - A group of toxic, persistent chemicals used in transformers and capacitors for insulating purposes and in gas pipeline systems as a lubricant.

**POL** - Petroleum, Oil, and Lubricants

**Proposed Plan** - A document required by section 117(a) of CERCLA that informs the public about alternatives that are considered for cleanup of a contaminated site and identifies a preferred cleanup alternative. The document encourages public comment on all alternatives.

**Record of Decision (ROD)** - As required by CERCLA section 117(b), a document of the final cleanup decision under the site cleanup rules. The ROD documents the rationale for selection of the cleanup remedy and establishes performance goals for achieving cleanup. A ROD issued by or for ADEC is similar to a USAF Decision Document or an EPA ROD, but its format may differ. The format for an ADEC ROD is specified in the *ADEC Guidance on Decision Documentation Under the Site Cleanup Rules* (July 1999).

**Responsiveness Summary** - A summary of oral and/or written public comments received during a comment period and the responses to those comments. The responsiveness summary is part of the decision document or ROD.

**Remedial Investigation (RI)** -: An evaluation of site conditions (RI).

**Risk-Based Cleanup Level (RBC)** - Pathway-specific

(e.g., inhalation or ingestion) soil levels corresponding to the concentration that would cause an adverse effect through the inhalation or ingestion routes of exposure. RBCs for method two soil inhalation and ingestion pathways are provided in Appendix B to the ADEC's Cumulative Risk Guidance (ADEC, November 7, 2002).

**Site Closure** - A written determination by ADEC that a site was adequately characterized and achieved the applicable requirements under the site cleanup rules (18 AAC 75.380(d)(1)).

**SVOCs** - Semi-volatile organic chemicals

**Trichloroethene (TCE)** - A chlorinated solvent that is a widely used degreaser. Its chemical formula is C<sub>2</sub>HCl<sub>3</sub>, and it is heavier than water. It is colorless, volatile, and nonflammable. It is also known as trichloroethylene.

**TPH - Total petroleum hydrocarbons.** In Alaska, use of TPH as a bulk hydrocarbon measurement became obsolete when the Alaska Methods for measuring **DRO** (AK Method 102), **GRO** (AK Method 101), and **RRO** (AK Method 103) were developed, and Alaska cleanup levels were established for DRO, GRO, and RRO.

**Upper Confidence Limit (UCL)** - Because it is usually impossible to know the true mean contaminant concentration at a site, confidence intervals are generally used to account for the uncertainties by placing boundaries on the estimated (calculated) mean concentration. A 95% UCL of the mean concentration means that there is a 95% probability that the actual mean concentration does not exceed the 95% UCL concentration. ADEC guidance (Risk Assessment Procedures Manual) generally requires use of 95% UCLs as exposure point concentrations for risk assessment.

**USAF** - United States Air Force

**VOCs**- Volatile organic chemicals

**White Alice** - Communications systems built throughout rural Alaska in the 1950s for military and civilian use. White Alice communications systems sent very large signals skyward, and a small fraction of the signal would bounce off the earth's atmosphere to be received by another White Alice site beyond the horizon. The White Alice sites were self-contained outposts that were staffed 24 hours a day, 365 days a year and typically contained dormitories, large generators and associated fuel storage facilities, and airstrips, in addition to the communications equipment. The White Alice sites were gradually replaced by more efficient earth satellite systems; the last White Alice site was deactivated in 1985.



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