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# BIG MOUNTAIN RRS
# ALASKA

# ADMINISTRATIVE RECORD
# COVER SHEET

**AR File Number** 76


# *FINAL* Record of Decision

*for*

1,000-Gallon Fuel Oil AST (SS002)
Auto Maintenance Shop and Flight Operations Bldg. (SS003)
1,000-Gallon Motor Vehicle Gasoline (MOGAS) AST (SS004)
Temporary Auto Storage Building (SS011)
Dual Fuel Oil AST System (126,000-gallon) (SS014)
Three Thousand Gallon AST System (SS016)
Well and Pump House (SS017)

## BIG MOUNTAIN RADIO RELAY STATION, ALASKA (BIG MOUNTAIN RRS)

*Prepared By*

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

June 2008

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# Acronyms

| | |
|---|---|
| AAC | Alaska Administrative Code |
| ADEC | Alaska Department of Environmental Conservation |
| ARARs | Applicable or Relevant and Appropriate Requirements |
| AST | Aboveground Storage Tank |
| ATV | all-terrain vehicle |
| 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 |
| CES | 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 |
| DRMO | Defense Reutilization and Marketing Office |
| DRO | Diesel-Range Organics |
| EPA | Environmental Protection Agency |
| EPC | Exposure point concentration |
| ERP | Environmental Restoration Program |
| FS | Feasibility Study |
| GRO | Gasoline-Range Organics |
| HARM | Hazard Assessment Rating Methodology |
| HI | Hazard Index |
| HQ | hazard quotient |
| IC | Institutional Controls |
| msl | mean sea level |
| NCP | National Contingency Plan |
| NEPA | National Environmental Policy Act |
| NPL | National Priorities List |
| OU | Operable Unit |
| PA | Preliminary Assessment |
| PAH | Polycyclic aromatic hydrocarbons |
| PCB | Polychlorinated biphenyl |
| RAB | Restoration Advisory Board |
| RAIS | Risk Assessment Information System |
| RAO | remedial action objective |
| RBC | Risk-based concentration |
| 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 |
| SF | slope factor |
| SVOC | semi-volatile organic compound |
| TPH | total petroleum hydrocarbons |
| TSCA | Toxic Substances Control Act |
| UCL | upper confidence limit |
| USAF | United States Air Force |
| USC | United States Code |
| UST | Underground Storage Tank |
| VOC | volatile organic compound |
| WACS | White Alice Communication System |

*Units of Measurement*

| | |
|---|---|
| mg/Kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| °F | Degrees Fahrenheit |

# 1.0 Declaration

## 1.1 Site Names and Location

| | |
|---|---|
| *Facility Name:* | Big Mountain Radio Relay Station Site (Big Mountain RRS), Alaska |
| *CERCLIS ID Number*: | NOT APPLICABLE |
| *Site Names (Numbers)*: | 1,000-Gallon Fuel Oil AST (SS002),<br>Auto Maintenance Shop/Flight Operations Building (SS003),<br>1,000-Gallon MOGAS AST (SS004),<br>Temporary Auto Storage Building (SS011),<br>Dual Fuel Oil AST System (126,000-gallon) (SS014)<br>Three Thousand Gallon AST System (SS016), and<br>Well and Pump House (SS017). |

The former Big Mountain RRS is located 220 miles from Anchorage in southwest Alaska on the south shore of Lake Iliamna.

Big Mountain includes 402 acres of land that has been divided into two areas, the Lower Camp and the Upper Camp. The former Lower Camp installation support facility and airstrip were located at the base of Big Mountain. The Upper Camp communication facility was located at the top of Big Mountain at an elevation of 2,150 feet above mean sea level (msl).

There are no roads connecting the installation to the surrounding communities, and access to the installation area is by air, barge across the lake, or by long overland trails with all-terrain vehicles (ATVs) in the summer months or snow mobiles in the winter. The refurbished 4,000-foot long runway at the Lower Camp area is used for current activities at the property. A 1.5-mile road connects the airstrip with the barge landing site on the lake, located at Reindeer Bay. The Barge Landing site property has been transferred to the University of Alaska, the current property owner.

Groundwater has not been encountered at the Upper Camp; bedrock is covered by only a thin layer of soil at Upper Camp. However, a well formerly located approximately 1000 feet west and downslope of Upper Camp historically produced groundwater from fractured bedrock approximately 230 feet below ground surface (bgs). In addition, there is shallow groundwater at the Lower Camp. There are no drinking water wells within 20 miles of Big Mountain RRS.

Surface water adjacent to Big Mountain RRS (Lake Iliamna and Belinda Creek, which flows into Iliamna Lake at Reindeer Bay) provides habitat for aquatic insects, shorebirds, and fish. The creek and lake also receive subsistence use.

## 1.2 Statement of Basis and Purpose

This Record of Decision (ROD) presents the Final Selected Remedies for the seven Environmental Restoration Program (ERP) sites listed above at Big Mountain 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. The final remedies selected for the seven subject sites are summarized below:

- No action under CERCLA for the seven ERP Sites: SS002, SS003, SS004, SS011, SS014, SS016, and SS017;
- Unconditional site closure under Alaska State Laws and Regulations for five ERP Sites: SS003, SS004, SS011, SS016, and SS017; and
- Conditional site closure with Institutional Controls (ICs) under Alaska State Laws and Regulations for two ERP Sites: SS002 and SS014.

This ROD is based on documents contained in the Administrative Record file for Big Mountain RRS, including but not limited to reports of the 1983 Hazardous Substance Investigation, 1989 and 1993 Preliminary Assessments, 1996 Environmental Assessment, 2000 Clean Sweep Environmental Survey, 1998-2001 Remedial Investigation/Feasibility Study, 2003-2004 Clean Sweep Phase I and II Activities, 2004-2006 Remedial Investigation, and 2005 Remedial Actions.

### 1.2.1 CERCLA Statement of Basis and Purpose

There are no CERCLA hazardous substances identified as contaminants of concern (COCs) at the seven 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 (DERP), 10 *United States Code* (USC) 2701 et seq.; CERCLA 42 USC 9601 et seq.; Executive Order 12580, 52 *Federal Register* 2923 (23 January 1987); and National Contingency Plan (NCP), 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 Big Mountain RRS. The State of Alaska concurs with the selected remedies (no action under CERCLA).

### 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 seven 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 there under.

This ROD is issued by the USAF in accordance with and satisfying the requirements of the Alaska Oil and Hazardous Substance Pollution Control Act, 18 *Alaska Administrative Code* (AAC) 75. The State of Alaska concurs with the selected remedies (unconditional or conditional closure).

## 1.3 Assessment of Sites

### 1.3.1 Assessment Under CERCLA

Response actions at the seven 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 five of the seven subject Big Mountain RRS ERP sites (i.e., SS003, SS004, SS011, SS016, and SS017). At the 1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014) sites, incidental fuel releases and operational practices have led to contamination of the soil with DRO above State of Alaska cleanup levels protective of unrestricted use (i.e., ADEC Method Two soil cleanup levels[1]). The response actions selected in this ROD are necessary under Alaska State authority to meet IC requirements promulgated in ADEC regulations (18 AAC 75.375).

Areas within the 1,000-Gallon Fuel Oil AST Site (SS002) and Dual Fuel Oil AST System Site (SS014) cannot support unrestricted use due to petroleum hydrocarbons remaining in place above ADEC Method Two cleanup levels. Land use restrictions are required as part of this response action and will be achieved through imposition of ICs[2] that limit the use and/or exposure to those areas of the property that are contaminated.

USAF is committed to implementing, monitoring, maintaining, and enforcing all components of the selected remedies to ensure that they remain compliant with Alaska laws and regulations.

## 1.4 Description of Selected Remedy

The 1,000-Gallon Fuel Oil AST (SS002), Auto Maintenance Shop/Flight Operations Building (SS003), 1,000-Gallon MOGAS AST (SS004), Temporary Auto Storage Building (SS011), Dual Fuel Oil AST System (126,000-gallon) (SS014), Three Thousand Gallon AST System (SS016), and Well and Pump House (SS017) are seven of the thirteen ERP sites at Big Mountain RRS. No action under CERCLA and unconditional or conditional closure under Alaska State regulations of these seven 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 Big Mountain RRS ERP sites.

### 1.4.1 Remedies Required Under CERCLA

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

[1] In this ROD, "ADEC Method Two" refers to the 18 AAC 75.341(c) Table B1 (Under 40-inch zone) or 18 AAC 75.341(d) Table B2 (Under 40-inch zone) soil cleanup levels protective of the migration to groundwater, inhalation, and ingestion pathways (as amended through December 30, 2006)

[2] ICs are usually referred to as land use controls, or LUCs, by the USAF.

### 1.4.2 Remedies Required Under State of Alaska Regulations

Remedial action is necessary under State of Alaska Regulations to address petroleum-based products (DRO) in the soil at Sites SS002 and SS014. The final remedies selected under Alaska State laws and regulations for the seven ERP sites addressed in this ROD are summarized below.

**Auto Maintenance Shop/Flight Operations Building (SS003), 1,000-Gallon MOGAS AST (SS004), Temporary Auto Storage Building (SS011), Three Thousand Gallon AST System (SS016), and Well and Pump House (SS017)**

**Unconditional Site Closure**

No action is necessary under State of Alaska Regulations at Sites SS003, SS004, SS011, SS016, and SS017. There are no COCs at these sites. Unconditional closure will be noted in ADEC and USAF records. The land is available for unrestricted use.

**1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014)**

**Conditional Closure with ICs**

Although contamination at the 1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014) does not pose unacceptable potential risk to human health or the environment, soil is contaminated by petroleum hydrocarbons above State of Alaska cleanup levels protective of unrestricted use (i.e., the ADEC Method Two cleanup levels for soil).

The Remedial Action Objectives (RAOs) for SS002 and SS014 are listed below:

a) Document that petroleum hydrocarbons in surface and subsurface soil exceed levels protective of unrestricted use.

b) Restrict excavation and transportation of contaminated soil to prevent migration of contaminants.

In order to achieve the RAOs listed above, USAF will implement the remedy outlined below.

**1. Institutional Controls (ICs)**

ICs are an integral part of the selected remedy and are necessary to meet RAOs (a) and (b) above. USAF will implement, monitor, maintain, and enforce the ICs identified below in accordance with Alaska's Contaminated Site regulations.

The goals of the ICs are to document (for waste management purposes in the event of subsurface activities) that soil impact exceeds ADEC Method Two cleanup levels protective of unrestricted use.

The ICs will consist of excavation and construction restrictions within the site boundaries and documentation that soil is impacted above levels allowing unrestricted use.

USAF will implement the ICs by taking the following actions:

- Delineate the boundaries of soil with DRO above Method Two cleanup levels at Sites SS002 and SS014.
- The boundaries of soil with DRO above Method Two cleanup levels at Sites SS002 and SS014 will be surveyed for State of Alaska and USAF Real Property Records.

- Document the ICs in USAF's Real Property Records. The Real Property Records will contain a map indicating IC locations.
- Notify ADEC prior to making any major changes to the ICs. The 611th Civil Engineer Squadron (CES) is the point of contact for the IC.
- ICs will stay in effect until DRO reaches State of Alaska Cleanup Levels protective of unrestricted use (i.e. ADEC Method Two cleanup levels for soil) at SS002 and SS014.

For as long as the Air Force manages the property, USAF will enforce the ICs by the following actions:

- Perform visual inspections to verify effectiveness of the ICs, and report results of the inspections to ADEC. Inspection reports will evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed
    - Any activity that is inconsistent with IC requirements, objectives, or controls, or any action that may interfere with the effectiveness of the IC shall be addressed by the USAF as soon as practicable after discovery, but in no case will the process be initiated later than 10 days after the USAF becomes aware of the breach.
    - USAF shall provide notice to ADEC as soon as practicable after discovery of any activity that is inconsistent with IC requirements, objectives or controls, or any action that may interfere with the effectiveness of the IC.
- In the event that the ICs fail or are deficient and could imminently lead to actual risk to human health or the environment, USAF will address the situation promptly, including notification to ADEC.
- USAF will obtain ADEC approval prior to conducting any excavation activities within the contaminated areas.

In the event that the property is transferred, the property transfer document will describe the ICs. USAF will provide notice to ADEC prior to any transfer, sale, or lease of the property, so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain the ICs.

**2. Final Disposition of Site**

When ICs have been established in accordance with Numbered Section 1 (above), Conditional Closure with ICs will be noted in USAF and ADEC records for the 1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014) Sites. The sites will be considered protective of recreational and residential use, with ICs.

## 1.5 Statutory Determinations

### 1.5.1 CERCLA

The selected remedy for the seven Big Mountain LRRS 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 seven subject Big Mountain RRS sites (SS002, SS003, SS004, SS011, SS014, SS016, and SS017). Because there are no CERCLA hazardous substances above levels that allow for unrestricted use at any of the Big Mountain RRS sites, there is no statutory requirement for a five-year review.

### 1.5.2 Remedies Required Under State of Alaska Regulations

The selected remedies for the seven Big Mountain RRS sites under State of Alaska Regulations (unconditional closure for SS003, SS004, SS011, SS016, and SS017 and conditional closure with ICs for SS002 and SS014) comply 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 seven sites: 1,000-Gallon Fuel Oil AST (SS002), Auto Maintenance Shop/Flight Operations Building (SS003), 1,000-Gallon MOGAS AST (SS004), Temporary Auto Storage Building (SS011), Dual Fuel Oil AST System (126,000-gallon) (SS014), Three Thousand Gallon AST System (SS016), and Well and Pump House (SS017) at Big Mountain LRRS, 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.

Brent A. Johnson — 10 JULY 2008

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

John Halverson — 7/14/08

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

# 2.0 Decision Summary

The Decision Summary identifies the Final Remedy selected for each of the seven 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*: 1,000-Gallon Fuel Oil AST (SS002) — (198125X912722), Auto Maintenance Shop/Flight Operations Building (SS003) — (198125X912723), 1,000-Gallon MOGAS AST (SS004) — (198125X912725), Temporary Auto Storage Building (SS011) — (198125X912727), Dual Fuel Oil AST System (126,000-gallon) (SS014) — (198125X912729) Three Thousand Gallon AST System (SS016)—(198125X912733), and Well and Pump House (SS017)—(198125X912731).

*Site Location*: Big Mountain Radio Relay Station (RRS), Alaska

*Latitude and Longitude*: 59.3612° north, 155.2588° west

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The former Big Mountain RRS is located 220 miles southwest of Anchorage on the south shore of Lake Iliamna (**Figure 2-1** and **Figure 2-2;** note that all figures are located at the end of Section 2). The nearest permanent settlement is Kokhanok, which is located on the southern shore of Iliamna Lake about 16 miles east of the Big Mountain RRS. The village of Igiugig is located about 30 miles west of the installation, where the Kvichak River flows out of Iliamna Lake. Other regional lake communities include Pedro Bay, Iliamna, and Newhalen.

Big Mountain RRS includes 402 acres of land that has been divided into two areas, the Lower Camp and the Upper Camp. The Lower Camp installation support facility and air strip were located at the base of Big Mountain. The Upper Camp communication facility was located at the

top of Big Mountain at an elevation of 2,150 feet above mean sea level (msl). **Figure 2-3** illustrates the installation layout.

Three of the subject sites, the 1,000-Gallon Fuel Oil AST (SS002), the Automotive Maintenance Shop/Flight Operations Building (SS003), and the 1,000-Gallon MOGAS AST (SS004) are located at Lower Camp, and three (i.e. the Temporary Auto Storage Building (SS011), Dual Fuel Oil AST System (SS014), and 3,000-Gallon AST (SS016)) are located at Upper Camp. The Well and Pump House (SS017) is located approximately 1,000 feet west of Upper Camp. All of the buildings, facilities, and tanks have been removed from Big Mountain RRS.

There are no roads connecting the Big Mountain installation to the surrounding communities, although there are a few cabins in the general area. Access to the installation is by air, barge, snow machine, or all-terrain vehicle (ATV). Although the Lower Camp airstrip has not been regularly maintained since 1979, repairs were made in 2003 to support USAF restoration efforts. Sportsmen who fly into the area for recreational purposes occasionally use the Lower Camp airstrip.

As the lead agency for remedial activities, the United States Air Force (USAF) has conducted environmental restoration activities at Big Mountain RRS sites SS002, SS003, SS004, SS011, SS014, SS016, and SS017 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

The seven Big Mountain RRS ERP sites addressed in this ROD are shown on **Figure 2-3** and described briefly below:

1,000-Gallon Fuel Oil AST Area (SS002): Site SS002 is located approximately ten feet north of the former Flight Operations Building at Lower Camp, adjacent to the Upper Camp Access road (**Figure 2-4**). The 1,000-gallon aboveground storage tank (AST) system was used to store fuel oil for generators and heating systems associated with the Automotive Maintenance Shop and Flight Operations buildings.

Site investigation activities discovered petroleum contamination in the soil at this site. There is no documentation of the contamination source, but the contamination is consistent with one or more historic fuel spills.

Automotive Maintenance Shop/Flight Operations Building (SS003): ERP site SS003 includes the former Automotive Maintenance Shop and the adjacent former Flight Operations Building. It is located in Lower Camp just to the south of the former 1,000-gallon Fuel Oil AST (Site SS002) and adjacent to the Upper Camp access road (**Figure 2-4**). Site SS003 also includes a concrete

slab reported to have been the Fire and Rescue Equipment Building and an area on the west side of the buildings once used for 55-gallon drum and vehicle storage.

Site investigation activities discovered petroleum contamination in the soil at this site. There is no documentation of the contamination source, but the contamination appears to be the result of one or more historic spills from SS002.

Former 1,000-gallon MOGAS AST (SS004): ERP Site SS004 is located approximately 250 feet northeast of the former Flight Operations Building at Lower Camp (**Figure 2-4**). The MOGAS tank system included an AST, a dispenser housed in a small wooden enclosure, and possibly a small drum storage area directly north of the AST. There are no records available regarding the amount of fuel stored, spills, or system leaks.

Site investigation activities in 2004 discovered petroleum contamination in the soil at this site[3]. There is no documentation of the contamination source, but the petroleum contamination likely resulted from one or more historic spills from the MOGAS tank or dispenser.

No indication of a structure, debris, or surface soil staining was identified at SS004 during the 1998 RI/FS activities; therefore, this site was not included in the 2003-2004 Clean Sweep activities.

Former Temporary Auto Storage Building (SS011): Site SS011 is located directly east of the main road entering the Upper Camp (**Figure 2-5**). The location is approximately 75 feet southwest of the former Auxiliary Dormitory Building.

The Temporary Auto Storage Building was used for vehicle storage and maintenance during the operation of the Big Mountain RRS facility. The types and quantities of material or equipment stored at the building are unknown; however, as-built drawings of the facility indicate the presence of an AST located at the northeast corner of the building.

Former Dual Fuel Oil AST system (SS014): Site SS014 is located at the western end of the Upper Camp facility directly west of the access road to the summit and 125 feet west of the dormitory (**Figure 2-5**). The system included two 126,000-gallon ASTs and aboveground and belowground piping within a bermed containment area. The ASTs reportedly held only fuel oil. The area north of the dual ASTs contained the truck-filling stand and another AST formerly located at the edge of a concrete pad.

Sampling performed during 1998 RI activities discovered petroleum contamination at this site. Leaks from fueling activities and a buried pipeline discovered during the 2005 excavation activities are the likely sources of petroleum contamination.

The 3,000-gallon AST system (SS016): Site SS016 is located on the north side of the former dormitory building and was likely used to store heating fuel for the dormitory. **Figure 2-5** shows the location of the AST system at the Upper Camp.

The Well and Pump House (SS017): Site SS017 is located approximately 1,000 feet west of the main Upper Camp facility (**Figure 2-3**). The pump house was a wooden structure with a concrete slab accessible by road from the main road leading to Upper Camp. An above ground pipeline

[3] Polychlorinated biphenyls (PCBs) were also detected above the ADEC Method Two cleanup level in one soil sample collected in 2004 However, PCBs were not detected in any of the eight follow-up soil samples that were collected in 2005 from the area of the 2004 detection (see discussion in Section 2.6.2.3).

carried water from the well to the water storage tank at Upper Camp. The former water supply well was decommissioned in accordance with ADEC regulations and the Well Pump House has been removed.

## 2.2 Site History and Enforcement Activities

This section provides background information about Big Mountain RRS. Historical environmental investigations at Big Mountain RRS that led to the ROD are summarized in Section 2.6.1, and remedial actions performed to date are summarized in Section 2.6.2.

The White Alice Communication System (WACS), located at the Upper Camp, was established as one of 31 WACS constructed across Alaska in the 1950s for a statewide communication system. The WACS served as a communication link between Long Range Radar Sites and military bases in Anchorage and Fairbanks until 1975.

The Big Mountain installation and operational mission was decommissioned in 1979. Most of the facilities were abandoned and left in place at that time. In 2003 and 2004, all remaining buildings and their foundations, antennas, tanks, pipelines, vehicles, and debris were cleaned up under the Clean Sweep program. All wastes generated during the Clean Sweep activities were managed in accordance with Federal and State regulations. Building debris was disposed into an inert waste landfill constructed for the Clean Sweep program, and all hazardous waste was shipped off-site.

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

NCP Section 300.430(f)(3) establishes a number of public participation activities that the lead agency (USAF) must conduct following preparation of the Proposed Plan and review by the support agency (ADEC). In accordance with the NCP requirements, USAF distributed the *Proposed Plan Final Actions for Seven ERP Sites at Big Mountain RRS* (Appendix A) to the local communities to solicit public input. Components of these items and documentation of how each component was satisfied for the Big Mountain RRS sites are described in Table 2-1 and **Table 2-2**.

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

| Requirement: | Satisfied by: |
|---|---|
| Notice of availability of the Proposed Plan and RI/FS must be made in a widely-read section of a major local newspaper. | Notice of availability was published in the display ad section of the Bristol Bay Times. |
| Notice of availability must occur at least two weeks prior to the beginning of the public comment period. | Notice of availability was sent to local and regional offices on June 6, 2007 for posting and was also published for one week in the Bristol Bay Times, starting on June 7, 2007. The public comment period began on June 14, 2007 and was held open through August 15, 2007. |
| Notice of availability must include a brief abstract of the proposed plan which describes the alternatives evaluated and identifies the preferred alternative (NCP Section 300.430(f)(3)(i)(A) | Notice of Availability provided the required information. |
| Notice of availability should consist of the following information:<br>• Site name and location<br>• Date and location of public meeting<br>• Identification of lead and support agencies<br>• Alternatives evaluated in the detailed analysis<br>• Identification of preferred alternative<br>• Request for public comments<br>• Public participation opportunities including:<br>o Location of information repositories and Administrative Record file<br>o Methods by which the public may submit written and oral comments, including a contact person<br>o Dates of public comment period<br>o Contact person for the community advisory group (e.g., Restoration Advisory Board) if applicable | |

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

| Requirement: | Satisfied by: |
|---|---|
| Lead agency should make document available to public for review on same date as newspaper notification. | Fifty copies of the Proposed Plans were mailed to the tribal offices of the following villages around Lake Iliamna on June 6, 2007: Igiugig, Pedro Bay, New Halen, Nondalton, Iliamna, Kokhanok, and Port Alsworth. An additional 100 copies were made available and distributed at each of the Public Meetings held in these communities. |
| 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 Big Mountain is maintained on Elmendorf AFB. The file is also available on-line at www.adminrec.com (select DOD, then PACAF, then Alaska, then Big Mountain), although the most recent documents may not be available yet on the internet. |
| CERCLA Section 177(a)(2) requires the lead agency to provide the public with a reasonable opportunity to submit written and oral comments on the Proposed Plan.<br><br>NCP Section 300.430(f)(3)(i) requires the lead agency to allow the public a minimum of 30 days to comment on the RI/FS and the Proposed Plan. | The Air Force extended the public comment period for the Proposed Plan to August 15, 2007, even though there was no formal request from the community for an extension. |
| The lead agency must extend the public comment period by at least 30 additional days upon timely request. | The Air Force received no requests to extend the public comment period but did so voluntarily to ensure time requirements were met for notice and review. |
| The lead agency must provide the opportunity for a public meeting to be held at or near the site during the public comment period. A transcript of this meeting must be made available to the public and be maintained in the Administrative Record for the site (pursuant to NCP Section 300.430(f)(3)(i)(E)). | Public meetings were held in Igiugig on June 11, in Pedro Bay on June 12, Nondalton and Iliamna on June 13, and Kokhanok and Port Alsworth on June 14, 2007. Transcripts and lists of attendees will be added to the Administrative Record file. |

Air Force responses to comments received during the public comment period are included in the Responsiveness Summary, which is provided as Section 3 of the ROD.

### 2.3.2 Big Mountain RRS Community Relations Activities

A **Community Relations Plan** (CRP) was prepared for Big Mountain RRS in 1998 (USAF [Dowl/Ogden], 1998a). A CRP is prepared to promote communication between the USAF and the general public during environmental restoration activities at Big Mountain RRS.

A **Restoration Advisory Board** (RAB) is one avenue for stakeholder involvement in the restoration process. In April 1998, the Nillivena Consortium (a consortium of five Iliamna Lake villages) was approached about the formation of a RAB to oversee and provide input into proposed restoration actions at the Big Mountain installation. Responses indicated that USAF attendance at Nillivena Consortium meetings and various public meetings was preferable to the establishment of a regional RAB for Big Mountain (USAF [MWH], 2001).

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

The Administrative Record is also available on the internet at www.adminrec.com (select DOD, then PACAF, then Alaska, then Big Mountain), 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 Big Mountain RRS. The mailing list developed for Big Mountain includes Alaska Native organizations and community agencies at Iliamna, Kokhanok, Igiugig, Pedro Bay, and Newhalen.

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 Big Mountain RRS or the ERP process.

At least three full-color **fact sheets** have been produced and distributed to interested stakeholders at public meetings between 2003 and 2006. The fact sheets have detailed upcoming demolition or restoration actions, or completed ones, and were intended to inform local residents what was going on at this site in terms of environmental cleanup of the property.

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

The USAF, with concurrence from ADEC, has organized the environmental restoration work at Big Mountain RRS into the 13 sites listed in **Table 2-3**. The actions selected for the seven sites addressed in this ROD do not affect restoration of the other ERP sites listed in **Table 2-3**.

**Table 2-3: Big Mountain RRS ERP Site Summary**

| Site | Name | Status |
|---|---|---|
| | Lower Camp | |
| ST001 | 42,000-Gallon Fuel Oil AST | DD for Interim Remedial Action (IRA)(2002)<br>Interim Cleanup (Removal Action) (2005) |
| **SS002** | **1,000-Gallon Fuel Oil AST** | **DD for IRA (2002)**<br>**Interim Cleanup (Removal Action) (2005);**<br>**CERCLA-No Action**<br>**State of Alaska-ICs and Conditional Closure** |
| LF005 | Landfill | Interim DD (2002)<br>Risk Assessment (in progress) |
| **SS003** | **Automotive Maintenance Shop/Flight Operations Building** | **CERCLA-No Action**<br>**State of Alaska-Unconditional Closure** |
| **SS004** | **1,000-Gallon MOGAS AST** | **Hot Spot Removal (2005);**<br>**CERCLA-No Action**<br>**State of Alaska-Unconditional Closure** |
| | Upper Camp | |
| SS013 | Antennae 2 and 4 | Final No Action DD (2002) |
| SS015 | Antennae 1 and 3 | Final No Action DD (2002) |
| **SS014** | **Dual Fuel Oil AST System (126,000-gallon ASTs)** | **DD for I IRA (2002)**<br>**Interim Cleanup (Removal Action) (2005);**<br>**CERCLA-No Action**<br>**State of Alaska-ICs and Conditional Closure** |
| SS009 | Septic Tank and Fire Pump House | Proposed Plan for Final Remedial Action (2004) |
| SS010 | Equipment and Power Building and Auxiliary Dormitory | Proposed Plan for Final Remedial Action (2004) |
| **SS011** | **Temporary Auto Storage Building** | **CERCLA-No Action**<br>**State of Alaska-Unconditional Closure** |
| **SS016** | **3,000-Gallon AST** | **CERCLA-No Action**<br>**State of Alaska-Unconditional Closure** |
| **SS017** | **Well and Pump House** | **CERCLA-No Action**<br>**State of Alaska-Unconditional Closure** |

## 2.5 Big Mountain RRS Environmental Characteristics

Most of the following discussion is summarized from the detailed geology/water resources sections in the *Final Remedial Investigation Report for Sites ST001, SS002, SS003, SS004, SS011, and LF005* (USAF [Paug-Vik], 2006), which was itself a compilation summary of several previous study reports for the Big Mountain installation, including the 2001 *Final Remedial Investigation/Feasibility Study for Big Mountain RRS.*

### 2.5.1 Physiography and Climate

Big Mountain RRS is located in southwest Alaska adjacent to Lake Iliamna. The Iliamna Lake region has a continental type of climate typical of interior Alaska, which is characterized by extreme seasonal variations in temperature and low amounts of precipitation. Weather observation data recorded at King Salmon, approximately 70 miles to the southwest in the coastal area of Bristol Bay, indicate average summer temperatures from 40 degrees Fahrenheit (°F) to 63°F, and winter temperatures between 8°F to 30°F (WRCC, 2000). Temperature extremes for King Salmon are a maximum of 88°F in the summer and a minimum of –48°F in the winter. Some variation in the data would be expected at Big Mountain, which is 70 miles inland but situated near two large regional lakes that exert a moderating influence on climatic conditions.

The rainy season at Big Mountain generally occurs between July and October, with snowfall and subfreezing temperatures typical between November and March. Annual precipitation levels measured at Iliamna, located 30 miles northwest of Big Mountain, average 25.6 inches, including 59 inches of snow (WRCC, 2000).

Wind data gathered at Iliamna shows average daily wind speeds exceeding 30 mph approximately 63 percent of the time (AFCCC, 2001). Similar wind conditions can be expected at the Big Mountain RRS.

Fog may create low visibility conditions for the Upper Camp area at the top of Big Mountain. Weather data gathered at the Upper Camp indicated that fog is more prevalent seasonally, occurring about 15 percent of the time between July and August, and 5 percent of the time during the rest of the year (AFCCC, 2001).

### 2.5.2 Geology

The majority of bedrock in the Big Mountain area is of volcanic origin, with exposed bedrock formations of basalt, andesite, tuff, and volcanic conglomerate and rubble. The surface topography of the region was altered during the last Pleistocene glaciation, with unconsolidated, poorly sorted glacial sediments and morainal deposits making up much of the material that thinly overlies volcanic bedrock in the highland areas.

In the lowland areas and drainage basins of the region, the glacial sediments have been reworked and distributed in broad alluvial outwash plains, which can cover many square miles. The alluvial stratigraphy consists of inter-stratified sand and gravel interspersed with silt and fine sand layers. Some of the lowland areas are poorly drained, and the surface soils may be dark, loamy, and highly acidic, with a high organic material content.

Soil data gathered at the Big Mountain RRS Lower Camp area indicate that much of the native soils in this area consist of 5 percent to 50 percent silt with variable amounts of organic material. The low-lying areas within the Lower Camp typically have a top layer of about 20 inches of dark brown loamy soils, which are strongly acidic and have been shown to contain naturally occurring arsenic. Much of the surface material at the Lower Camp facility consists of imported fill of local gravel material.

Surface material at the Upper Camp area has been found to be thin to non-existent overlying exposed bedrock layers. Thin layers of unconsolidated volcanic gravel material are typical of the mountainous terrain in the area.

### 2.5.3 Hydrogeology and Surface Water Hydrology

Groundwater and surface water have not been encountered at the Upper Camp. A thin layer of rocky soil covers bedrock, with no permanent water table[4]. However, during installation operations, potable water and fire protection resources for Upper Camp were reportedly provided by a well located in bedrock (230 feet bgs) approximately 1,000 feet west and downslope of Upper Camp at former Building 1004 (Water Supply Facility, ERP Site SS017). The well has not been used since 1979 and was abandoned in accordance with ADEC guidelines in 2004. Surface water drainage at Upper Camp is generally by overland flow down the mountain.

Shallow groundwater and surface water are present at the Lower Camp. Boreholes advanced at the Lower Camp during RI activities encountered water at depths ranging from 1.5 to 25 feet below ground surface (bgs) (USAF [Dowl/Ogden], 2001). Generally, groundwater flow at the Lower Camp sites mimics topography and trends northwest. However, a groundwater gradient of 0.08 feet/feet with a south to southwesterly groundwater flow direction was measured at the Lower Camp landfill (LF005). This indicates that the pond may recharge the surrounding shallow water table aquifer under certain conditions (i.e. heavy rainfall or snow melt runoff). A small, unnamed drainage located just north of the Lower Camp airstrip receives most of the surface water from the Lower Camp area. Several beaver dams built along this stream have led to the formation of many large ponds and marshy areas.

Water draining from the north, northwest, and northeast side of Big Mountain drains directly into Iliamna Lake, which is located two miles west of the Big Mountain installation. Surface water from the west and south sides of the Upper Camp area and from Lower Camp tends to flow south and southeast into the Belinda Creek drainage. Belinda Creek flows into Iliamna Lake at Reindeer Bay. Iliamna Lake is the regional discharge zone for the area's surface water.

### 2.5.4 Ecology

Big Mountain rises to an elevation of 2,160 feet above msl, which is well above tree line for the area. The mountain slopes are rocky, barren, and windswept, dominated by mountain avens (*Dryas spp.),* heaths (*Ericaceae* family), low-growing forbs (*Saxifragaceae* and *Fabaceae* families), grasses (*Poaceae* families), and sedges (*Cyperaceae* families). In some areas, mosses form patchy to continuous mats on the rocky substrate.

On the well-drained mountain slopes, taller scrub plant communities occur at the tree line, especially along stream banks and drainages. Sitka alder (*Alnus viridis*) and feltleaf willow (*Salix alaxensis*) grow to a height of about six feet and dominate these plant community niches. Low shrubs and understory herbaceous layers are common in the more open alder-willow stands.

[4] After a rain or snowmelt event, there may be precipitation water present in the thin soil layer for a short time until it drains off down the mountain, but there is no permanent water table. A well formerly located approximately 1,000 feet west and downslope of Upper Camp historically produced groundwater from fractured bedrock approximately 230 feet deep.

Below tree line at Big Mountain, mixed alder and willow communities dominate the Lower Camp area. Areas south of the former runway are vegetated primarily by mixed forest communities dominated by white spruce (*Picea glauca*), paper birch (*Betula papyrifera*), and balsam poplar (*Populus balsamifera*). Dense stands of low shrubs and herbaceous ground cover characterize understory areas in these forests. Sedge-moss bog meadows can be found in depressions within the forest communities, and marshy wetland areas along impounded stream drainages.

Most birds, mammals, and fishes common to interior or southwestern Alaska are found in the Big Mountain area. Iliamna Lake produces a fall flight of approximately 370,000 ducks and geese and 12,000 tundra swans (*Cygnus columbianus*) and serves as a resting spot for waterfowl and other migrating birds.

There have been 135 species of birds reportedly sighted in the Big Mountain RRS area. Bird species observed during remedial investigation/feasibility study (RI/FS) field work at the installation in 1998 included snow buntings (*Plectrophenax nivalis*), golden-crowned sparrows (*Zonotrichia atricapilla*), Wilson's warblers (*Wilsonia pusilla*), orange-crowned warblers (*Verivora celata*), hermit thrushes (*Catharus guttatus*), gray jays (*Perisoreus candensis*), and ravens (*Corus caurinus*). Game birds were also observed at the installation and include spruce grouse (*Falcipennis canadensis*) and ptarmigan (*Lagopus spp).*

Herbivorous mammals are common in the Big Mountain area. Species adapted to foraging on open, hilly ground or talus slopes such as marmots and ground squirrels are found at higher elevations. Voles and lemmings are common at lower elevations where plant abundance is greater.

Larger-bodied mammalian predators, such as arctic foxes (*Alopex lagopus*) and wolves (*Canis lupis*) that prey on the smaller mammals are present in the area. The larger foraging range mammals are also present and include brown bear (*Ursus arctos*), moose (*Alces alces*), and caribou (*Rangifer tarandus*).

Fisheries are an important natural wildlife resource in the Big Mountain area. The regional network of rivers, streams, and lakes produces some of the world's finest sport fishing. The Bristol Bay area is the largest producer of sockeye salmon in the world, and approximately two-thirds of the Bristol Bay harvest is produced from the Kvichak River drainage, which includes Iliamna Lake. An unnamed creek that flows from the Lower Camp airstrip to Iliamna Lake supports anadromous (ocean-run) Arctic char that are harvested from the lower areas of Belinda Creek.

## 2.6 Summary of Characterization and Remediation Activities at the Seven ERP Sites

### 2.6.1 Site Characterization Activities

Beginning with a 1983 hazardous materials inspection and continuing through a 2005 soil removal action, USAF has conducted investigations of the Big Mountain RRS sites to determine if former installation operations caused environmental impacts. Historical site characterization events are summarized below, and historical remediation activities are discussed in Section 2.6.2. Detailed investigation results for each site are presented in Sections 2.74 through 2.7.10.

- In 1983, a hazardous substance investigation identified potentially dangerous substances at the inactive White Alice site (USAF [DOWL], 1983). Solvents, de-icing fluid, fuels, beryllium compounds, PCBs, glycol, and fuels were found in containers at Upper and Lower Camp. After this investigation, a USAF cleanup team removed transformer oil from the site.
- In 1989, a Preliminary Assessment (PA) identified potential contamination sources, including fuels, batteries, asbestos, and electrical equipment possibly containing PCBs at Big Mountain RRS (HMTC, 1989).
- In 1993, a second PA was performed (USAF [SAIC], 1993). Soil samples were collected, a geophysical survey was conducted at the suspected landfill, and organic vapor monitoring was performed at targeted locations.
- In 1996, an Environmental Assessment was performed to evaluate the environmental impacts of demolishing the Big Mountain RRS (USAF [ENSR], 1996).
- In 2000, a Clean Sweep Environmental Survey was conducted at Big Mountain RRS. Items requiring cleanup (e.g., buildings, tanks, debris, fluids in tanks, vehicles, and equipment) were inventoried, samples were collected for building demolition and waste characterization, demolition methods and equipment were identified, and data were collected on infrastructure and logistics (USAF, 2001).
- In 2001, a Remedial Investigation/Feasibility Study (RI/FS) report was completed[5] (USAF [Dowl/Ogden], 2001). During the RI/FS, soil and/or groundwater samples were collected from five Lower Camp ERP sites and eight Upper Camp sites (**Table 2-3**).
- In 2002, a Decision Document for Interim Remedial Action was completed for four sites: 42,400-gallon AST (ST001), 1,000-Gallon Fuel Oil AST (SS002), Dual AST System (SS014), and Landfill (LF005) (USAF [Paug-Vik], 2002).
- In 2004, additional remedial investigations were performed at the 42,400-gallon AST (ST001), 1,000-Gallon Fuel Oil AST (SS002), the Automotive Maintenance Shop and Flight Operations Building (SS003), the 1,000-Gallon MOGAS AST (SS004), the Temporary Auto Storage Building (SS011), and the Former Camp Landfill (LF005) (USAF [Paug-Vik], 2006).
- In 2006 and 2007, groundwater samples were collected from Site SS002 (USAF [Paug-Vik], 2008) in accordance with the Decision Document for Interim Remedial Action.

### 2.6.2 Remedial Activities Performed

Several phases of remedial activities have been performed at Big Mountain RRS. Some of the former installation's infrastructure was removed prior to a site inventory performed in 2000 for Operation Clean Sweep. During Operation Clean Sweep (Phase I in 2003 and Phase II in 2004), remaining tanks, pipelines, vehicles, and structures were dismantled and removed, regulated asbestos-containing material was removed, the water well was decommissioned, the septic tank

[5] Although the report was completed in 2001, the samples were collected in 1998. Throughout this ROD, this will be referred to as the 1998 RI/FS.

and outfall pipeline was removed, the inert waste landfill was partially closed, and the site was restored. In 2005, interim remedial actions (i.e. excavation of petroleum-contaminated soil) were performed at sites ST001, SS002, SS004, and SS014. The excavated soil was stored on-site in lined, bermed stockpiles and remediated on-site in summer 2006. The remedial activities specific to each subject ERP site are summarized in the following sections.

#### 2.6.2.1 1,000-Gallon Fuel Oil AST Area (SS002)

Approximately 1,400 cubic yards of petroleum-contaminated soil were removed from Site SS002 in 2005 (**Figure 2-4** and **Figure 2-6**) (USAF [Paug-Vik], 2007). The excavation area measured approximately 75 feet by 30 feet. The total excavation depth ranged from 10 to 15 feet bgs at the northern excavation limit to approximately 25 feet bgs at the southern limit of the excavation. Excavated soils were screened to remove material greater than two inches in diameter[6]. The oversized material was later used to backfill the excavation area. Petroleum-contaminated soil from SS002 that was two inches in diameter or smaller was placed into lined, bermed stockpile areas. In summer 2006, the soil was remediated on-site.

In accordance with the DD for Interim Remedial Action (USAF [Paug-Vik], 2008), groundwater monitoring was performed in 2006 and 2007 to evaluate the need for a final groundwater remedy. No contamination was detected above 1/10 of ADEC Table C cleanup levels.

#### 2.6.2.2 Automotive Maintenance Shop and Flight Operations Building (SS003)

The remaining structures at Site SS003 were removed during 2003-2004 Clean Sweep activities (USAF [ILC and Paug-Vik], 2004 and 2005). Previously, during the time of the 1998 RI/FS activities, a concrete slab and various wood and metal debris remained from the maintenance shop, and the Flight Operations Building was in fair condition (USAF [Dowl/Ogden], 2001).

Petroleum-contaminated soil was excavated from site SS003 as part of the SS002 excavation in 2005 (discussed in Section 2.6.2.1). Sampling performed before and during the excavation confirmed that contaminated soil from site SS002 extended into the northern portion of site SS003. Therefore, the SS002 excavation was expanded to remove all of the contaminated soil in Site SS003 (**Figure 2-4** and **Figure 2-6**) (USAF [Paug-Vik], 2007).

#### 2.6.2.3 1,000-gallon MOGAS AST (SS004)

Approximately 175 cubic yards of petroleum-contaminated soil were removed from three separate areas within site SS004 in 2005. The final excavation areas are described below and shown on (**Figure 2-4** and **Figure 2-7**) (USAF [Paug-Vik], 2007).

- The excavation at soil boring SB15 measured approximately 8 feet by 14 feet and was 9 feet deep.
- The excavation at soil boring SS003 measured approximately 9 feet by 14 feet and was 1 to 2 feet deep.

[6] Rock material greater than 2-inches in diameter cannot retain significant amounts of contamination; therefore, it is generally not considered to be contaminated.

- The excavation at soil boring SS004 measured approximately 14 feet by 12 feet. The excavation depth for approximately half of the area was 4 feet bgs, and the depth of the other half was approximately 17 feet bgs.

Excavated soils were screened to remove material greater than two inches in diameter. The oversized material was later used to backfill the excavation area. Petroleum-contaminated soil from SS004 that was two inches in diameter or smaller was placed into lined, bermed stockpile areas. In summer 2006, the soil was remediated on-site.

#### 2.6.2.4 Temporary Auto Storage Building (SS011)

The Temporary Auto Storage Building was demolished in 2003 under the Clean Sweep Phase I project, and the concrete foundation was removed during 2004 Clean Sweep Phase II activities (USAF [ILC and Paug-Vik], 2004 and 2005).

#### 2.6.2.5 Dual Fuel Oil AST System (SS014)

The Dual Fuel Oil AST System tanks and aboveground pipelines were emptied and dismantled in 2003 under the Clean Sweep project (USAF [ILC and Paug-Vik], 2004). Belowground pipelines were cut off 24-inches bgs, capped, and buried in-place.

In 2005, approximately 340 cubic yards of petroleum-contaminated soil were removed from two separate areas within Site SS014 (**Figure 2-5**) (USAF [Paug-Vik], 2007). To delineate the excavation areas, 34 test pits were sampled at the beginning of the field effort. DRO concentrations in all shallow (0 to 2 feet bgs) soil samples were below the ADEC Method Two cleanup level. Therefore, the top two feet of soil in each excavation were stripped off and saved for use as excavation backfill. The final excavation areas are described below and shown on **Figure 2-5**.

- The Test Pit TP2 excavation measured approximately 40 feet by 50 feet and was extended to bedrock, with a maximum depth of 6 feet bgs.
- The Test Pit TP11 excavation measured approximately 55 feet by 22 feet and was extended to bedrock, with an average depth of 4 feet bgs.

Excavated soils were screened to remove material greater than two inches in diameter. The oversized material was later used to backfill the excavation areas. Petroleum-contaminated soil from SS014 that was two inches in diameter or smaller was placed into lined, bermed stockpile areas. The excavation areas at SS014 (Test Pit TP2 and Test Pit TP11) were backfilled using the top two feet of soil initially removed from each excavation area, all oversized material removed from each excavation area, and clean new fill obtained from the on-site borrow source located at Lower Camp. Both excavation areas were backfilled to the previously existing grade. Approximately 320 cubic yards of fill was used at Test Pit TP2. Backfill at Test Pit TP2 averages 3 feet in thickness and there is at least 4 feet of backfill in the area of Test Pit TP2 where DRO contaminated soils in excess of ADEC Method Two soil cleanup levels remain in place due to the presence of bedrock. Approximately 200 cubic yards of fill was used at Test Pit TP11. The average thickness of backfill at Test Pit TP11 is 4 feet, with a minimum thickness of 2 feet. During the summer 2006, contaminated soil excavated from Test Pits TP2 and TP11 was remediated on-site.

Although the DD for Interim Remedial Action called for the installation of groundwater monitoring wells at SS014 (USAF [Paug-Vik], 2002), no groundwater has been encountered at Big Mountain Upper Camp, so monitoring wells were not installed.

#### 2.6.2.6 3,000-Gallon AST System (SS016)

The tank and its support structure were removed from the facility before the 1998 RI field activities were conducted; however, subsurface piping running parallel to the dormitory was observed at the time (USAF [Dowl/Ogden], 2001). Subsequently, during demolition activities (Clean Sweep) from 2002 through 2004, the subsurface piping was not encountered or observed, and was likely removed with other building debris at the time.

#### 2.6.2.7 Well Pump House (SS017)

The Well Pump House was removed during Phase II Clean Sweep activities in 2004 (USAF [ILC and Paug-Vik], 2005). The former water supply well was decommissioned in accordance with ADEC regulations.

## 2.7 Nature and Extent of Contamination

This section of the ROD establishes that there is no evidence of contamination remaining above regulatory cleanup levels at the seven subject ERP sites by comparing investigation results to the applicable regulatory cleanup levels. The regulatory framework establishing applicable cleanup levels is discussed below, followed by a summary of environmental investigation results for the seven Big Mountain ERP sites addressed in this ROD.

### 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 (as amended through December 30, 2006) (ADEC, 2006a). Surface water standards are provided in 18 AAC 70 Alaska Water Quality Standards (as amended through December 28, 2006) (ADEC, 2006b). These regulations are discussed below.

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

Method Two tabulated soil cleanup levels are provided in ADEC 18 AAC 75.341 Table B1 and B2 (Under 40-inch precipitation zone) (hereinafter referred to as ADEC Method Two cleanup levels) for protection of three exposure pathways: migration to groundwater, inhalation, and ingestion. The Method Two cleanup levels are protective of unlimited use and unrestricted

exposure[7]. 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. Soil cleanup levels for the Big Mountain sites are summarized below.

- For the Upper Camp sites (SS011, SS014, and SS016), the applicable ADEC Method Two soil cleanup levels are the lower of the inhalation or ingestion pathway cleanup levels, because there is no groundwater at Upper Camp, and therefore no migration to groundwater pathway.
- For the Lower Camp sites (SS002, SS003, and SS004), the applicable ADEC Method Two soil cleanup levels are the lowest of the migration to groundwater, inhalation, and ingestion pathway cleanup levels, because groundwater is present at Lower Camp.

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 IC requirements in 18 AAC 75.375 must be met to restrict the site from unprotected uses.

Groundwater: Tabulated groundwater cleanup levels provided in ADEC 18 AAC 75.345 Table C (hereinafter referred to as ADEC Table C cleanup levels) are considered protective for all groundwater uses, including drinking water. Table C groundwater cleanup levels are appropriate for use at the Lower Camp sites.

### 2.7.2 Naturally-Occurring Metals

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

Sample results for metals in soil and groundwater 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 Big Mountain RRS.

- Some fuel contains lead; therefore, lead is considered a potential contaminant at Big Mountain RRS. However, lead was not detected above its residential ADEC Method Two cleanup level in any representative soil samples collected from the seven subject Big Mountain 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

[7] Tabulated cleanup levels provided in 18 AAC 75 are considered protective of human health; ecological protectiveness is evaluated on a site-by-site basis. The ecological risk evaluation (discussed in Section 2.9.3 of this ROD) indicated that contamination from the subject sites has not adversely affected the environment, nor would it be expected to do so in the future.

frequently detected at elevated levels across Alaska. Specifically at Big Mountain 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 Big Mountain RRS.

### 2.7.3 Data Screening Process

To determine the nature and extent of contamination at the Big Mountain RRS ERP sites, analytical results from all previous site investigation activities were screened against soil and groundwater 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 the more conservative (i.e., lower) of the ADEC Method Two migration to groundwater cleanup level or 1/10 of the ADEC Method Two inhalation or ingestion cleanup level. In accordance with the ADEC Cumulative Risk Guidance (ADEC, 2002), analytes detected above 1/10 of the ADEC Method Two inhalation and ingestion soil cleanup levels should be retained for cumulative risk calculations.
- Groundwater results were screened against 1/10 of the Table C groundwater cleanup levels.

Analytical results above screening levels were considered to represent potential contamination and were included in cumulative risk calculations (see Section 2.9).

The following sections of this ROD present detailed investigation summaries for each site. These investigation summaries support the conclusion previously stated that there is no evidence of contamination remaining above regulatory cleanup levels at any of the subject sites of this ROD.

### 2.7.4 1,000-Gallon Fuel Oil AST Area (SS002)

#### 2.7.4.1 Cleanup Levels

At SS002, ADEC Method Two cleanup levels (protective of inhalation, ingestion, and migration to groundwater pathways) were used as soil cleanup levels. These cleanup levels are protective of unrestricted use. The groundwater cleanup levels are the ADEC Table C groundwater cleanup levels.

#### 2.7.4.2 Contamination Extent

Based on the 2004 and 2005 soil sample results, there is a small area of diesel-range organics (DRO) contamination above the ADEC Method Two migration to groundwater cleanup level at site SS002 (i.e., DRO at 2,230 mg/Kg in MW-02 at 25 feet bgs). However, as discussed in Section 2.9, the contamination does not pose unacceptable risk to human health or the environment, because it is below inhalation and ingestion pathway cleanup levels and there is no complete exposure pathway to this contamination.

Based on the 2004, 2006, and 2007 groundwater sample results, there is no groundwater contamination present above ADEC Table C groundwater cleanup levels.

2.7.4.3 Investigation Summary

Soil and groundwater samples were collected from SS002 during environmental investigations in 1998 and 2004, confirmation soil samples were collected at the limits of the 2005 excavation, and groundwater samples were collected in 2006 and 2007. The 2005 excavation removed most of the soil contamination above ADEC Method Two cleanup levels (**Figure 2-6**); therefore, only the 2005 confirmation soil samples and previous sample results outside of the 2005 excavation limits are representative of current site conditions. The 1998, 2004, 2005, and 2006 investigations are summarized briefly below, and sample locations are shown in **Figure 2-6**.

In 1998, soil samples were collected from two test pits (TP-14/AP-16 and TP-15) and two soil borings (AP-17 and AP-19) (**Figure 2-6)** and analyzed for gasoline-range organics (GRO), diesel-range organics (DRO), residual-range organics (RRO), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and metals (USAF [Dowl/Ogden], 2001). Soil sample results indicated DRO, GRO, benzene, and toluene above ADEC Method Two soil cleanup levels. However, all contamination detected above Method Two cleanup levels in 1998 was removed during the 2005 excavation (**Figure 2-6**).

One temporary monitoring well (AP-17) was installed between SS002 and SS003. A groundwater sample was collected and analyzed for the same analytical suite as the soil samples plus PCBs. Groundwater sample results indicated DRO at 1.8 milligrams per liter (mg/L), which is above the ADEC Table C cleanup level of 1.5 mg/L.

In 2004, soil samples were collected from five soil borings (i.e., SB09, SB10, SB11, SB14, and MW-02 in **Figure 2-6**) and analyzed for GRO, DRO, RRO, benzene, toluene, ethylbenzene, and xylenes (BTEX), and lead (USAF [Paug-Vik], 2006). Soil sample results indicated DRO, GRO, and BTEX above ADEC Method Two cleanup levels at soil boring SB14 and DRO above Method Two cleanup levels at soil boring MW02. All contamination detected above Method Two soil cleanup levels in 2004 was removed during the 2005 excavation, except at MW-02, where DRO were detected at 2,230 mg/Kg at 25 feet bgs.

One groundwater well was installed (MW-02) and sampled for GRO, DRO, RRO, VOCs, and lead. Groundwater sample results from MW-02 indicated no contamination above ADEC Table C cleanup levels.

In 2005, twelve confirmation samples were collected from the excavation area and analyzed for DRO, GRO, and BTEX (USAF [Paug-Vik], 2007). The 95 percent Upper Confidence Limit (UCL) of the mean DRO concentration in the confirmation samples was calculated to determine a representative exposure point concentration (EPC) for DRO in soil at SS002. The EPC of 124 mg/Kg is below the 250 mg/Kg Method Two cleanup level. Confirmation sample results are summarized in **Table 2-4**.

In 2006, groundwater samples were collected from monitoring wells MW-02, MW-03, and MW-04[8] and analyzed for GRO, DRO, and BTEX (USAF [Paug-Vik], 2008). All results were below ADEC Table C cleanup levels.

[8] The installation and previous sampling of MW-03 and MW-04 is included in the SS003 discussion in Section 2.7.5.3.

In 2007, groundwater samples were collected from monitoring well MW-03 and analyzed for GRO, DRO, and BTEX (USAF [Paug-Vik], 2008). All results were below ADEC Table C cleanup levels.

## 2.7.5 Automotive Maintenance Shop/ Flight Operations Building (SS003)

### 2.7.5.1 Cleanup Levels

At SS003, ADEC Method Two cleanup levels (protective of inhalation, ingestion, and migration to groundwater pathways) were used as soil cleanup levels. These cleanup levels are protective of unrestricted use. The groundwater cleanup levels are the ADEC Table C groundwater cleanup levels.

**Table 2-4: 1,000-Gallon Fuel Oil AST (SS002) 2005 Soil Sample Summary**

| COPC | ADEC Method Two Cleanup Level* (mg/Kg) | # of Samples | # of Detections | Max. Concentration (GRO and BTEX) or 95% UCL of Mean (DRO)* (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| DRO | 250 | 12 | 12 | 124 | 95% UCL of mean < 250 mg/Kg |
| GRO | 300 | 12 | 2 | 0.703 | 0 |
| BTEX | varies | 12 | 0 | ND | 0 |

*Notes:*
*Note that there was also a 2004 DRO detection of 2,230 mg/Kg at 25 feet bgs at MW-02 (outside the excavation area).*
**Protective of all pathways (i.e., lowest of inhalation, ingestion, and migration to groundwater pathway cleanup levels.*
*COPC = Chemical of potential concern* *DRO = Diesel Range Organics*
*GRO: Gasoline-Range Organics* *BTEX: Benzene, toluene, ethylbenzene, and xylenes*
**A 95 % UCL could not be calculated for GRO or BTEX, because there were insufficient detections of these analytes.*

### 2.7.5.2 Contamination Extent

Based on the 2004 and 2005 soil sample results, there is no contamination above ADEC Method Two cleanup levels at site SS003. Based on the 2004 and 2006 groundwater sample results, there is no groundwater contamination present above ADEC Table C groundwater cleanup levels.

### 2.7.5.3 Investigation Summary

Soil and groundwater samples were collected from SS003 during environmental investigations in 1998 and 2004, and confirmation soil samples were collected at the limits of the 2005 excavation at SS002 (which extended into SS003). The 2005 excavation removed all soil contamination above ADEC Method Two cleanup levels at SS003; therefore, only the 2005 confirmation soil samples are representative of current site conditions. The 2005 confirmation soil sampling was discussed in the previous section (for Site SS002), and results are presented in **Table 2-4**. The 1998 and 2004 investigations are summarized briefly below.

In 1998, soil samples were collected from seven test pits and one soil boring (**Figure 2-6**) and analyzed for GRO, DRO, RRO, VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), PCBs, pesticides, and metals (USAF [Dowl/Ogden], 2001). Soil sample results indicated DRO, GRO, benzene, and toluene above ADEC Method Two cleanup levels. However, all contamination detected above Method Two cleanup levels in 1998 was removed during the 2005 excavation (**Figure 2-6**).

In 2004, soil samples were collected from twelve soil borings around the perimeter of the site and one surface location (i.e., borings B01, B02, B03, and B05 for field-screening only and borings SB01 through SB08 for laboratory analysis - see **Figure 2-6**). Field screening was used to determine analytical sample locations; analytical samples were analyzed for GRO, DRO, RRO, VOCs, PAHs, PCBs, SVOCs, and lead (USAF [Paug-Vik], 2006). Soil sample results indicated no contamination above ADEC Method Two cleanup levels.

Two groundwater wells were installed (MW-03 and MW-04) and sampled for GRO, DRO, RRO, VOCs, PCBs, PAHs, pesticides, and dissolved metals. Groundwater sample results indicated no contamination above ADEC Table C groundwater cleanup levels.

## 2.7.6 1,000-Gallon MOGAS Tank (SS004)

### 2.7.6.1 Cleanup Levels

At SS004, ADEC Method Two cleanup levels (protective of inhalation, ingestion, and migration to groundwater pathways) were used as soil cleanup levels. These cleanup levels are protective of unrestricted use. The groundwater cleanup levels are the ADEC Table C groundwater cleanup levels.

### 2.7.6.2 Contamination Extent

Based on the 2004 and 2005 soil sample results, there is no contamination above ADEC Method Two cleanup levels at site SS004. Based on the 2004 groundwater sample results, there is no groundwater contamination present above ADEC Table C groundwater cleanup levels.

### 2.7.6.3 Investigation Summary

Soil and groundwater samples were collected from SS004 during environmental investigations in 1998 and 2004, and confirmation soil samples were collected at the limits of the 2005 excavations. The 2005 excavations removed all soil contamination above ADEC Method Two cleanup levels delineated during the 2004 RI sample event; therefore, only the 2005 confirmation soil samples are representative of current site conditions. The 1998, 2004, and 2005 investigations are summarized briefly below.

In 1998, soil samples were collected from five test pits and one soil boring (**Figure 2-7**) and analyzed for GRO, BTEX, VOCs, SVOCs, pesticides, and metals (USAF [Dowl/Ogden], 2001). Soil sample results indicated no contamination above ADEC Method Two cleanup levels.

One temporary monitoring well (AP-25) was installed at SS004 and sampled for GRO, BTEX, and lead. Groundwater sample results showed lead at a concentration of 0.028 mg/L, exceeding the ADEC Table C cleanup level of 0.015 mg/L. No other analytes were detected in the groundwater sample.

In 2004, soil samples were collected from thirteen soil borings (including borings for two monitoring wells and one attempted monitoring well) and five surface locations (**Figure 2-7**) and analyzed for GRO, DRO, RRO, VOCs, PCBs, PAHs, pesticides, and metals (USAF [Paug-Vik], 2006). Soil sample results indicated DRO above ADEC Method Two cleanup levels at three locations (locations 03, 04, and SB-15) and PCBs above Method Two cleanup levels at one location (4.32 mg/Kg in a surface soil sample from MW-12).

Two groundwater wells were installed (MW-12 and MW-13) and sampled for GRO, DRO, RRO, VOCs, PCBs, PAHs, pesticides, and dissolved metals. Groundwater sample results indicated no contamination above Table C cleanup levels.

In 2005, seven confirmation samples (two from location SB15, two from location SS003, and three from location SS004) were collected from the excavation limits and analyzed for DRO (USAF [Paug-Vik], 2007). Sample results indicate DRO concentrations below the 250 mg/Kg ADEC Method Two cleanup level. Confirmation sample results are summarized in **Table 2-5**.

**Table 2-5: 1,000-Gallon MOGAS AST (SS004) 2005 Soil Sample Summary**

| COPC | ADEC Method Two Cleanup Level (mg/Kg) | # of Samples | # of Detections | Max. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| DRO | 250 | 7 | 7 | 234 | 0 |

*Notes:*
**Protective of all pathways (i.e., lowest of inhalation, ingestion, and migration to groundwater pathway cleanup levels.*
*COPC = Chemical of potential concern* *DRO = Diesel Range Organics*

To follow-up on the detection of PCBs in 2004, eight surface soil samples were collected near monitoring well MW-12 (**Figure 2-7**) and analyzed for PCBs. PCBs were not detected in any of these samples. Based on the 2005 sample results, the 2004 result was determined not to be reproducible or representative of the site.

## 2.7.7 Temporary Auto Storage Building (SS011)

### 2.7.7.1 Cleanup Levels

At SS011, ADEC Method Two cleanup levels (lowest of the inhalation or ingestion pathway) were used as soil cleanup levels. These cleanup levels are protective of recreational use. Groundwater has not been encountered at Upper Camp (where SS011 is located).

### 2.7.7.2 Contamination Extent

The soil at Site SS011 is considered to meet ADEC Method Two cleanup levels protective of the inhalation and ingestion pathways. Although the 1998 and 2004 soil sample results suggested one very small (1-square foot) area with PCBs and benzo-a-pyrene slightly above ADEC Method Two cleanup levels, the potentially-impacted area is so small relative to the overall area of the site that it is considered to pose negligible risk. Therefore PCBs and benzo(a)pyrene were not retained as COPCs for SS011.

2.7.7.3 Investigation Summary

In 1998, soil samples were collected from three surface soil sample locations, two test pits, and one subsurface boring (**Figure 2-5**) at SS011 (USAF [Dowl/Ogden], 2001). A total of five surface samples and five subsurface samples were analyzed for DRO, RRO, VOCs, SVOCs, PAHs, PCBs, pesticides, and metals. One surface soil sample (L4) was collected from an approximately 1-square foot hole in the middle of the concrete foundation[9]; L4 sample results are discussed separately from the other sample results.

- In Sample L4, PCBs were detected above the ADEC Method Two cleanup level of 1 mg/Kg at 1.3 mg/Kg. Benzo(a)pyrene was detected at 0.1 mg/Kg (versus its 1 mg/Kg Method Two cleanup level), and RRO were detected at 1,700 mg/Kg (versus its 10,000 mg/Kg Method Two cleanup level). No other results exceeded 1/10 of Method Two (inhalation or ingestion) cleanup levels.
- In the other nine soil samples, no results exceeded Method Two (inhalation or ingestion) cleanup levels. DRO were detected in one sample at 4,500 mg/Kg (exceeding 1/10 of the 10,250 mg/Kg cleanup level) and in four samples at concentrations below 1/10 of the cleanup level. No other results exceeded 1/10 of Method Two (inhalation or ingestion) cleanup levels.

In 2004, ten surface and five subsurface soil samples were collected from the perimeter of the former concrete pad and the area of 1998 RI sample L4 (**Figure 2-5**) and analyzed for GRO, DRO, VOCs, PCBs, SVOCs, and metals (USAF [Paug-Vik], 2006). One surface sample, a duplicate, and a subsurface sample were collected from Location 10, which is the same location as 1998 RI sample L4. As with the 1998 results, the Location 10 results are discussed separately below.

- At Location 10, benzo(a)pyrene was detected above the Method Two cleanup level of 1 mg/Kg at 1.34 mg/Kg in one soil sample. Benzo(a)pyrene was also detected in the duplicate sample at a concentration of 0.274 mg/Kg. However, benzo(a)pyrene was not detected in a subsurface (1.5 feet bgs) soil sample at the same location. PCBs were detected at 0.358 mg/Kg (versus the Method Two cleanup level of 1 mg/Kg), 0.072 mg/Kg in the duplicate sample, and 0.288 mg/Kg in the subsurface sample. No other results exceeded 1/10 of Method Two (inhalation or ingestion) cleanup levels.
- In the other 13 soil samples, no results exceeded Method Two (inhalation or ingestion) cleanup levels. n-Nitrosodi-n-propylamine (a possible contaminant in weed killer) was detected in one sample at a concentration of 0.245 mg/Kg (versus its 1.2 mg/Kg ingestion cleanup level). No other results exceeded 1/10 of Method Two (inhalation or ingestion) cleanup levels.

The benzo(a)pyrene and PCB detections from 1998 Location L4/2004 Location 10 are not considered to represent COPCs at SS011, because the L4/Location 10 area is not considered representative of the entire SS011 site for the following reasons:

[9] The hole in the concrete pad was interpreted to be a floor sump; one of the test pits was excavated to investigate what appeared to be the effluent from the floor sump. PCBs were not detected in either the surface or subsurface samples collected from the test pit. Note that the concrete foundation, which was approximately 1 to 2 feet thick, was removed in 2004 Clean Sweep activities to a depth of 24 inches below grade, as discussed in Section 2.6 2.4.

- The L4/Location 10 area is small (approximately 1-square foot in area) relative to the size of Site SS011.
- Samples collected from outside of the L4/Location 10 area show no indication of PCB or benzo(a)pyrene contamination above Method Two cleanup levels. Outside of the L4/Location 10 area, the maximum PCB detection was 0.053 mg/Kg (2004 Location 6), and the maximum benzo(a)pyrene detection was 0.0065 mg/Kg (2004 Location 2).
- There is no indication of PCB or benzo(a)pyrene contamination with depth at the L4/Location 10 area. In the subsurface sample collected from 1.5 feet bgs at Location 10, PCBs were detected at 0.29 mg/Kg and benzo(a)pyrene was not detected above the 0.01 mg/Kg detection limit.
- Even within the small L4/Location 10 area, PCB and benzo(a)pyrene detections are variable, with 2/3 of sample results below the Method Two cleanup levels, as summarized below:
    - Benzo(a)pyrene was detected at 1.34 mg/Kg (2004 Loc. 10), 0.274 mg/Kg (2004 Loc. 10 field duplicate), and 0.1 mg/Kg (1998 L4).
    - PCBs were detected at 1.3 mg/Kg (1998 L4), 0.358 mg/Kg (2004 Loc. 10), and 0.072 mg/Kg (2004 Loc. 10 field duplicate).
- The 2004 test pit dug at Location 10 indicated the presence of insulation, burned wood, and caribou bones, which were not found in other test pits dug at the site, suggesting that the soil found at Location 10 is not representative of the soil found across the rest of the site.

The COPCs for Site SS011 are summarized in **Table 2-6**.

**Table 2-6: Temporary Auto Storage Building (SS011) Soil Sample Summary**

| COPC | ADEC Method Two Cleanup Level* (mg/Kg) | # of Samples | # of Detections** | Max. Conc. (Location) (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| **1998 RI Sampling** | | | | | |
| DRO | 10,250 | 10 | 5 | 4,500 (TP-42 0' bgs) | 0 |
| **2004 RI Sampling** | | | | | |
| n-Nitrosodi-n-propylamine | 1.2 | 15 | 1 | 0.245 (Loc 07 at 0' bgs) | 0 |

*Notes:*
**Protective of inhalation and ingestion pathways*
***As discussed in the text, results from 1998 sample L4 and 2004 sample L10 are not considered representative of SS011 site conditions and therefore are not shown on this table.*
*COPC = Chemical of potential concern* *DRO = Diesel Range Organics*

## 2.7.8 Dual Fuel Oil AST System (SS014)

### 2.7.8.1 Cleanup Levels

At SS014, ADEC Method Two cleanup levels (lower of the inhalation or ingestion pathway) were used as soil cleanup levels. These cleanup levels are protective of recreational land use. Groundwater has not been encountered at Upper Camp (where SS014 is located).

### 2.7.8.2 Contamination Extent

Based on the 2005 soil sample results, there are two areas of DRO contamination above the ADEC Method Two cleanup level (protective of inhalation and ingestion pathways) of 10,250 mg/Kg at site SS014 (i.e., DRO at 11,100 mg/Kg at 10 feet bgs at TP7 and DRO at 10,300 mg/Kg and 16,900 mg/Kg at TP2 [4 to 5 feet bgs]). However, as discussed in Section 2.9, the contamination does not pose unacceptable risk to human health or the environment, because there is no complete exposure pathway to this contamination.

### 2.7.8.3 Investigation Summary

Soil samples were collected from SS014 during the 1998 RI and pre-excavation activities in 2005, and confirmation soil samples were collected at the limits of the 2005 excavations. The 2005 excavation removed most of the soil contamination above Method Two cleanup levels delineated during the 1998 and 2005 pre-excavation sampling; therefore, only the 2005 confirmation soil samples are representative of current site conditions (except at TP7, which was not excavated). The 1998 and 2005 investigations are summarized briefly below.

In 1998, soil samples were collected from 13 locations within the bermed containment area and from 13 test pits and five soil borings outside the bermed area (USAF [Dowl/Ogden], 2001). The samples were analyzed for DRO, RRO, and PAHs. Although soil sample results indicated DRO above ADEC Method Two cleanup levels at four locations, these locations are not shown on **Figure 2-8,** because 2005 re-sampling in those areas showed DRO concentrations below the Method Two cleanup level.

In 2005, 34 test pits were dug and sampled to confirm the 1998 results and fill in data gaps to guide the excavation activities (USAF [Paug-Vik], 2007). Samples were analyzed in the field for total petroleum hydrocarbons (TPH), and many of the samples were also analyzed in a laboratory for DRO. DRO were detected above ADEC Method Two cleanup levels at three locations (TP2, TP7, and TP11 on **Figure 2-8**). Based on the soil sample results, excavations removed DRO-contaminated soil to bedrock at TP2 and TP11. However, there was no excavation at TP7, because soil removal at that location is impracticable due to its position on the edge of a steep cliff and depth of the contaminated soil (within weathered bedrock at 10 feet bgs). As shown in **Figure 2-8** and **Table 2-7**, DRO detected at 11,100 mg/Kg in TP7 was left in-place.

After the 2005 excavation, 14 confirmation samples (eight from TP2 and six from TP11) were collected at the excavation limits and analyzed for DRO (USAF [Paug-Vik], 2007). Sample results show that most of the petroleum-contaminated soil was removed by the 2005 field effort. Two samples collected from the top of bedrock at the base of the TP2 excavation (4-5 feet bgs) had DRO results (10,300 mg/Kg and 16,900 mg/Kg) exceeding the ADEC Method Two cleanup level. Additional excavation at TP2 was not possible due to the presence of bedrock. **Table 2-7**

presents a summary of the 2005 confirmation sample results and test pit sample results from areas that were not subsequently excavated (i.e., TP7).

**Table 2-7: Dual Fuel Oil AST System (SS014) 2005 Soil Sample Summary**

| COPC | ADEC Method Two Cleanup Level* (mg/Kg) | # of Samples | # of Detections | Max. Conc. (mg/Kg) | Min. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|---|
| **2005 Test Pit (pre-excavation) Sampling (area not subsequently excavated)** | | | | | | |
| DRO | 10,250 | 19 | 19 | 11,100 | 6.7 | 1 |
| **2005 TP2 and TP11 Confirmation Sampling** | | | | | | |
| DRO | 10,250 | 14 | 14 | 16,900 | 244 | 2 |

*Notes:*
**Protective of inhalation and ingestion pathways*
*COPC = Chemical of potential concern* *DRO = Diesel Range Organics*

## 2.7.9 Three Thousand-Gallon AST System (SS016)

### 2.7.9.1 Cleanup Levels

At SS016, ADEC Method Two cleanup levels (lower of the inhalation or ingestion pathway) were used as soil cleanup levels. These cleanup levels are protective of recreational land use. Groundwater has not been encountered at Upper Camp (where SS016 is located).

### 2.7.9.2 Contamination Extent

Based on the 1998 soil sample results, there is no contamination above ADEC Method Two cleanup levels (protective of inhalation and ingestion pathways) at site SS016.

### 2.7.9.3 Investigation Summary

In 1998, soil samples were collected from three test pits and analyzed for DRO, RRO, SVOCs, PAHs, PCBs, pesticides, and metals (USAF [Dowl/Ogden], 2001). Soil sample results exceeding 1/10 of the Method Two cleanup level are shown in **Table 2-8.** As shown in **Table 2-8,** only PCBs were detected above 1/10 of the ADEC Method Two cleanup level, and there were no detections above the Method Two cleanup levels.

## 2.7.10 Well and Pump House (SS017)

### 2.7.10.1 Cleanup Levels

At SS017, ADEC Table C groundwater cleanup levels are appropriate for use as groundwater cleanup levels.

**Table 2-8: 3,000-Gallon AST System (SS016) Soil Sample Summary**

| COPC | ADEC Method Two Cleanup Level* (mg/Kg) | # of Samples | # of Detections | Max. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| PCBs | 1 | 6 | 4 | 0.44 | 0 |

*Notes:*
**Protective of inhalation and ingestion pathways*
*COPC = Chemical of potential concern* *PCBs = Polychlorinated biphenyls*

### 2.7.10.2 Contamination Extent

Based on the 1998 soil sample results, there is no contamination above ADEC Table C cleanup levels at site SS017.

### 2.7.10.3 Investigation Summary

In 1998, the Well and Pump House was investigated by collecting a groundwater sample from the well (USAF [Dowl/Ogden], 2001). There is no discernible contamination source at the Well and Pump House (SS017), nor has there been any likely scenario identified for contamination at this site. The groundwater sample was analyzed for DRO, RRO, VOCs, SVOCs, PCBs, pesticides, and metals. Although bis(2-ethylhexyl) phthalate and lead were detected at concentrations slightly exceeding their ADEC Table C groundwater cleanup levels, neither of these detections is likely to represent groundwater contamination at the site for the reasons discussed below.

- Bis(2-ethylhexyl)phthalate is a plasticizer that is ubiquitous in the environment, and the detection is likely the result of cross-contamination of the sample (possibly from sample equipment).
- The lead is interpreted to come from the heavily corroded well components that were present in the well[10].

The groundwater accessed by the former water supply well is not interpreted to be contaminated.

[10] Although the pump was removed to sample the well, the well was not properly developed due to equipment limitations, and the sample is more representative of water within the well casing than ambient groundwater.

### 2.7.11 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. Because there is no contamination present above applicable cleanup levels and no unacceptable cumulative risk (based on conservative default exposure parameters) at any of the seven ERP sites addressed in this ROD, a detailed conceptual exposure model was not developed.

The default exposure parameters used in the cumulative risk calculations were based on unrestricted use and unlimited exposure (residential use). The default residential use assumed in the cumulative risk calculations is conservative and protective of actual exposures.

## 2.8 Current and Potential Future Land and Resource Uses

### 2.8.1 Land Use

USAF uses the Big Mountain RRS for environmental restoration purposes only. The facility has been abandoned for many years. Future land use is expected to be recreational/subsistence.

There is no road access to the Big Mountain installation from surrounding local communities. Access to the installation property is exclusively by barge on Lake Iliamna, aircraft (there is a 4,000-foot runway on the installation property that was repaired in 2003 to support demolition and restoration activities), and via overland trails by snowmobile during the winter months and by ATVs during the summer months.

Regional residents use the remote region surrounding the installation property, including the installation property, for subsistence and recreational hunting and fishing.

After restoration of Big Mountain RRS has been completed, the USAF plans to relinquish the property to the Bureau of Land Management (BLM).

### 2.8.2 Groundwater and Surface Water Uses

The groundwater resources in the vicinity of Big Mountain RRS are described in Section 2.5.3. As discussed in Section 2.5.3, groundwater has not been encountered at Upper Camp. Groundwater is present at Lower Camp, but there are no groundwater supply wells in the vicinity. During the time when the Big Mountain RRS was active, a groundwater well supplied water for the facility. This well was located approximately 1,000 feet west of Upper Camp at a surface elevation approximately 50 feet lower than Upper Camp. Although there is no well log available, the well was reportedly driven to a depth of 232 feet below the Pump House floor and produced water from fractured bedrock. The well was decommissioned in accordance with ADEC regulations in 2004.

The surface water resources in the vicinity of Big Mountain RRS are described in Section 2.5.3. There is no evidence of surface water contamination associated with the seven ERP sites addressed in this ROD. Surface water is used for aquatic life and wildlife propagation; the lower

portion of Belinda Creek is used for subsistence fishing about three miles downgradient from Lower Camp. The surface water is not currently being used for water supply purposes, and there are no plans to develop surface water as a drinking water source (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]).

## 2.9 Summary of Site Risks

This section summarizes the human health and ecological risk assessments that have been performed at the seven Big Mountain ERP sites addressed in this ROD. The overall conclusion from the risk assessments is that the individual risk posed by each chemical, and cumulative risk posed by all chemicals detected at each site, are below published risk levels. No cleanup is required to protect human health at the subject sites.

In accordance with the NCP's requirement for baseline risk assessment (40 CFR § 300.400 (d)) to characterize current and potential threats to human health and the environment, risk due to contamination at the subject Big Mountain ERP sites was evaluated in the 2001 RI/FS report (USAF [DOWL/Ogden], 2001). The 2001 risk evaluation was updated for the seven subject sites to consider the effects of cleanup activities and monitoring data collected since completion of the 2001 RI/FS. The risk update evaluated whether individual contaminant concentrations are above cleanup levels, whether cumulative risks from multiple chemicals are above thresholds, and whether potential exposure pathways are complete.

The updated risk evaluations indicated that contamination remaining at the seven subject sites does not pose unacceptable potential risk to human health or the environment and that these sites can be grouped into the three potential risk categories listed below.

1) Sites where the 2001 RI/FS human health risk evaluation indicated no risks or hazards above allowable thresholds[11] (SS016 and SS017);
2) Sites where further investigation and risk calculations since 2001 indicate no risks or hazards above allowable thresholds (SS011); and
3) Sites where contaminated soil was removed (in 2005), and there are currently no complete exposure pathways or risks present above allowable thresholds (SS002, SS003, SS004, and SS014).

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

### 2.9.1 Human Health Risk Assessment

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

[11] Potential risk due to naturally-occurring arsenic and laboratory contaminants was quantified during the risk evaluation process but is not appropriate for consideration in site cleanup decisions.

**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 seven subject ERP sites, chemicals of potential concern (COPCs) were identified in accordance with ADEC Cumulative Risk Guidance (ADEC, 2002). Per the guidance, all analytes detected at concentrations greater than 1/10 of the ADEC 18 AAC 75.341 Method Two Tables B1 and B2 (Under 40-inch zone) inhalation or ingestion pathway soil cleanup levels are considered chemicals of potential concern and must be included in cumulative risk calculations. COPCs for the subject Big Mountain RRS sites are listed below:

- SS002: DRO
- SS011: DRO and n-Nitrosodi-n-propylamine[12]
- SS014: DRO
- SS016: PCBs
- SS003, SS004, and SS017: none

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. The published ADEC risk-based concentrations (RBCs) used in the quantitative risk evaluation for the seven subject sites are based on conservative default exposure assumptions (residential use and exposure parameters) that are protective of unlimited use and unrestricted exposure. Complete exposure pathways included inhalation and ingestion of chemicals in soil by hypothetical residents.

**Toxicity Assessment**: This section describes the carcinogenic and noncarcinogenic toxicity criteria used to calculate the potential risk for each COPC. RBCs published by ADEC were used to characterize risk for petroleum hydrocarbons (DRO), and, because ADEC does not publish RBCs for PCBs, RBCs provided by the Risk Assessment Information System (RAIS) (http://risk.lsd.ornl.gov/) were used to characterize risk for PCBs. In providing RBCs, RAIS follows the hierarchy of human health toxicity values recommended by EPA for use in risk assessments, as amended by OSWER Directive 9285.7-53.

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 (there is no difference between current and

[12] As discussed in Section 0, PCBs and benzo(a)pyrene are not considered COPCs at Site SS011, because the area where they were detected is small relative to the size of the site and is not representative of the rest of the site.

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:

Risk = CDI x SF

Where:

Risk = a unitless probability (e.g., 2E-05) of an individual's likelihood of developing cancer;

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

SF = slope factor, expressed as $(mg/Kg\text{-}day)^{-1}$.

These risks are probabilities that usually are expressed in scientific notation (e.g., $10^{-6}$ or 1E-06). An excess lifetime cancer risk of 1E-06 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:

Non-cancer HQ = CDI/RfD

Where:

CDI = chronic daily intake; and

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

Temporary Auto Storage Building (SS011): The cumulative risk results for Site SS011 are presented in **Table 2-9**. As shown in **Table 2-9**, noncancer risk due to DRO remaining at SS011 (HQ=0.6) and RRO remaining at SS011 (HQ=0.2) is below the threshold HQ of 1.0. Benzo(a)pyrene and PCBs were each detected above their respective ADEC Method Two cleanup levels in one out of four samples collected from the approximately 1-square foot hole in the concrete pad. In soil samples from other areas of the site, benzo(a)pyrene was only detected once (at 0.0065 mg/Kg), and PCBs were only detected at concentrations below 0.1 mg/Kg (less than 1/10 of the Method Two cleanup level). Because the elevated concentrations of benzo(a)pyrene and PCBs represent the maximum concentration within only a very area of the site, these elevated concentrations are not representative of the entire site. The potentially-impacted area is so small relative to the overall area of the site that it is considered to pose negligible risk.

As shown in **Table 2-9**, the cumulative risks and HI are below threshold levels (2E-05 and 1, respectively). Contamination detected at SS011 does not pose unacceptable potential risk to human health or the environment.

**Table 2-9: SS011 Cumulative Risk Summary**

| | Max. Detected (mg/kg) | RBC (mg/kg) | Exposure Pathway | HQ | Risk |
|---|---|---|---|---|---|
| DRO | 4,500 | 10,139 | Ingestion-NC | 0.4 | |
| DRO | 4,500 | 19,917 | Inhalation-NC | 0.2 | |
| RRO | 1,700 | 10,139 | Ingestion-NC | 0.2 | |
| PCBs | *see text* | 2 | Ingestion-NC | *see text* | |
| PCBs | *see text* | 4 | Ingestion-C | | *see text* |
| PCBs | *see text* | 15.3 | Inhalation-C | | *see text* |
| Benzo(a)pyrene | *see text* | 1.1 | Ingestion-C | | *see text* |
| n-Nitrosodi-n-propylamine | 0.245 | 1.2 | Ingestion-C | | 2E-06 |

No cumulative risk calculations were necessary or performed for Sites SS002, SS003, SS004, SS014, SS016, or SS017, as discussed below. These sites do not pose unacceptable potential risk to human health or the environment

- Site SS002: Although the 2004 RI soil sampling indicated DRO above the ADEC Method Two cleanup level (i.e., 2,230 mg/Kg) at 25 feet bgs in the borehole for MW-02 (**Figure 2-8**), there is no complete exposure pathway between this soil and human and ecological receptors. Therefore, the contamination detected at SS0002 does not pose unacceptable risk to human health or the environment.

- Sites SS003 and SS004: No cumulative risk calculations were performed, because the 2005 confirmation sample results indicated no contamination remaining above 1/10 of Method Two (inhalation or ingestion pathways) cleanup levels.
- Site SS014: Although the 2005 confirmation soil sampling indicated DRO above the ADEC Method Two cleanup level (i.e., 10,250 mg/Kg) in two locations at the bottom of the backfilled excavation and at 10 feet bgs at TP7 (**Figure 2-8**), there is no complete exposure pathway between this soil and human and ecological receptors. Therefore, the contamination detected at SS014 does not pose unacceptable risk to human health or the environment.
- Site SS016: No cumulative risk calculations were performed, because the 1998 sample results indicated no contamination above Method Two (inhalation or ingestion pathway) cleanup levels and only one analyte (PCBs) between 1/10 of the Method Two cleanup level and the Method Two cleanup level.
- Site SS017: The groundwater is not interpreted to be contaminated above ADEC Table C cleanup levels. Furthermore, the well has been decommissioned so there is no access to the groundwater.

#### 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

No complete exposure pathways are present between the seven subject sites themselves and ecological receptors. The subject sites are considered poor quality ecological habitat, as the ground is very rocky and contains little or no vegetation. There is no surface water present at the sites. The risk to ecological receptors from foraging at the sites is considered negligible.

However, ecological risk was evaluated in the 2001 RI/FS and in an additional 2006 ecological risk assessment (for two Lower Camp sites not subjects of this ROD) to evaluate potential ecological impacts to areas outside of the specific ERP site boundaries.

- At Upper Camp, the 2001 ecological risk evaluation found no evidence of impact to the surrounding area from site-related chemicals.
- At Lower Camp, the 2001 ecological assessment for Lower Camp was inconclusive and further evaluation was recommended.
- An ecological risk assessment was completed for two sites at the Lower Camp (the 42,400-Gallon Fuel Oil AST [ST001] and Landfill [LF005]) in 2006. Although these sites are not included in this ROD, the ecological risk assessment is potentially relevant because it evaluated potential impacts to plants and animals in the ecological habitat nearest Lower Camp facilities more contaminated than the sites considered in this ROD.

- The 2006 Lower Camp ecological risk assessment quantified risk to aquatic and semi-aquatic receptors (plant and animal communities) in the beaver pond and wetland adjacent to the landfill and evaluated potential human food chain exposure. The 2006 ecological risk assessment concluded that the ecological risks at Big Mountain RRS Lower Camp are negligible, and no further action to prevent potential ecological risk was necessary.

## 2.10 Remedial Action Objectives

The overall objectives of Big Mountain 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 seven 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

At Sites SS003, SS004, SS011, SS016, and SS017, no petroleum hydrocarbons have been detected above ADEC Method Two cleanup levels. Therefore, no RAOs were needed or developed under State of Alaska Regulations for these sites.

At Sites SS002 and SS014, although petroleum detections do not pose unacceptable risk to human health or the environment, DRO concentrations in soil are above levels allowing unrestricted use under Alaska Contaminated Site regulations. Site-specific RAOs developed under State of Alaska Laws and Regulations for SS002 and SS014 are summarized below.

- Document the presence of soil impact above levels allowing unrestricted use (Method Two cleanup levels), and
- Restrict access to contaminated subsurface soil.

In accordance with the Decision Document for Interim Action (USAF [Paug-Vik], 2002) for Site SS002, groundwater monitoring results from 2006 and 2007 were used to determine that no further groundwater remedy is needed. No contamination was detected above 1/10 of ADEC Table C cleanup levels; therefore, no groundwater RAOs were developed and no further action is necessary.

## 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 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.

## 2.14 Selected Remedy

### 2.14.1 Remedies Required Under CERCLA

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

### 2.14.2 Remedies Required Under State of Alaska Regulations

Remedial action is necessary under State of Alaska Regulations to address petroleum-based products (DRO) in the soil at Sites SS002 and SS014. The final remedies selected under Alaska State laws and regulations for the seven ERP sites addressed in this ROD are summarized below.

**Auto Maintenance Shop/Flight Operations Building (SS003), 1,000-Gallon MOGAS AST (SS004), Temporary Auto Storage Building (SS011), Three Thousand Gallon AST System (SS016), and Well and Pump House (SS017)**

**Unconditional Site Closure**

No action is necessary under State of Alaska Regulations at Sites SS003, SS004, SS011, SS016, and SS017. There are no COCs at these sites. Unconditional closure will be noted in ADEC and USAF records. The land is available for unrestricted use.

**1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014)**

**Conditional Closure with ICs**

Although contamination at the 1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014) does not pose unacceptable potential risk to human health or the environment, soil is contaminated by petroleum hydrocarbons above State of Alaska cleanup levels protective of unrestricted use (i.e., the ADEC Method Two cleanup levels for soil).

In order to achieve the RAOs in Section 2.10, USAF will implement the remedy outlined below.

**1. Institutional Controls (ICs)**

ICs are an integral part of the selected remedy and are necessary to meet RAOs in Section 2.10. USAF will implement, monitor, maintain, and enforce the ICs identified below in accordance with Alaska's Contaminated Site regulations.

The goals of the ICs are to document (for waste management purposes in the event of subsurface activities) that soil impact exceeds ADEC Method Two cleanup levels protective of unrestricted use.

The ICs will consist of excavation and construction restrictions within the site boundaries and documentation that soil is impacted above levels allowing unrestricted use.

USAF will implement the ICs by taking the following actions:

- Delineate the boundaries of soil with DRO above Method Two cleanup levels at Sites SS002 and SS014.
- The boundaries of soil with DRO above Method Two cleanup levels at Sites SS002 and SS014 will be surveyed for State of Alaska and USAF Real Property Records.
- Document the ICs in USAF's Real Property Records. The Real Property Records will contain a map indicating IC locations.
- Notify ADEC prior to making any major changes to the ICs. The 611th Civil Engineer Squadron (CES) is the point of contact for the IC.
- ICs will stay in effect until DRO reaches State of Alaska Cleanup Levels protective of unrestricted use (i.e. ADEC Method Two cleanup levels for soil) at SS002 and SS014.

For as long as the Air Force manages the property, USAF will enforce the ICs by the following actions:

- Perform visual inspections to verify effectiveness of the ICs, and report results of the inspections to ADEC. Inspection reports will evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed
    - Any activity that is inconsistent with IC requirements, objectives, or controls, or any action that may interfere with the effectiveness of the IC shall be addressed by the USAF as soon as practicable after discovery, but in no case will the process be initiated later than 10 days after the USAF becomes aware of the breach.
    - USAF shall provide notice to ADEC as soon as practicable after discovery of any activity that is inconsistent with IC requirements, objectives or controls, or any action that may interfere with the effectiveness of the IC.
- In the event that the ICs fail or are deficient and could imminently lead to actual risk to human health or the environment, USAF will address the situation promptly, including notification to ADEC.
- USAF will obtain ADEC approval prior to conducting any excavation activities within the contaminated areas.

In the event that the property is transferred, the property transfer document will describe the ICs. USAF will provide notice to ADEC prior to any transfer, sale, or lease of the property, so that ADEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain the ICs.

**2. Final Disposition of Site**

When ICs have been established in accordance with Numbered Section 1 (above), Conditional Closure with ICs will be noted in USAF and ADEC records for the 1,000-Gallon Fuel Oil AST (SS002) and Dual Fuel Oil AST System (SS014) Sites. The sites will be considered protective of recreational and residential use, with ICs.

## 2.15 Statutory Determinations

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 seven subject Big Mountain RRS sites (SS002, SS003, SS004, SS011, SS014, SS016, and SS017).

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 seven subject ERP sites, there is no statutory requirement for a five-year review.

### 2.15.1 Remedies Required Under State of Alaska Regulations

DRO, which are exempt from CERCLA but considered hazardous substances under State of Alaska laws and regulations, are present at concentrations above levels protective of unrestricted use allowed by Alaska regulations. The selected remedy complies with state requirements under 18 AAC 75.325-390.

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

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

#### 2.15.1.2 Compliance with Alaska State Regulations

The chemical-specific, location-specific, and action-specific Alaska regulations applicable to the seven ERP sites are listed in **Table 2-10**.

**Table 2-10: Action-Specific and Chemical-Specific Alaska State Regulations**

| Citation | Description | Rationale |
|---|---|---|
| **Action-Specific** | | |
| Alaska Oil and Other Hazardous Substance Pollution Control Regulations (as amended through December 30, 2006)<br>18 AAC 75.375 – Institutional Controls<br>75.369(3) Investigation-Derived Waste | Defines situations where institutional controls (ICs) are required and specifies criteria for their use.<br>All investigation-derived waste must be handled consistent with ADEC regulations. | ICs are a component of the selected remedies.<br>Waste generated by planned investigation activities will be handled consistent with ADEC regulations. |
| **Chemical-Specific** | | |
| Alaska Oil and Other Hazardous Substance Pollution Control Regulations (as amended through December 30, 2006)<br>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 have been no significant changes to the remedies presented in the Proposed Plan

**Figure 2-1: Big Mountain RRS Location Map**


**Figure 2-2: Big Mountain RRS Location Detail**

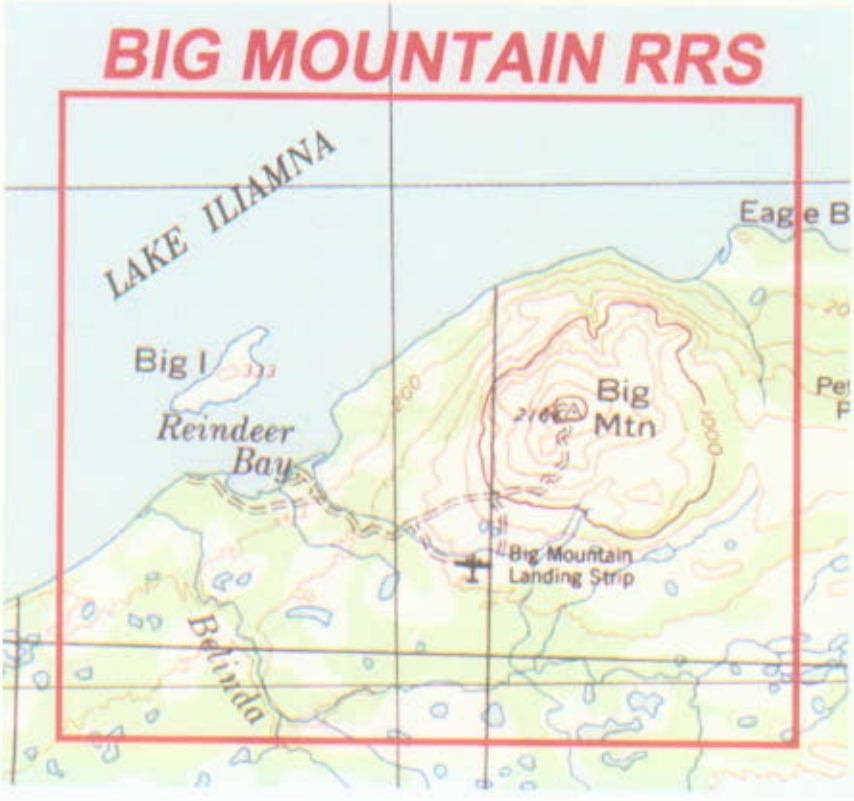


**Figure 2-3: Big Mountain RRS Layout (Upper Camp and Lower Camp)**

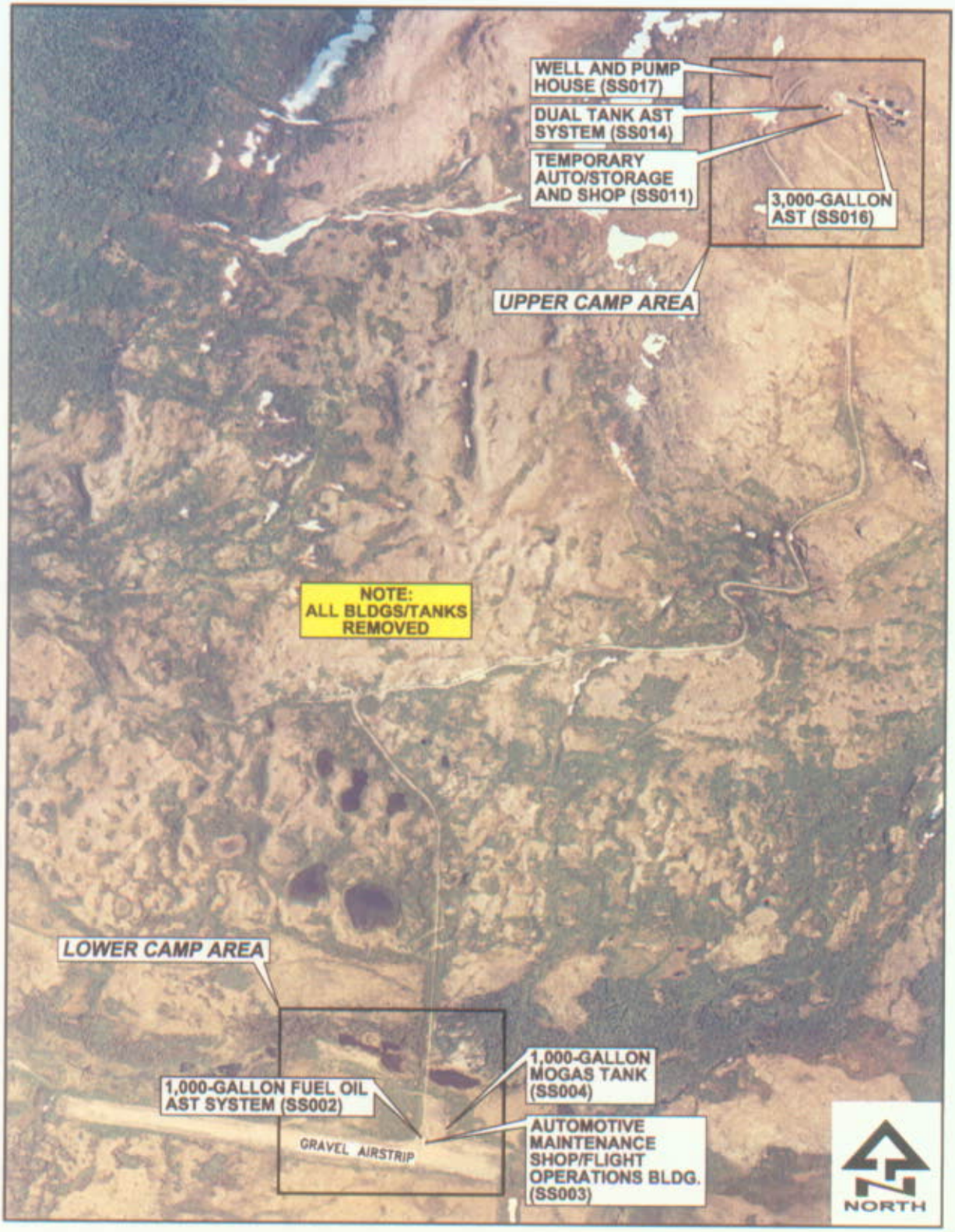


**Figure 2-4: Big Mountain RRS Lower Camp ERP Sites (SS002, SS003, and SS004)**

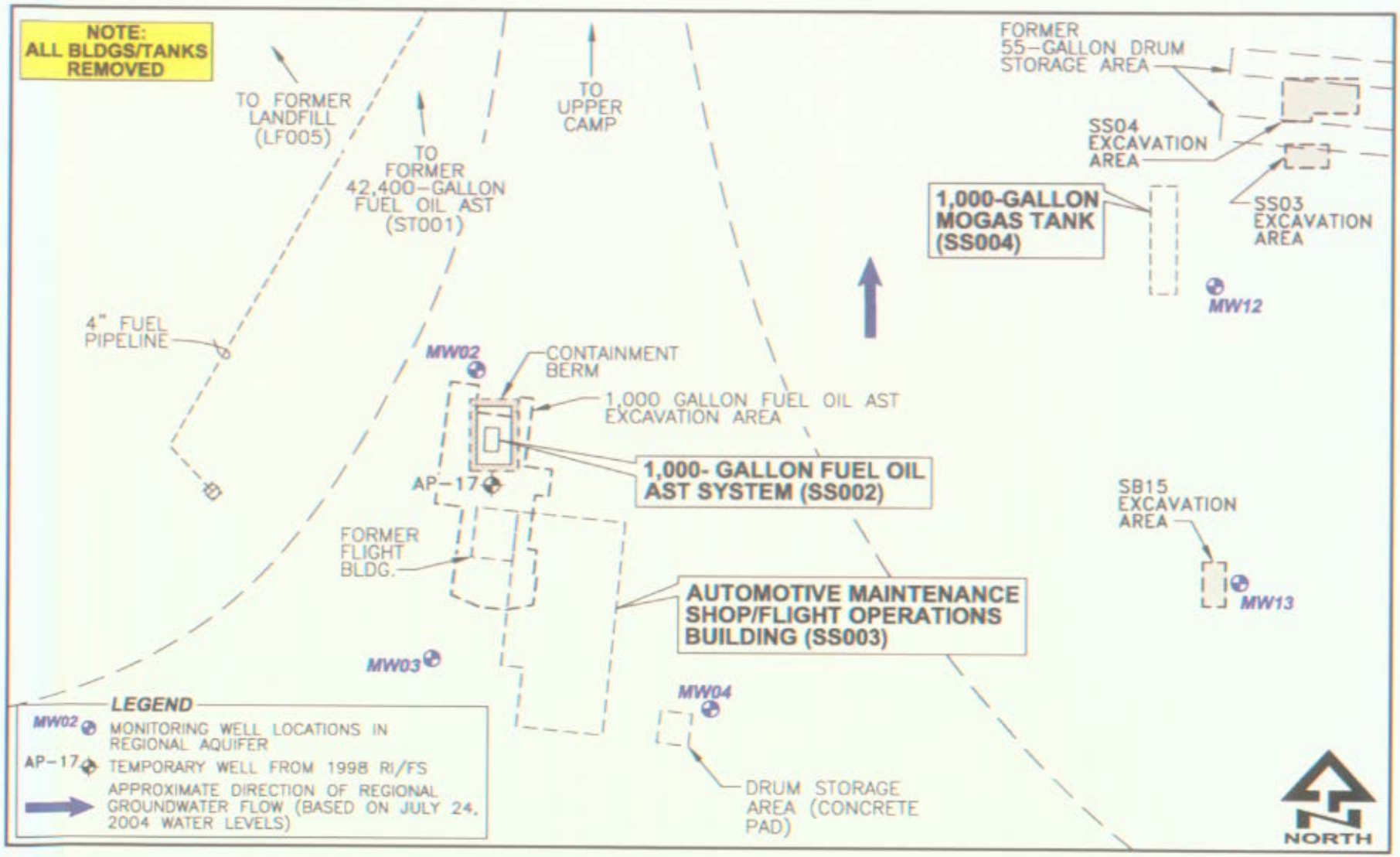


**Figure 2-5: Big Mountain Upper Camp ERP Sites (SS011, SS014, and SS016)**

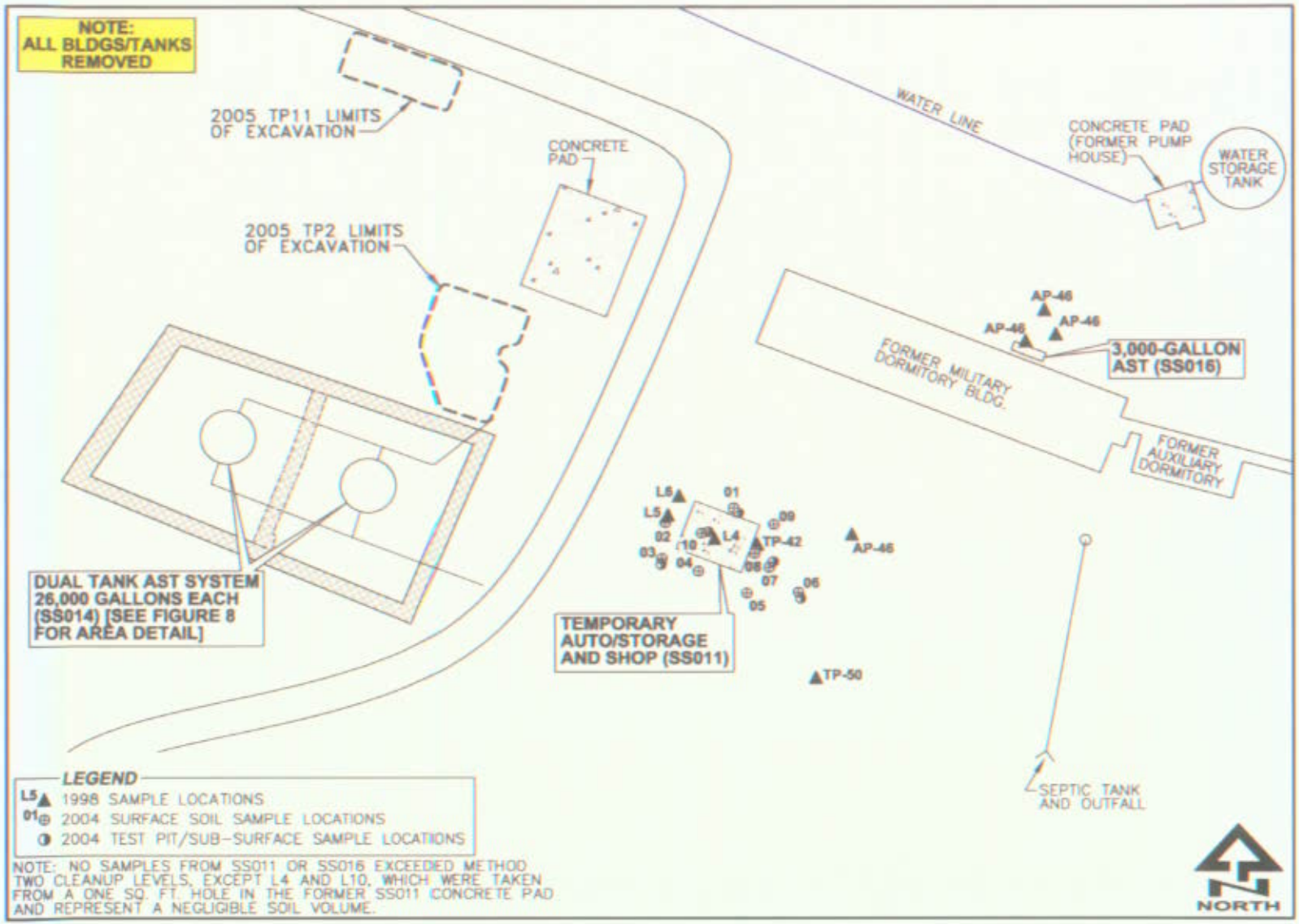


**Figure 2-6: Big Mountain SS002 and SS003 Site Details**

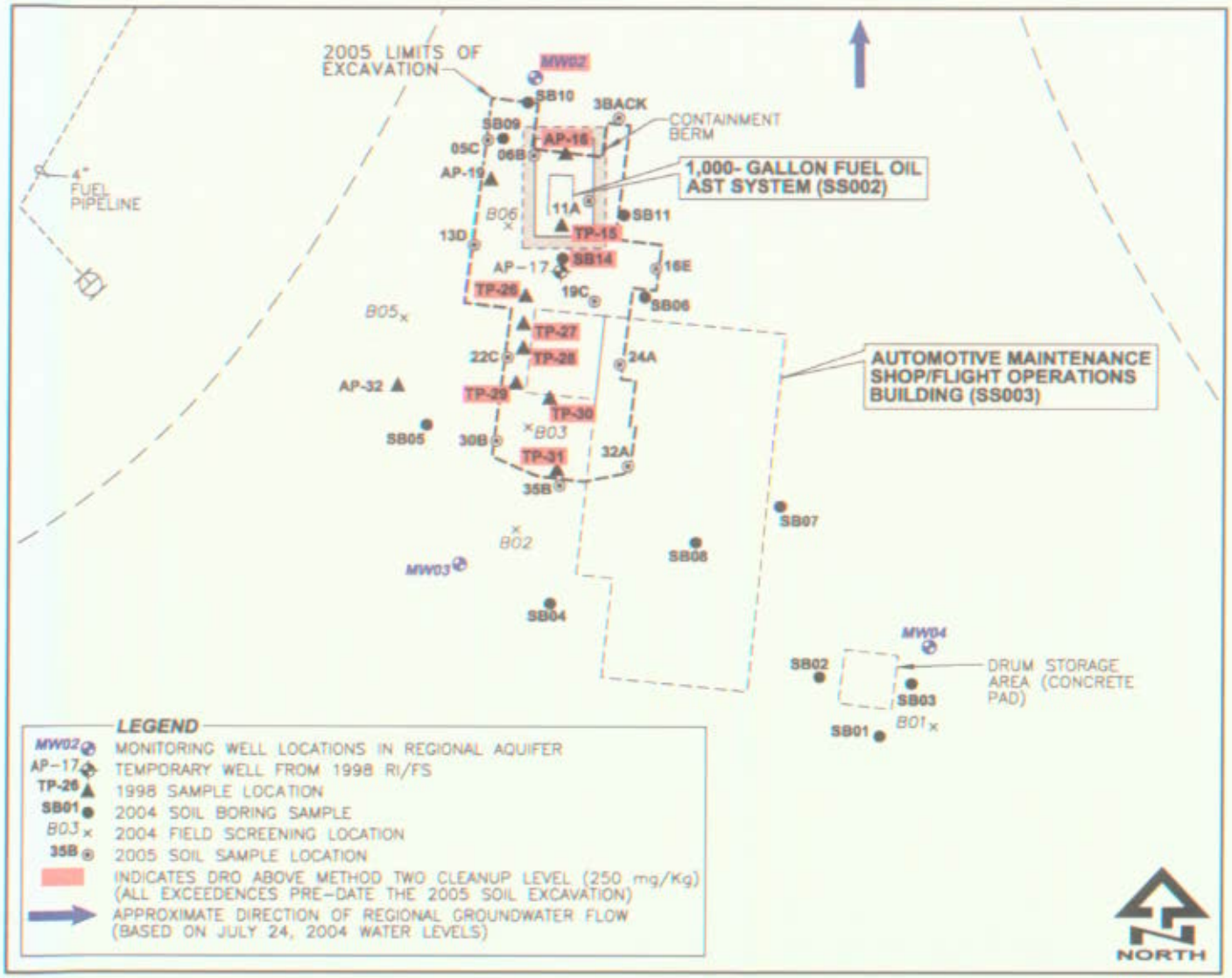


**Figure 2-7: Big Mountain SS004 Site Details**

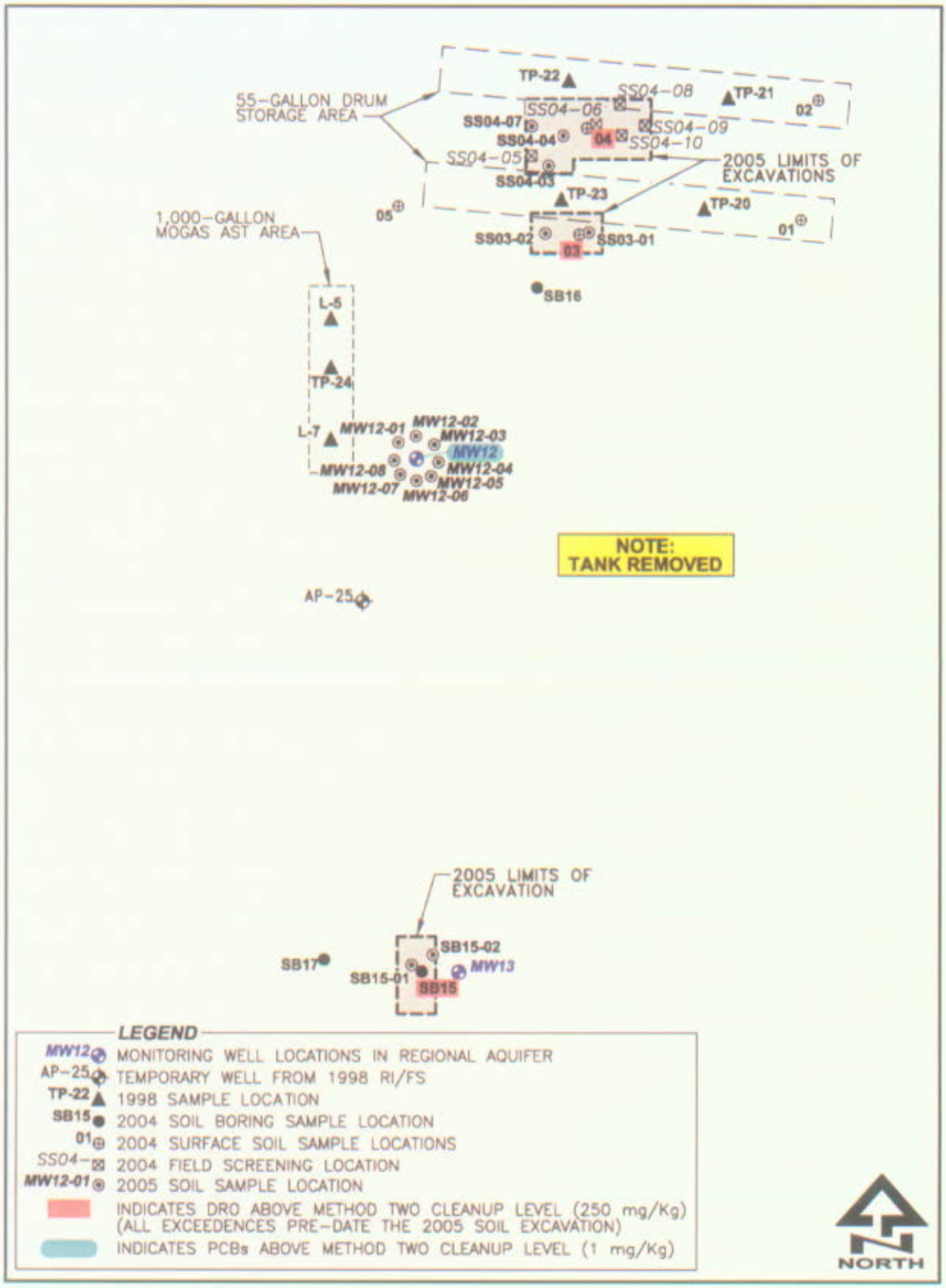
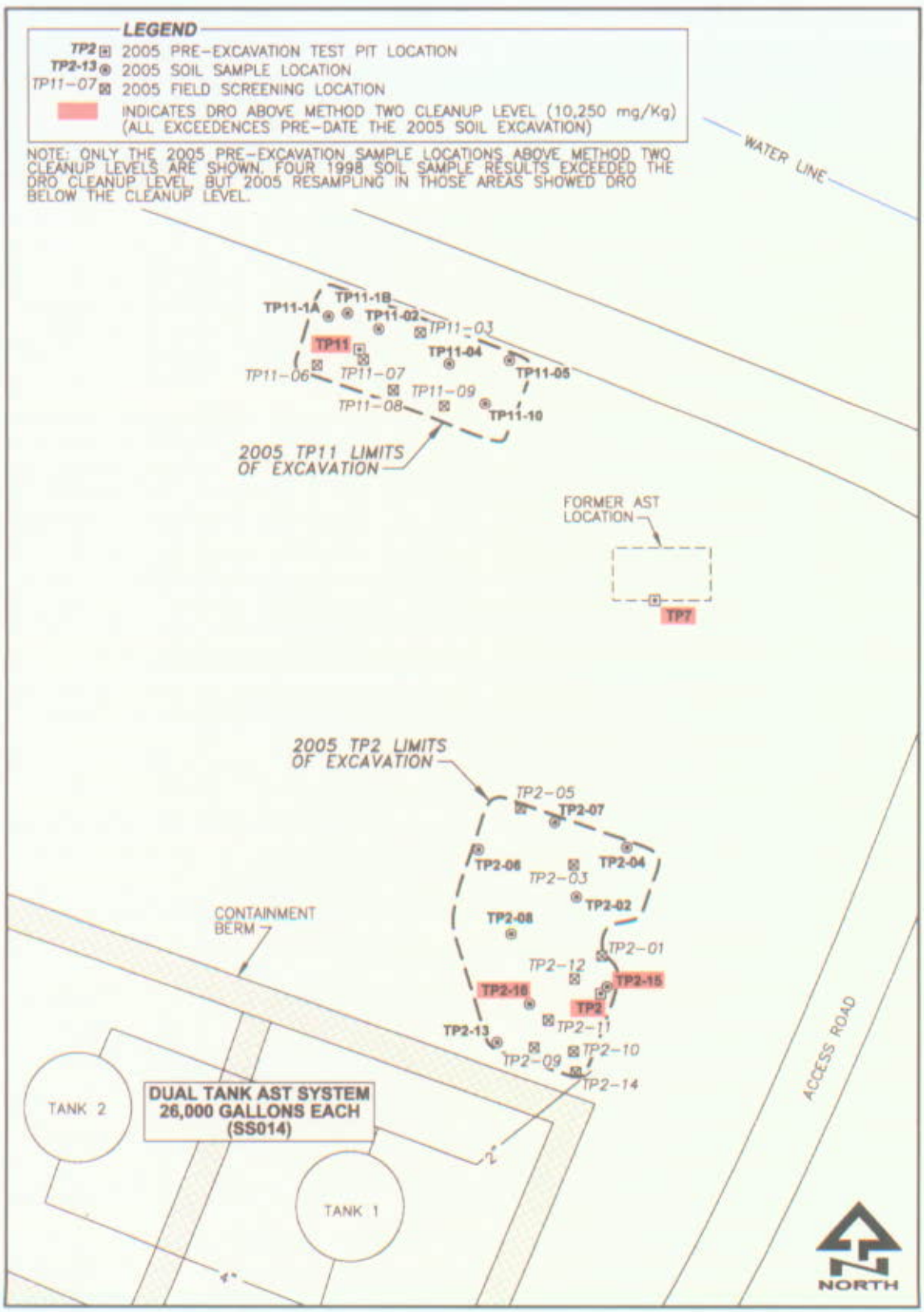


**Figure 2-8: Big Mountain SS014 Site Details**



# 3.0 Responsiveness Summary

This section provides a summary of the public comments regarding the *Proposed Plan for Final Actions for Seven ERP Sites Big Mountain RRS.* A public review and comment period was open for the *Proposed Plan for Final Actions for Seven ERP Sites* from June 14 through August 15, 2007. Public meetings were held in Igiugig on June 11, 2007, in Pedro Bay on June 12, 2007, Nondalton and Iliamna on June 13, 2007, and Kokhanok and Port Alsworth on June 14, 2007.

## 3.1 Stakeholder Comments and Lead Agency Responses

No written comments were received during the public comment period for the *Proposed Plan for Final Actions for Seven ERP Sites Big Mountain RRS* (14 June to 15 August 2007). Two verbal comments were received during the public meetings. These comments and USAF responses are summarized below.

**Question from Roz Goodman of Pedro Bay:** "What will the Air Force do with the property once it is cleaned up?"

Answer from Mike Rhoads: *"In addition to the sites discussed in this proposed plan, there are a couple other sites at the Upper Camp that have levels of PCB contaminants above regulatory cleanup levels, so before the Air Force can give the property away, they have to clean that up. It could be several years before that is done successfully. Only then will the Big Mountain property be suitable to transfer to BLM, the agency that will consider claims for the property."*

**Question from Annie Wilson of Igiugig:** "Will we be able to pick berries around these sites where you say they are acceptable and are proposing no further action?"

Answer from Mike Rhoads: *"Yes. All of these sites in the Proposed Plan have been carefully evaluated for human health risks and exposure pathways by approved screening methods in the regulatory process and have been found to be suitable for no action, which means there is no appreciable risk present to you as a subsistence user of the property, based upon all the elements we have evaluated. ADEC approves the no further action and agrees that this is appropriate and protective of human health."*

# 4.0 References

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*(Closed Landfill), SS002 (Former 1,000-Gal Fuel Oil AST), and ST001 (Former 42,400-Gal Fuel Oil AST), Big Mountain Radio Relay Station, Alaska.* March.

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# Appendix A

Proposed Plan for Closure of Seven ERP Sites, Big Mountain RRS

# Appendix A

Proposed Plan for Closure of Seven ERP Sites, Big Mountain RRS

# PROPOSED PLAN

## FINAL ACTIONS FOR SEVEN ERP SITES

## BIG MOUNTAIN RRS

***COMMENT PERIOD: June 14, 2007 to July 16, 2007***

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

## INTRODUCTION

This ***Proposed Plan***[1] discusses the final actions proposed for seven (7) *Environmental Restoration Program* (***ERP***[2]) sites located at the former Big Mountain *Radio Relay Station* (***RRS***). The seven subject sites are listed below:

- 1,000-Gallon Fuel Oil ***Aboveground Storage Tank*** (AST) (SS002),
- Automotive Maintenance Shop/Flight Operations Building (SS003),
- 1,000-Gallon ***Motor Vehicle Gasoline*** (MOGAS) AST (SS004),
- Temporary Auto Storage Building (SS011),
- Dual Fuel Oil AST System (126,000-gallon ASTs) (SS014),
- Three Thousand Gallon AST System (SS016), and
- Well and Pump House (SS017).

Results from the most recent site investigation activities (1998, 2004, and 2005) show that the seven subject sites do not pose unacceptable risk to human health or the environment. Therefore, the *United States Air Force* (***USAF***) is proposing no action at these seven 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 seven subject sites are below levels allowed by Alaska regulations and do not pose unacceptable risk to human health or the environment. However, because petroleum detections at two of the sites (SS002 and SS014) are above levels allowing unrestricted use under Alaska State regulations, *Institutional Controls* (***ICs***) are proposed for these sites. The final actions proposed by USAF under Alaska State regulations are: conditional closure with ICs for SS002 and SS014 and unconditional closure for the other five subject sites (SS003, SS004, SS011, SS016, and SS017).

USAF provided an opportunity for the United States Environmental Protection Agency (***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*

### 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 AND REGULATIONS. 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.

[1] For convenience to the reader, the terms in ***bold italic*** are defined in the Glossary at the end of this publication.

[2] The ERP is the USAF's program modeled after the EPA's Superfund environmental cleanup program.

*Contingency Plan* (*NCP*) requirements. The purpose of the Proposed Plan is to supplement the *remedial investigation* (*RI*) reports and provide the public with an opportunity to comment on the proposed actions and participate in the final remedy selection.

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 (*Responsiveness Summary*).

### How You Can Participate

You are encouraged to comment on this Proposed Plan. **The 30-day public comment period begins June 14, 2007 and ends on July 16, 2007.** Public Meetings will be held locally during the week of June 11, 2007. A schedule of times and places is included at the end of this Proposed Plan document.

A pre-addressed comment form is included at the end of the plan. You can mail or email your comments to the USAF Community Relations Coordinator at the following address:

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This Proposed Plan is also available on the following website:
**http://www.state.ak.us/dec/spar/csp/sites/big_mountain.htm**

## ORGANIZATION OF PROPOSED PLAN

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

# BIG MOUNTAIN RRS BACKGROUND

## LOCATION

The former Big Mountain RRS is located in southwest Alaska on the south shore of Lake Iliamna (**Figure 1** and **Figure 2**).

Big Mountain RRS includes 402 acres of land that has been divided into two areas, the Lower Camp and the Upper Camp. The Lower Camp installation support facility and air strip were located at the base of Big Mountain. The Upper Camp communication facility was located at the top of Big Mountain at an elevation of 2,150 feet above mean sea level. **Figure 3** illustrates the installation layout.

Three of the subject sites, the 1,000-Gallon Fuel Oil AST (SS002), the Automotive Maintenance Shop/Flight Operations Building (SS003), and the 1,000-Gallon MOGAS AST (SS004) are located at Lower Camp, and three (i.e., the Temporary Auto Storage Building (SS011), Dual Fuel Oil AST System (SS014), and 3,000-Gallon AST (SS016)) are located at Upper Camp. The Well and Pump House (SS017) is located approximately 1,000 feet west of Upper Camp. All of the buildings, facilities, and tanks have been removed from Big Mountain RRS.

**Figure 1: Big Mountain RRS Location Map**

Figure 2: Site Location Detail


## ENVIRONMENTAL SETTING

The former Big Mountain RRS has a continental type of climate typical of interior Alaska, which is characterized by low precipitation and extreme seasonal temperatures.

The majority of bedrock in the Big Mountain area is of volcanic origin. In the highland areas, unconsolidated, poorly-sorted glacial deposits thinly overly bedrock. In the lowland areas and drainage basins, glacial sediments have been reworked and distributed in broad alluvial outwash plains.

There is no groundwater or surface water at the Upper Camp. A thin layer of rocky soil covers bedrock, with no permanent water table[3]. Surface water drainage at Upper Camp is generally by overland flow down the mountain.

Shallow groundwater and surface water are present at the Lower Camp. A small, unnamed drainage located just north of the Lower Camp airstrip receives most of the surface water from the Lower Camp area. Several beaver dams built along this stream have led to the formation of many large ponds and marshy areas.

Water draining from the north, northwest, and northeast side of Big Mountain drains directly into Iliamna Lake. Surface water from the west and south sides of the Upper Camp area and from Lower Camp tends to flow south and southeast into the Belinda Creek drainage. Belinda Creek flows into Iliamna Lake at Reindeer Bay. Iliamna Lake is the regional discharge zone for the area's surface water.

## HISTORICAL USE

The *White Alice Communication System* (*WACS*), located at the Upper Camp, was established as one of 31 WACS constructed across Alaska for a statewide communication system. The WACS served as a communication link between Long Range Radar Sites and military bases in Anchorage and Fairbanks until 1975.

The Big Mountain installation and operational mission was decommissioned in 1979. Most of the facilities were abandoned and left in place at that time. In 2003 and 2004, all remaining buildings and their foundations, antennas, tanks, pipelines, vehicles, and debris were cleaned up under the Clean Sweep program. All wastes generated during the Clean Sweep activities were managed in accordance with Federal and State regulations. Building debris was disposed into an inert waste landfill constructed for the Clean Sweep program, and all hazardous waste was shipped off-site.

During the time when the installation was active, hazardous and potentially ***hazardous substances*** were used and stored there to support base activities. These substances included diesel fuel and gasoline, oils, antifreeze, solvents (for servicing and cleaning equipment), lead-acid and nickel-cadmium batteries, asbestos (as construction insulation material), and electrical transformers containing polychlorinated biphenyls (*PCBs*).

## SITE RESTORATION HISTORY

Beginning with a 1983 hazardous materials inspection and continuing through a 2005 soil removal action, USAF has conducted investigations of the Big Mountain RRS sites to determine if former installation operations

[3] After a rain or snowmelt event, there may be precipitation water present in the thin soil layer for a short time until it drains off down the mountain.

caused environmental impacts. A total of 13 ERP sites have been identified at Big Mountain RRS (listed in Table 1 and shown on Figures 4 and 5). The proposed actions discussed in this

Plan do not affect restoration of the other ERP sites listed in Table 1.

Historical site restoration events are summarized below.

- In 1983, a hazardous substance investigation identified potentially dangerous substances at the inactive White Alice site. Solvents, de-icing fluid, fuels, beryllium compounds, PCBs, glycol, and fuels were found in containers at Upper and Lower Camp. Subsequent to this investigation, a USAF cleanup team removed transformer oil from the site.
- In 1989, a Preliminary Assessment (*PA*) identified potential contamination sources, including fuels, batteries, asbestos, and electrical equipment possibly containing PCBs at Big Mountain RRS.
- In 1993, a second PA was performed. Soil samples were collected, a geophysical survey was conducted at the suspected landfill, and organic vapor monitoring was performed at targeted locations.
- In 1996, an Environmental Assessment was performed to evaluate the environmental impacts of demolishing the Big Mountain RRS.
- In 2000, a Clean Sweep Environmental Survey was conducted at Big Mountain RRS. Items requiring cleanup (e.g., buildings, tanks, debris, fluids in tanks, vehicles, and equipment) were inventoried, samples were collected for building demolition and waste characterization, demolition methods and equipment were identified, and data were collected on infrastructure and logistics.

**Table 1: Big Mountain RRS ERP Site Summary**

| Site | Name | Status |
|---|---|---|
| Lower Camp | | |
| ST001 | 42,000-Gallon Fuel Oil AST | Interim DD (2002)<br>Interim Cleanup (Removal Action) (2005) |
| **SS002** | **1,000-Gallon Fuel Oil AST** | **Interim DD (2002)<br>Interim Cleanup (Removal Action) (2005);<br>Included in this Proposed Plan** |
| LF005 | Landfill | Interim DD (2002)<br>Risk Assessment (in progress) |
| **SS003** | **Automotive Maintenance Shop/Flight Operations Building** | **Included in this Proposed Plan** |
| **SS004** | **1,000-Gallon MOGAS AST** | **Hot Spot Removal (2005);<br>Included in this Proposed Plan** |
| Upper Camp | | |
| SS013 | Antennae 2 and 4 | Final No Action DD (2002) |
| SS015 | Antennae 1 and 3 | Final No Action DD (2002) |
| **SS014** | **Dual Fuel Oil AST System (126,000-gallon ASTs)** | **Interim DD (2002)<br>Interim Cleanup (Removal Action) (2005);<br>Included in this Proposed Plan** |
| SS009 | Septic Tank and Fire Pump House | Proposed Plan for Final Remedial Action (2004) |
| SS010 | Equipment and Power Building and Auxiliary Dormitory | Proposed Plan for Final Remedial Action (2004) |
| **SS011** | **Temporary Auto Storage Building** | **Included in this Proposed Plan** |
| **SS016** | **3,00-Gallon AST** | **Included in this Proposed Plan** |
| **SS017** | **Well and Pump House** | **Included in this Proposed Plan** |

***Note: Sites shown in blue, bold font are addressed in this Proposed Plan.***

Figure 1: Big Mountain Upper Camp and Lower Camp

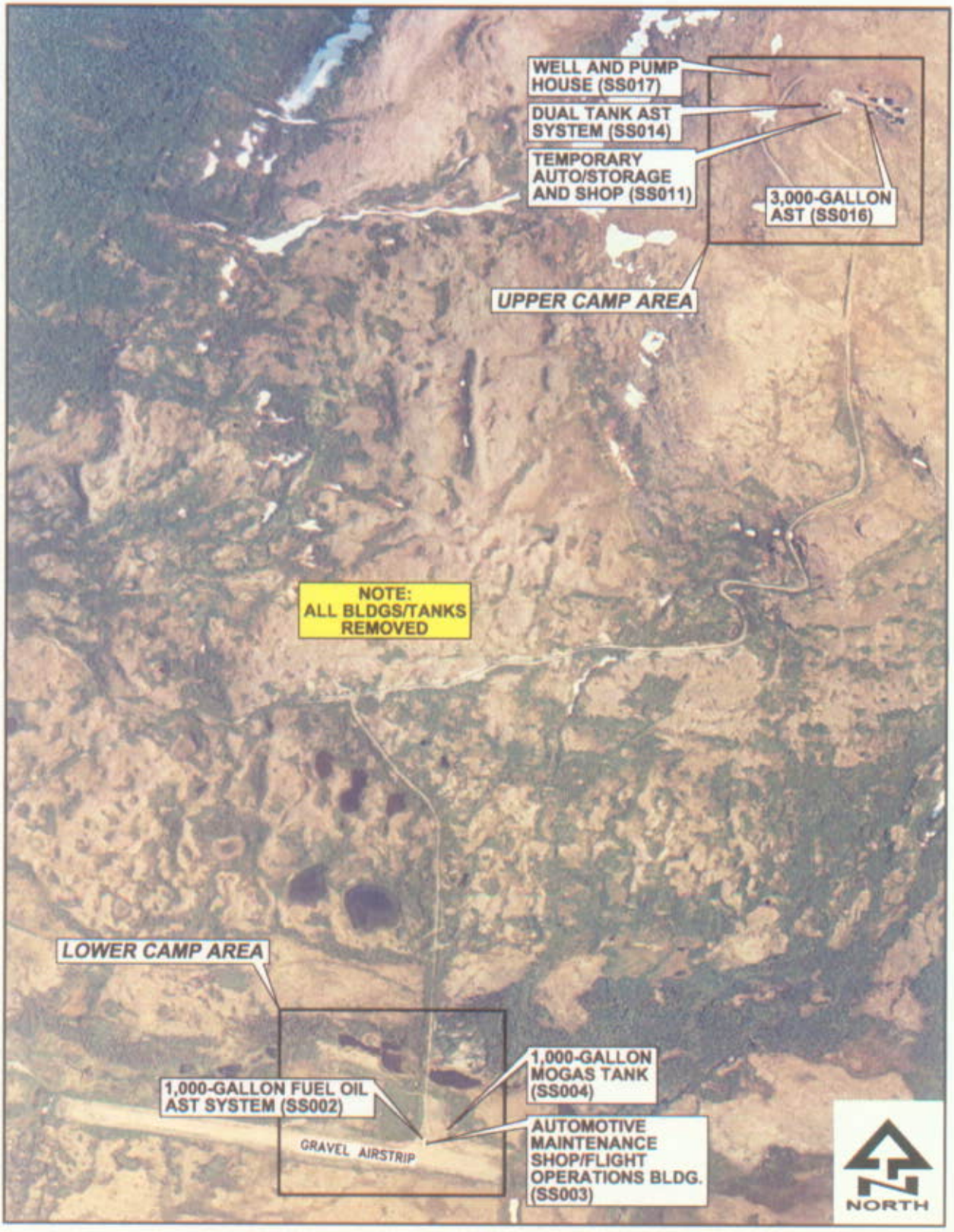
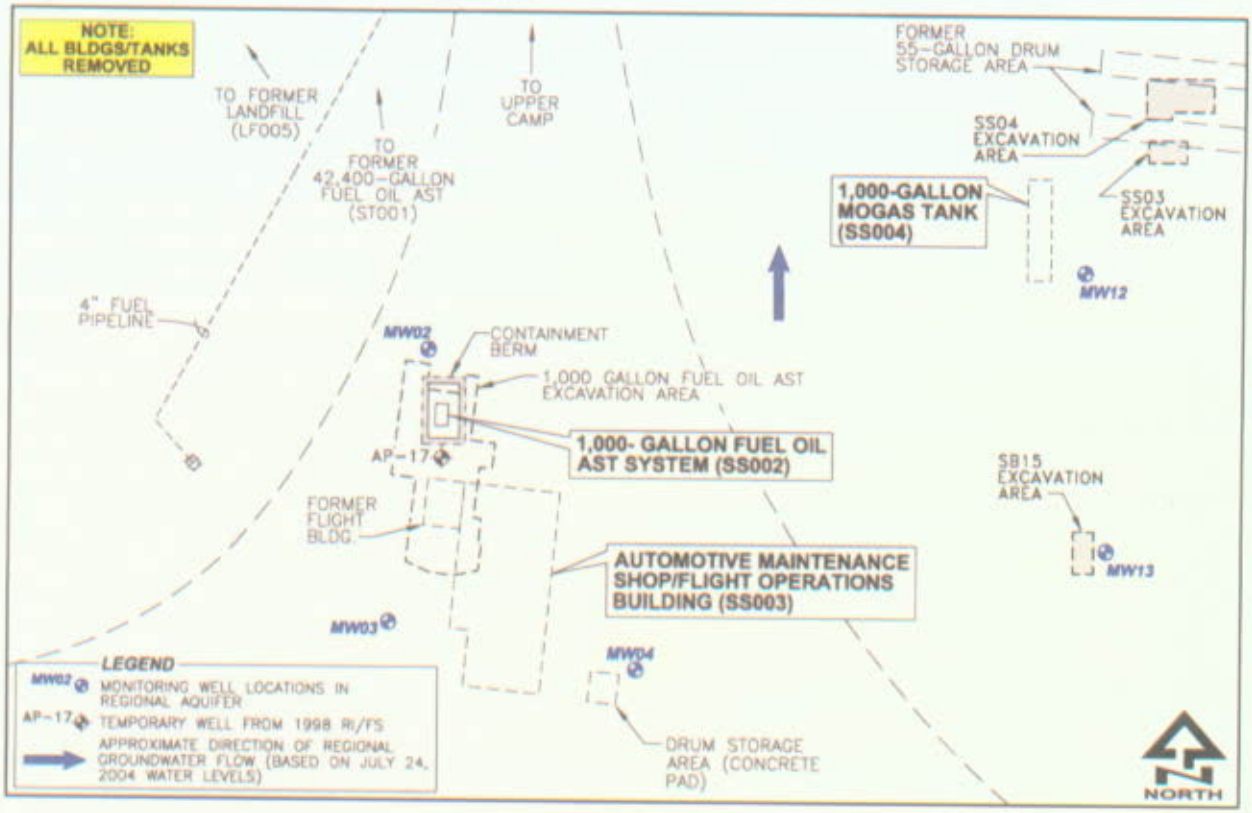


**Figure 4: Big Mountain RRS Lower Camp**




- In 2001, a *Remedial Investigation/ Feasibility Study* (***RI/FS***) report was completed[4]. During the RI/FS, soil and/or groundwater samples were collected from five Lower Camp ERP sites and eight Upper Camp sites (Table 1).
- In 2003 and 2004, additional remedial investigations were performed at the Septic Tank and Fire Pump House Tank (SS009), the Equipment and Power Building (SS010), the 42,400-gallon AST (ST001), 1,000-Gallon Fuel Oil AST (SS002), the Automotive Maintenance Shop and Flight Operations Building (SS003), the 1,000-Gallon MOGAS AST (SS004), the Temporary Auto Storage Building (SS011), and the Former Camp Landfill (LF005).
- In 2003, Clean Sweep Phase I activities were performed. A borrow source was developed, the runway and existing roads were repaired, an inert waste landfill was constructed, regulated asbestos-containing material was removed and disposed of, tanks, pipelines, and vehicles were dismantled, any fluids present were collected and shipped for off-site disposal, and the upper septic tank sludge was chlorinated.
- In 2004, Clean Sweep Phase II activities were performed. Remaining structures were demolished and removed, the water well was decommissioned, the septic tank and outfall pipeline was removed, the inert waste landfill was partially closed, and the site was restored.

[4] Although the report was completed in 2001, the samples were collected in 1998. Throughout the remainder of this Plan, this will be referred to as the 1998 RI/FS.

- In 2005, petroleum-contaminated soils were excavated from sites ST001, SS002, SS004, and SS014. The excavated soils were stored on-site in lined, bermed stockpiles and remediated on-site in summer 2006. All of the reports are available in the ***Administrative Record*** (access information is provided on page 24 of this Plan). Key reports documenting conditions at the subject sites are listed below.
- *Final Remedial Investigation/Feasibility Study (RI/FS) Volume I – Report, Big Mountain Radio Relay Station*, DOWL, February 2001.
- *Final Remedial Investigation Report for Sites ST001, SS002, SS003, SS004, SS011, and LF005, Big Mountain RRS, Alaska*, Paug-Vik, February 10, 2006.
- *Final Report, 2005 Remedial Action, Big Mountain Radio Relay Station Big Mountain, Alaska*, *Paug-Vik*, January 10, 2007.

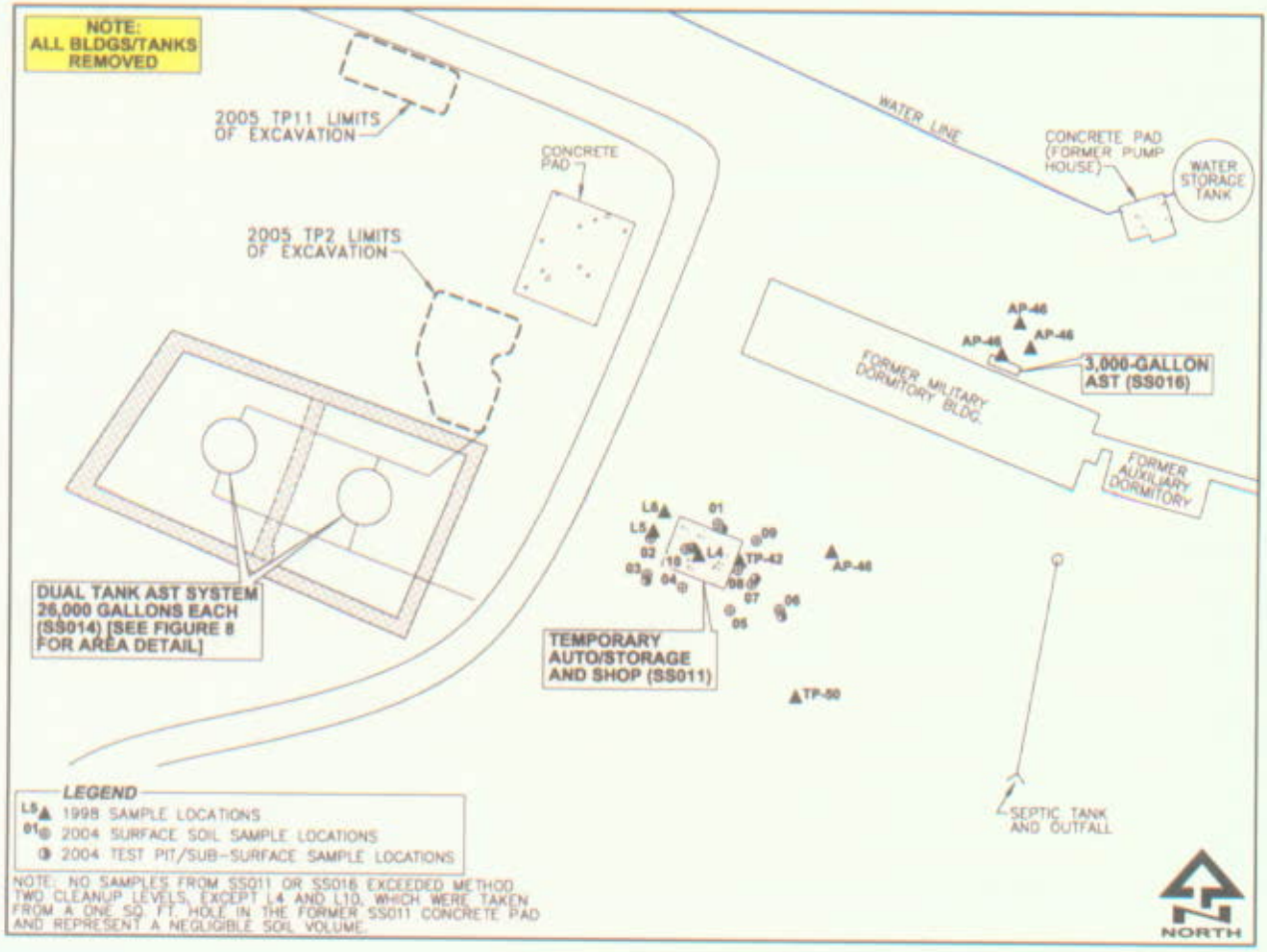
Investigation results for each subject site are summarized on pages 12 to 24 of this Plan.

## LAND USE

USAF uses the Big Mountain RRS for environmental restoration purposes only. The facility has been abandoned for many years. Future land use is expected to be recreational/subsistence.

There is no road access to the Big Mountain installation from surrounding local

**Figure 5: Big Mountain RRS Upper Camp Sites**



communities. Outside access to the installation property is exclusively by barge on Lake Iliamna, aircraft (there is a 4,000-foot runway on the installation property that was repaired in 2003 to support ERP activities), and via overland trails by snowmobile during the winter months and all-terrain vehicles during the summer months.

Regional residents use the remote region surrounding the installation property, including the installation property, for subsistence and recreational hunting and fishing.

After restoration of Big Mountain RRS has been completed, USAF plans to relinquish the property.

### GROUNDWATER AND SURFACE WATER USE

As discussed on page 3, there is no groundwater at Upper Camp. Groundwater is present at Lower Camp, but there are no groundwater production wells in the vicinity.

During the time when the Big Mountain RRS was active, a groundwater well supplied water for the facility. This well was located approximately 1,000 feet west of Upper Camp at a surface elevation approximately 50 feet lower than Upper Camp. Although there is no well log available, the well was reportedly driven to a depth of 232 feet below the Pump House floor and produced water from fractured bedrock. The well was abandoned in 2004.

As discussed on page 3, most of the surface water from Big Mountain RRS drains into Belinda Creek and ultimately into Iliamna Lake. The lower portion of Belinda Creek is used for subsistence fishing about three miles downgradient from Lower Camp.

## OVERALL SITE RESTORATION OBJECTIVES

The overall objectives of environmental site restoration at Big Mountain RRS are to ensure that conditions at each site are protective of human health and the environment and to comply with federal and state 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 1,000,000. Cancer risk is explained on page 10 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)[5] 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

[5] Throughout this Plan, these cleanup levels are referred to as ADEC Method Two soil cleanup levels.

and unrestricted access[6]. ADEC 18 AAC 75.345 Table C provides tabulated groundwater cleanup levels[7]. 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.

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 Upper Camp, the applicable ADEC Method Two soil cleanup levels for the Upper Camp sites (SS011, SS014, and SS016) are the lower of the inhalation or ingestion pathway cleanup levels. The specific cleanup levels for the contaminants detected at each site are discussed in the individual site summaries on pages 12-24.

Since groundwater is present at Lower Camp, the applicable ADEC Method Two soil cleanup levels for the Lower Camp sites (SS002, SS003, and SS004) are the lowest of the migration to groundwater, inhalation, and ingestion pathway cleanup levels. The specific cleanup levels for the contaminants detected at each site are discussed in the individual site summaries on pages 12-24.

### *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 at contaminated sites. USAF has taken a "multiple lines of evidence[8]" 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 naturally-occurring and not considered a potential contaminant at Big Mountain RRS, because of the following considerations:

- At Big Mountain 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 Big Mountain RRS.

## SUMMARY 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, risk due to contamination at the subject Big Mountain ERP sites was evaluated in the 2001 RI/FS report. The 2001 risk evaluation was updated for each site in this Plan to consider the effects of cleanup activities and monitoring performed since completion of the 2001 RI/FS. The risk update evaluated whether individual contaminant concentrations are above cleanup levels, whether cumulative risks from multiple chemicals are above thresholds, and whether potential exposure pathways are complete.

The updated risk evaluations indicated that contamination remaining at the seven sites discussed in this Plan does not pose unacceptable potential risk to human health or the environment. The subject sites of this Plan

[6] 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 11-12 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.

[7] Throughout this Plan, these cleanup levels are referred to as ADEC Table C groundwater cleanup levels.

[8] 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.

fall into one of the three potential risk categories listed below.

1) Sites where the 2001 RI/FS human health risk evaluation indicated no risks or hazards above allowable thresholds[9] (SS016 and SS017);
2) Sites where further investigation and risk calculations since 2001 indicate no risks or hazards above allowable thresholds (SS011); and
3) Sites where contaminated soil was removed (in 2005), and there are currently no complete exposure pathways or risks above allowable thresholds (SS002, SS003, SS004, and SS014).

The risk evaluation methodology is discussed below, and site-specific risk evaluation results are presented individually in each site summary on pages 12 to 24 of this Plan.

## *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 Big Mountain 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 threshold (maximum allowable) HI is one.

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 *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 ADEC's 2002 Cumulative

[9] Potential risk due to naturally-occurring arsenic and laboratory contaminants was quantified during the risk evaluation but is not appropriate for consideration in site cleanup decisions.

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 Evaluation

As discussed on pages 8-9 of this Plan, 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.

## *CUMULATIVE HUMAN HEALTH RISK EVALUATION 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 individually in each site summary on pages 12 to 24 of this Plan.

## *ECOLOGICAL RISK EVALUATION*

No complete exposure pathways are present between the subject sites themselves (AST pads and building pads) and ecological receptors. The subject sites are considered poor quality ecological habitat, as the ground is very rocky and contains little or no vegetation. There is no surface water present at the sites. The risk to ecological receptors from foraging at the sites is considered negligible.

However, ecological risk was evaluated in the 2001 RI/FS and in an additional 2006 ecological risk assessment (for two Lower Camp sites) to evaluate potential ecological impacts to areas outside of the specific ERP site boundaries.

- At Upper Camp, the 2001 ecological risk evaluation found no evidence of impact to the surrounding area from site-related chemicals.
- At Lower Camp, the 2001 ecological assessment for Lower Camp was inconclusive and further evaluation was recommended.
- An ecological risk assessment was completed for two sites at the Lower Camp (the 42,400-Gallon Fuel Oil AST [ST001] and Landfill [LF005]) in 2006. Although these sites are not the subject of this Proposed Plan, the ecological risk assessment is potentially relevant, because it evaluated potential impacts to plants and animals in the ecological habitat nearest Lower Camp facilities more contaminated than the sites considered in this Plan.

- The 2006 Lower Camp ecological risk assessment quantified risk to aquatic and semi-aquatic receptors (plant and animal communities) in the beaver pond and wetland adjacent to the landfill and evaluated potential human food chain exposure. The 2006 ecological risk assessment concluded that the ecological risks at Big Mountain RRS Lower Camp are negligible, and no further action to prevent potential ecological risk was necessary.

## INDIVIDUAL SITE SUMMARIES

### *1,000-GALLON FUEL OIL AST AREA (SS002)*

#### Site Description

The 1,000-gallon AST fuel oil system was located approximately ten feet north of the former Flight Operations Building at Lower Camp, adjacent to the Upper Camp Access road (**Figure 4**). The system was used to store fuel oil for generators and heating systems associated with the Automotive Maintenance Shop and Flight Operations buildings.

Site investigation activities discovered petroleum contamination in the soil at this site. There is no documentation of the contamination source, but the contamination is consistent with one or more historic fuel spills.

#### Cleanup Actions To-Date

Approximately 1,400 cubic yards of petroleum-contaminated soil was removed from this site in 2005 (**Figure 4** and **Figure 6**). The excavation area measured approximately 75 feet by 30 feet. The total excavation depth ranged from 10 to 15 feet *below ground surface* (*bgs*) in the northern portion to approximately 25 feet bgs at the southern limit of the excavation. Excavated soils were screened to remove material greater than two inches in diameter[10]. The oversized material was later used to backfill the excavation area. Petroleum-contaminated soil from SS002 that was two inches in diameter or smaller was placed into lined, bermed stockpile areas. In summer 2006 the soil was remediated on-site.

#### Summary of Site Conditions

Current Site Conditions: Based on the 2004 RI and 2005 confirmation sample results, the excavation successfully removed most of the petroleum contamination above ADEC Method Two soil cleanup levels delineated by the 1998 and 2004 soil sampling at the former 1,000-Gallon Fuel Oil AST Area (SS002). One area (MW-02 at 25 feet bgs) of DRO-contaminated soil was outside of the excavation limits and remains above ADEC Method Two cleanup levels at the site.

Groundwater results from 2004 and 2006 showed no contamination above ADEC Table C cleanup levels.

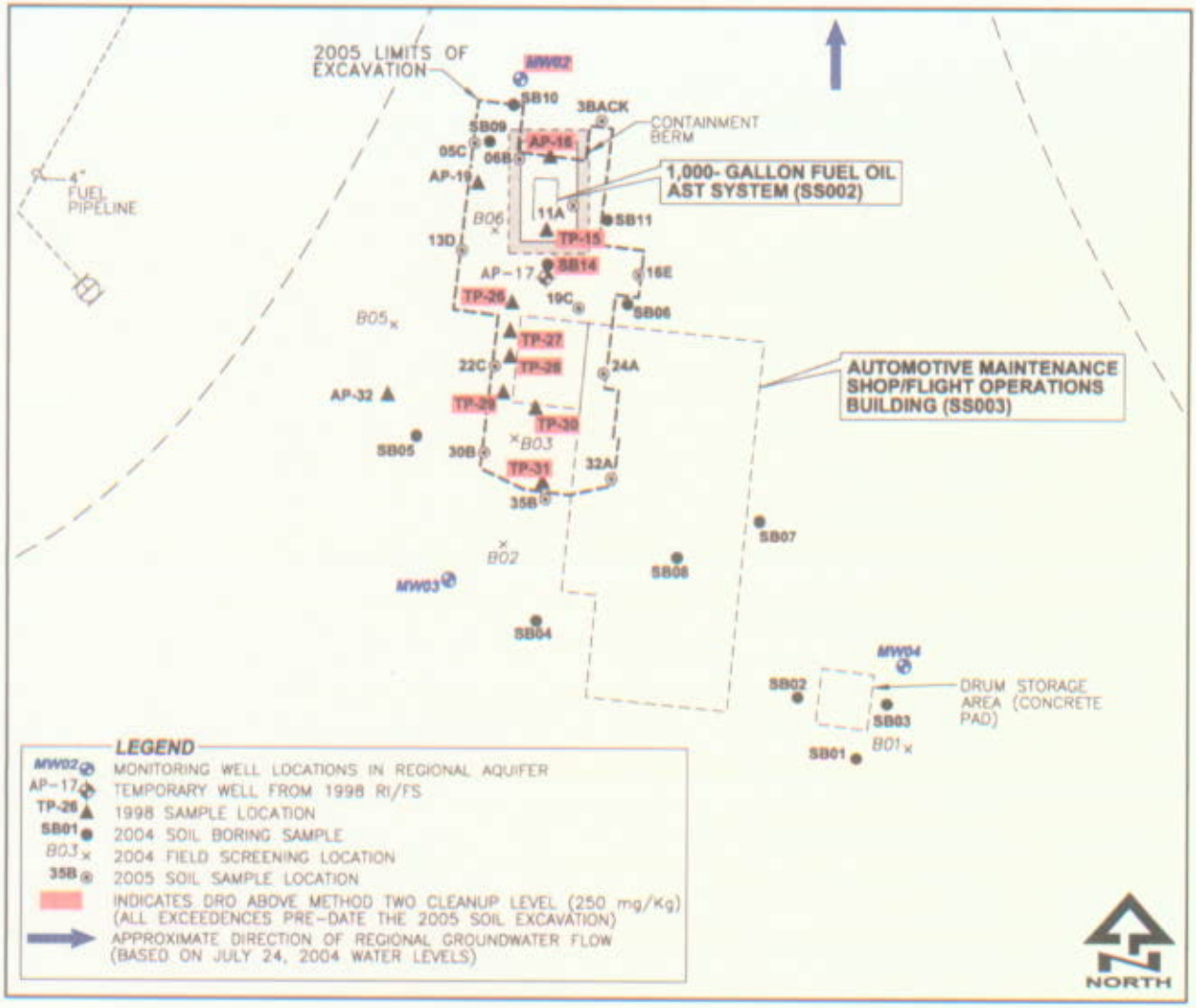
Investigation Summary: Soil and groundwater samples were collected from SS002 during environmental investigations in 1998 and 2004, confirmation soil samples were collected at the limits of the 2005 excavation, and groundwater samples were collected in 2006. Since the 2005 excavation removed most of the soil contamination above ADEC Method Two cleanup levels (**Figure 6**); only the 2005 confirmation soil samples and previous sample results outside of the 2005 excavation limits are representative of current site conditions. The 1998, 2004, 2005, and 2006 investigations are summarized briefly below.

In 1998, soil samples were collected from two test pits and two soil borings (**Figure 6**) and analyzed for GRO, DRO, RRO, *volatile organic compounds* (*VOCs*), *semi-volatile organic compounds* (*SVOCs*), pesticides, and metals. Soil sample results indicated DRO, GRO, benzene, and toluene above ADEC Method Two soil cleanup levels. However, all contamination detected above Method Two cleanup levels in 1998 was removed during the 2005 excavation (**Figure 6**).

One temporary monitoring well (AP-17) was

[10] Rock material greater than 2-inches in diameter cannot retain significant amounts of contamination; therefore, it is generally not considered to be contaminated.

**Figure 6: Site SS002 and SS003 Layout**




installed between SS002 and SS003 and sampled for the same analytical suite as the soil samples plus PCBs. Groundwater sample results indicated DRO at 1.8 mg/L, which is above the ADEC Table C cleanup level of 1.5 mg/L.

In 2004, soil samples were collected from six soil borings (**Figure 6**) and analyzed for GRO, DRO, RRO, benzene, toluene, ethylbenzene, and xylenes (***BTEX***), and lead. Soil sample results indicated DRO, GRO, and BTEX above ADEC Method Two cleanup levels at soil boring SB14 and DRO above Method Two cleanup levels at soil boring MW02. All contamination detected above Method Two soil cleanup levels in 2004 was removed during the 2005 excavation, except at MW-02, where DRO were detected at 2,230 *milligrams per kilogram* (***mg/Kg***) at 25 feet bgs.

One groundwater well was installed (MW-02) and sampled for GRO, DRO, RRO, VOCs, and lead. Groundwater sample results from MW-02 indicated no contamination above ADEC Table C cleanup levels.

In 2005, twelve confirmation samples were collected from the excavation area and analyzed for DRO, GRO, and BTEX. Sample results indicate contaminant concentrations below ADEC Method Two cleanup levels at the excavation limits. The 95% *Upper Confidence Limit* (***UCL***) of the mean DRO concentration in the confirmation samples was 124 mg/Kg

(below the 250 mg/Kg Method Two cleanup level). Confirmation sample results are summarized in Table 3.

In 2006, groundwater samples were collected from monitoring wells MW-02, MW-03, and MW-04[11] and analyzed for GRO, DRO, and BTEX. All results were below 1/10 of ADEC Table C cleanup levels.

**Table 3: 1,000-Gallon Fuel Oil AST (SS002) 2005 Soil Sample Summary**

| | ADEC Method Two Cleanup Level | # of Samples | # of Detections | 95% UCL of mean (DRO) or Max. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| DRO | 250 | 12 | 12 | 124 | 1 |
| GRO | 300 | 12 | 2 | 0.703 | 0 |
| BTEX | varies | 12 | 0 | ND | 0 |

*Notes:*
*There was one area of DRO contamination above the cleanup level outside of the limits of the 2005 excavation (DRO at 2,230 mg/Kg at 25 ft bgs in MW-02*

## Summary of Site Risks

As shown in Table 2, noncancer risk due to contamination remaining at the former 1,000-Gallon AST (SS002) (HQ=0.3) is below the threshold risk level of 1.0. Since DRO was the only analyte detected above 1/10 of the Method Two cleanup levels (inhalation or ingestion pathways), and no analytes were detected above 1/10 of the ADEC Table C groundwater cleanup levels in 2004 or 2006, cumulative risk was not calculated. Contamination remaining at SS002 does not pose an unacceptable risk to human health or the environment.

**Table 2: SS002 Risk Calculations**

| | Max. Detected[1] (mg/kg) | RBC (mg/kg) | Exposure Pathway | HQ[3] | Risk |
|---|---|---|---|---|---|
| DRO | 2,230 | 10,139 | Ingestion-NC | 0.2 | |
| DRO | 2,230 | 19,917 | Inhalation-NC | 0.1 | |

*Notes:*
*RBC =Risk-Based Concentration (equates to HQ=1)*
*HQ = Hazard Quotient*
*NC = Non-carcinogenic*

## Proposed Remedy

Under CERCLA, no further action is proposed at the 1,000-Gallon Fuel Oil AST Area (SS002), 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 1,000-Gallon Fuel Oil AST Area (SS002) 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, as of 2004, DRO concentrations in soil exceed ADEC Method Two cleanup levels for unrestricted land use, and that disturbance of DRO-contaminated soil must comply with ADEC regulations.

USAF proposes to implement the IC by the following actions:

- USAF will survey the 1,000-Gallon Fuel Oil AST Area (SS002) 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 SS002 (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.

[11] The installation and previous sampling of MW-03 and MW-04 is included in the SS003 discussion on page 15.

## *AUTOMOTIVE MAINTENANCE SHOP/ FLIGHT OPERATIONS BUILDING (SS003)*

### Site Description

ERP site SS003 includes the former Automotive Maintenance Shop and the adjacent former Flight Operations Building. It is located in Lower Camp just to the south of the former 1,000-gallon Fuel Oil AST (Site SS002) and adjacent to the Upper Camp access road (**Figure 4**). Site SS003 also includes a concrete slab reported to have been the Fire and Rescue Equipment Building and an area on the west side of the buildings once used for 55-gallon drum and vehicle storage.

Site investigation activities discovered petroleum contamination in the soil at this site. There is no documentation of the contamination source, but the contamination appears to be the result of one or more historic spills from SS002.

### Cleanup Actions To-Date

The final remnants of the Automotive Maintenance Shop and Flight Operations Building were removed during 2003-2004 Clean Sweep activities. Previously, during the time of the 1998 RI/FS activities, a concrete slab and various wood and metal debris remained from the maintenance shop, and the Flight Operations Building was in fair condition.

Petroleum-contaminated soil was excavated from site SS003 as part of the SS002 excavation in 2005 (discussed in the previous section). Sampling performed before and during the excavation confirmed that contaminated soil from site SS002 extended into the northern portion of site SS003. Therefore, the SS002 excavation was expanded to remove all of the contaminated soil in Site SS003 (**Figure 4** and **Figure 6**).

### Summary of Site Conditions

Current Site Conditions: Based on the 2005 confirmation sample results, the excavation removed all of the petroleum contamination above ADEC Method Two cleanup levels in the former Automotive Maintenance Shop/Flight Operations Building site (SS003). There is no contamination remaining above ADEC Method Two cleanup levels at site SS003.

Investigation Summary: Soil and groundwater samples were collected from SS003 during environmental investigations in 1998 and 2004, and confirmation soil samples were collected at the limits of the 2005 excavation. Since the 2005 excavation removed all soil contamination above ADEC Method Two cleanup levels, only the 2005 confirmation soil samples are representative of current site conditions. The 2005 confirmation soil sampling was discussed in the previous section (Site SS002) of this Plan. The 1998 and 2004 investigations are summarized briefly below.

In 1998, soil samples were collected from seven test pits and one soil boring (**Figure 6**) and analyzed for GRO, DRO, RRO, VOCs, SVOCs, *polynuclear aromatic hydrocarbons* (***PAHs***), PCBs, pesticides, and metals. Soil sample results indicated DRO, GRO, benzene, and toluene above ADEC Method Two cleanup levels. However, all contamination detected above Method Two cleanup levels in 1998 was removed during the 2005 excavation (**Figure 6**).

In 2004, soil samples were collected from twelve soil borings around the perimeter of the site and one surface location (**Figure 6**) and analyzed for GRO, DRO, RRO, VOCs, PAHs, PCBs, SVOCs, and lead. Soil sample results indicated no contamination above ADEC Method Two cleanup levels.

Two groundwater wells were installed (MW-03 and MW-04) and sampled for GRO, DRO, RRO, VOCs, PCBs, PAHs, pesticides, and dissolved metals. Groundwater sample results indicated no contamination above ADEC Table C groundwater cleanup levels.

### Summary of Site Risks

No cumulative risk calculations were performed for Site SS003, because the 2005 confirmation soil sample results indicated no contamination remaining above 1/10 of Method Two cleanup levels (inhalation or ingestion pathways) and no analytes were detected above 1/10 of the ADEC

Table C groundwater cleanup levels. Contamination remaining at SS003 does not pose unacceptable potential risk to human health or the environment.

### Proposed Remedy

Under CERCLA, no further action is proposed at the Automotive Maintenance Shop/Flight Operations Building (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.

## *1,000-GALLON MOGAS TANK (SS004)*

### Site Description

The former 1,000-gallon MOGAS AST (SS004) is located approximately 250 feet northeast of the former Flight Operations Building at Lower Camp (**Figure 4**). The MOGAS tank system included an AST, a dispenser housed in a small wooden enclosure, and possibly a small drum storage area directly north of the AST. There are no records available regarding the amount of fuel stored, spills, or system leaks.

Site investigation activities in 2004 discovered petroleum and possible PCB contamination in the soil at this site. There is no documentation of the contamination source, but the petroleum contamination likely resulted from one or more historic spills from the MOGAS tank or dispenser.

No indication of a structure, debris, or surface soil staining was identified at SS004 during the 1998 RI/FS activities; therefore, this site was not included in the 2003-2004 Clean Sweep activities.

### Cleanup Actions To-Date

Approximately 175 cubic yards of petroleum-contaminated soil were removed from three separate areas within site SS004 in 2005. The final excavation areas are described below and shown on **Figures 4** and **7**.

- The excavation at soil boring SB15 measured approximately 8 feet by 14 feet and was 9 feet deep.
- The excavation at soil boring SS03 measured approximately 9 feet by 14 feet and was 1 to 2 feet deep.
- The excavation at soil boring SS04 measured approximately 14 feet by 12 feet. The excavation depth for approximately half of the area was 4 feet bgs, and the depth of the other half was approximately 17 feet bgs.

Excavated soils were screened to remove material greater than two inches in diameter. The oversized material was later used to backfill the excavation area. Petroleum-contaminated soil from SS004 that was two inches in diameter or smaller was placed into lined, bermed stockpile areas. In summer 2006, the soil was remediated on-site.

### Summary of Site Conditions

Current Site Conditions: Based on the 2005 confirmation sample results, the excavation removed all of the petroleum contamination above ADEC Method Two cleanup levels delineated by the 2004 soil sampling. There is no contamination remaining above ADEC Method Two cleanup levels at the former 1,000-MOGAS AST (SS004).

There is no groundwater contamination above ADEC Table C groundwater cleanup levels.

Investigation Summary: Soil and groundwater samples were collected from SS004 during environmental investigations in 1998 and 2004, and confirmation soil samples were collected at the limits of the 2005 excavations. Since the 2005 excavations removed all soil contamination above ADEC Method Two cleanup levels delineated during the 2004 RI sample event, only the 2005 confirmation soil samples are representative of current site conditions. The 1998, 2004, and 2005 investigations are summarized briefly below.

In 1998, soil samples were collected from five test pits and one soil boring (Figure 7) and analyzed for GRO, BTEX, VOCs, SVOCs, pesticides, and metals. Soil sample results indicated no contamination above ADEC Method Two cleanup levels.

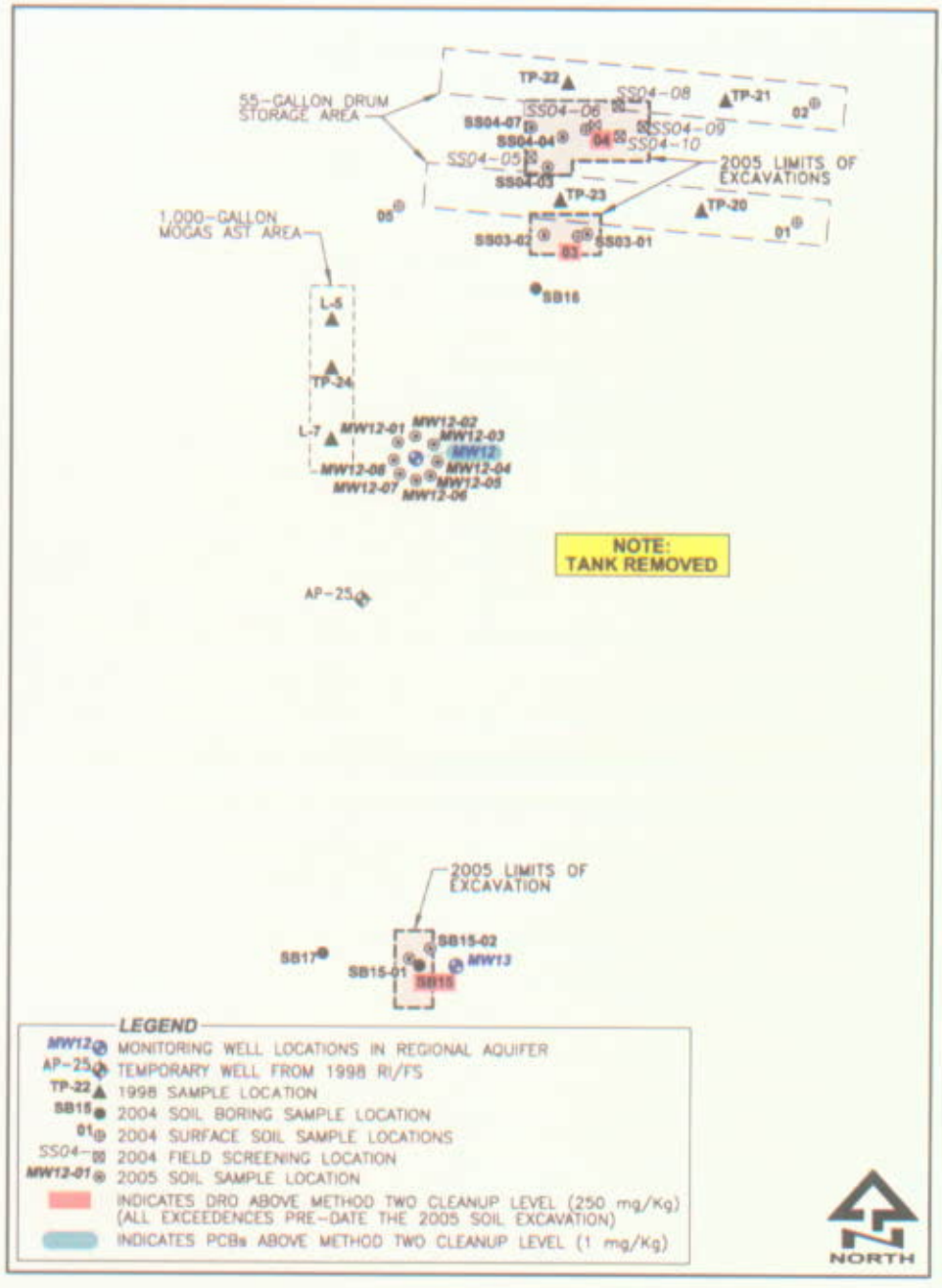
One temporary monitoring well (AP-25) was installed at SS004 and sampled for GRO, BTEX, and lead. Groundwater sample results showed lead at a concentration of 0.028 mg/L, exceeding the ADEC Table C cleanup level of 0.015 mg/L. No other analytes were detected in the groundwater sample.

In 2004, soil samples were collected from thirteen soil borings (including borings for two monitoring wells and one attempted monitoring well) and five surface locations (Figure 7) and analyzed for GRO, DRO, RRO, VOCs, PCBs, PAHs, pesticides, and metals. Soil sample results indicated DRO above ADEC Method Two cleanup levels at three locations (locations 03, 04, and SB-15 on Figure 7) and PCBs above Method Two cleanup levels at one location (4.32 mg/Kg in a surface soil sample from MW-12; see Figure 7).

Two groundwater wells were installed (MW-12 and MW-13) and sampled for GRO, DRO, RRO, VOCs, PCBs, PAHs, pesticides, and dissolved metals. Groundwater sample results indicated no contamination above Table C cleanup levels.

In 2005, seven confirmation samples (two from SB15, two from SS03, and three from SS04) were collected from the excavation limits and analyzed for DRO. Sample results indicate DRO concentrations below the 250 mg/Kg ADEC

**Figure 7: 1,000-Gallon MOGAS AST (SS004) Site Summary**



Method Two cleanup level. Confirmation sample results are summarized in Table 4.

As follow-up to the detection of PCBs in 2004, eight surface soil samples were collected near monitoring well MW-12 (**Figure 7**) and analyzed for PCBs. PCBs were not detected in any of these samples. Based on the 2005 sample results, the 2004 result was determined not to be reproducible or representative of the site.

**Table 4: 1,000-Gallon MOGAS AST (SS004) 2005 Soil Sample Summary**

| | ADEC Method Two Cleanup Level | # of Samples | # of Detec -tions | Max. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| DRO | 250 | 7 | 7 | 234 | 0 |

### Summary of Site Risks

No cumulative risk calculations were performed for Site SS004, because the 2005 confirmation sample results indicated no contamination remaining above 1/10 of Method Two (inhalation or ingestion pathways) cleanup levels. PCBs were not detected in the 2005 samples around MW-12, indicating that the 2004 PCB detection is neither reproducible nor representative of site conditions. Contamination remaining at SS004 does not pose unacceptable potential risk to human health or the environment.

### Proposed Remedy

Under CERCLA, no further action is proposed at the former 1,000-gallon MOGAS AST (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 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.

## *TEMPORARY AUTO STORAGE BUILDING (SS011)*

### Site Description

The former Temporary Auto Storage Building (SS011) is located directly east of the main road entering the Upper Camp (**Figure 5**). The location is approximately 75 feet southwest of the former Auxiliary Dormitory Building.

The Temporary Auto Storage Building was used for vehicle storage and maintenance during the operation of the Big Mountain RRS facility. The types and quantities of material or equipment stored at the building are unknown; however, as-built drawings of the facility indicate the presence of an ***AST*** located at the northeast corner of the building.

### Cleanup Actions To-Date

The Temporary Auto Storage Building was demolished in 2003 under the Clean Sweep Phase I project, and the concrete foundation was removed during 2004 Clean Sweep Phase II activities.

### Summary of Site Conditions

Current Site Conditions: Based on the 1998 and 2004 soil sample results, there is no contamination above ADEC Method Two cleanup levels at the former Temporary Auto Storage Building (SS011). The 1998 and 2004 investigations are summarized briefly below.

As discussed on page 3, there is no groundwater at Upper Camp.

Investigation Summary:

In 1998, soil samples were collected from three surface soil sample locations, two test pits, and one subsurface boring (**Figure 5**) at SS011. A total of five surface samples and five subsurface samples were analyzed for DRO, RRO, VOCs, SVOCs, PAHs, PCBs, pesticides, and metals. Sample results indicated PCBs at 1.3 mg/Kg in one soil sample (L4), exceeding the ADEC Method Two cleanup level of 1 mg/Kg (for residential use). Sample L4 was collected from an approximately 1-square foot hole in the middle of the concrete foundation. No other

sample results exceeded Method Two cleanup levels. All sample results exceeding 1/10 of Method Two cleanup levels are summarized in Table 5.

In 2004, ten surface and five subsurface soil samples were collected from the perimeter of the former concrete pad and the area of 1998 RI sample L4 (**Figure 5**) and analyzed for GRO, DRO, VOCs, PCBs, SVOCs, and metals. Sample results indicated benzo(a)pyrene at 1.34 mg/Kg in one soil sample (location 10; which is the same as 1998 RI sample L4), exceeding the ADEC Method Two cleanup level of 1 mg/Kg. No other sample results exceeded Method Two cleanup levels. All sample results exceeding 1/10 of Method Two cleanup levels are summarized in Table 5.

**Table 5: Temporary Auto Storage Building (SS011) Soil Sample Summary**

| | ADEC Method Two Cleanup Level | # of Samples | # of Detections | Max. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| **1998 RI Sampling** | | | | | |
| DRO | 10,250 | 10 | 6 | 4,500 | 0 |
| RRO | 10,000 | 10 | 8 | 1,700 | 0 |
| Benzo(a) pyrene | 1 | 10 | 1 | 0.1 | 0 |
| PCBs | 1 | 10 | 4 | 1.3 | 1 |
| **2004 RI Sampling** | | | | | |
| Benzo(a) pyrene | 1 | 15 | 2 | 1.34 | 1 |
| n-Nitrosodi-n-propylamine | 1.2 | 15 | 1 | 0.245 | 0 |
| PCBs | 1 | 15 | 11 | 0.358 | 0 |

## Summary of Site Risks

Benzo(a)pyrene and PCBs were each detected above their respective ADEC Method Two cleanup levels in one out of four samples collected from the approximately 1-square foot hole in the concrete pad. In soil samples from other areas of the site, benzo(a)pyrene was only detected once (at 0.0065 mg/Kg), and PCBs were only detected at concentrations below 0.1 mg/Kg (less than 1/10 of the Method Two cleanup level). Because the elevated concentrations of benzo(a)pyrene and PCBs represent the maximum concentration within only a very small (1 square foot) area of the site, these elevated concentrations are not representative of the entire site. The potentially-impacted area is so small relative to the overall area of the site that it is considered to pose negligible risk.

As shown in Table 6, the cumulative risks and HI are below threshold levels ($10^{-5}$ and 1, respectively). As discussed in the previous paragraph, PCBs and benzo(a)pyrene were not considered representative of overall site conditions and were therefore not included in the cumulative risk calculations.

**Table 6: SS011 Cumulative Risk Summary**

| | Max. Detected (mg/kg) | RBC (mg/kg) | Exposure Pathway | HQ | Risk |
|---|---|---|---|---|---|
| DRO | 4,500 | 10,139 | Ingestion-NC | 0.4 | |
| DRO | 4,500 | 19,917 | Inhalation-NC | 0.2 | |
| RRO | 1,700 | 10,139 | Ingestion-NC | 0.2 | |
| PCBs | *see text* | 2 | Ingestion-NC | *see text* | |
| PCBs | *see text* | 4 | Ingestion-C | | *see text* |
| PCBs | *see text* | 15.3 | Inhalation-C | | *see text* |
| Benzo(a)pyrene | *see text* | 1.1 | Ingestion-C | | *see text* |
| n-Nitrosodi-n-propylamine | 0.245 | 1.2 | Ingestion-C | | 2E-06 |

Contamination detected at SS011 does not pose unacceptable potential risk to human health or the environment.

## Proposed Remedy

Under CERCLA, no further action is proposed at the former Temporary Auto Storage Building site (SS011), 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 SS011, 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.

## *DUAL FUEL OIL AST SYSTEM (SS014)*

### Site Description

The former Dual Fuel Oil AST system is located at the western end of the Upper Camp facility directly west of the access road to the summit and 125 feet west of the dormitory (Figure 5). The system included two 126,000-gallon ASTs and aboveground and belowground piping within a bermed containment area. The ASTs reportedly held only fuel oil. The area north of the dual ASTs contained the truck-filling stand and another AST formerly located at the edge of a concrete pad.

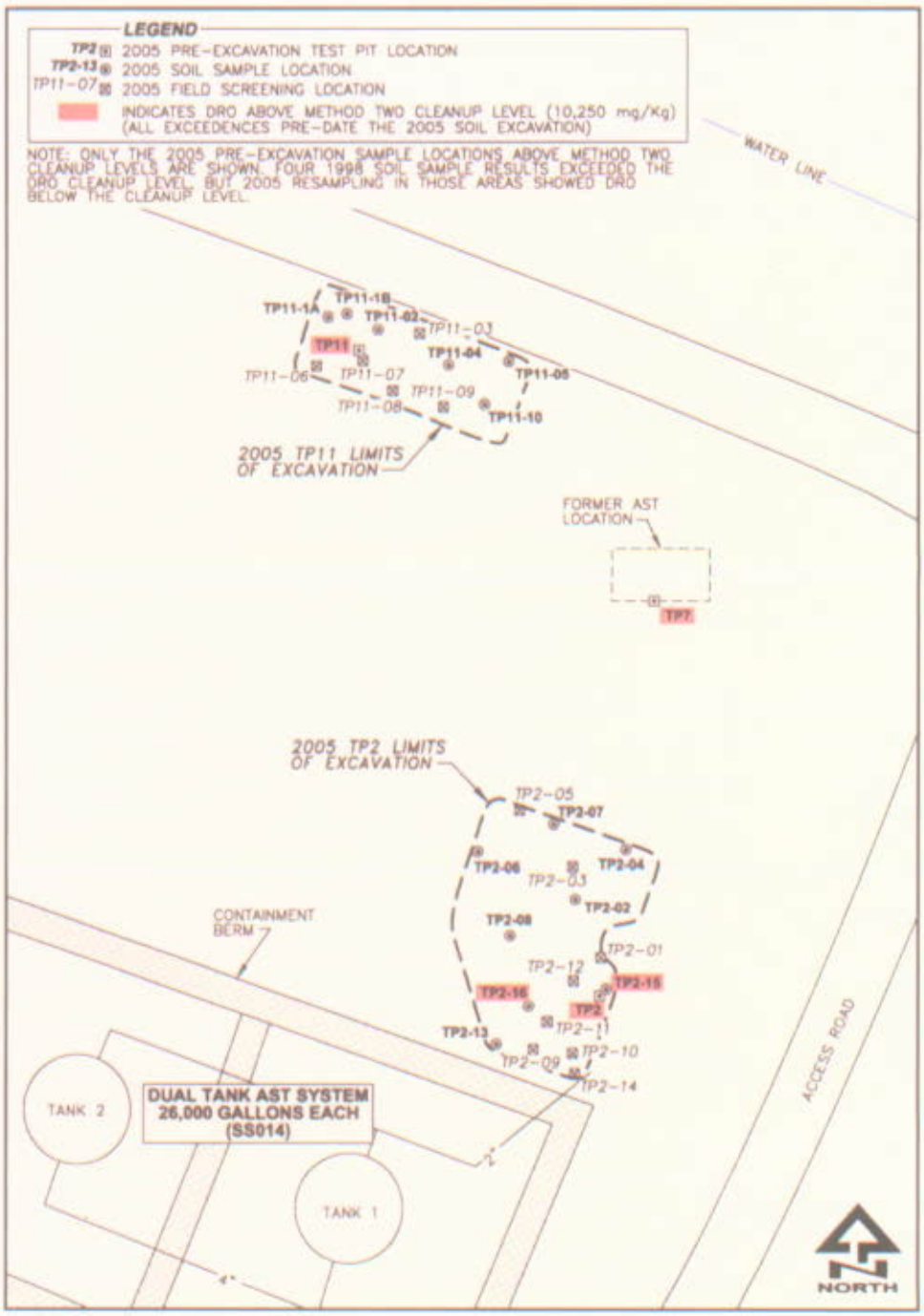
Sampling performed during 1998 RI activities discovered petroleum contamination at this site. Leaks from fueling activities and a buried pipeline discovered during the 2005 excavation activities are the likely sources of petroleum contamination.

### Cleanup Actions To-Date

The Dual Fuel Oil AST System tanks and aboveground pipelines were emptied and dismantled in 2003 under the Clean Sweep project. Belowground pipelines were cut off 24-inches bgs, capped, and buried in-place.

In 2005, approximately 340 cubic yards of petroleum-contaminated soil were removed from two separate areas within Site SS014 (Figure 5). To delineate the excavation areas, 34 test pits were sampled at the beginning of the

**Figure 8: SS014 Site Summary**



field effort. DRO concentrations in all shallow (0 to 2 feet bgs) soil samples were below the ADEC Method Two cleanup level. Therefore, the top two feet of soil in each excavation were stripped off and saved for use as excavation backfill. The final excavation areas are described below and shown on Figure 5.

- The Test Pit TP2 excavation measured approximately 40 feet by 50 feet and had a maximum depth of 6 feet bgs.
- The Test Pit TP11 excavation measured approximately 55 feet by 22 feet and had an average depth of 4 feet bgs.

Excavated soils were screened to remove material greater than two inches in diameter. The oversized material was later used to backfill the excavation area. Petroleum-contaminated soil from SS014 that was two inches in diameter or smaller was placed into lined, bermed stockpile areas. In summer 2006 the soil was remediated on-site.

### Summary of Site Conditions

Current Site Conditions: Based on the 2005 confirmation sample results, the excavation removed most of the petroleum contamination above ADEC Method Two cleanup levels at the former Dual Fuel Oil AST System (SS014). DRO contamination above the ADEC Method Two cleanup level (10,250 mg/Kg) remains at the bottom of the TP2 excavation (maximum detection of 16,900 mg/Kg) and at the location of test pit TP7 (maximum detection of 11,000 mg/Kg).

Investigation Summary: Soil samples were collected from SS014 during the 1998 RI and pre-excavation activities in 2005, and confirmation soil samples were collected at the limits of the 2005 excavations. Since the 2005 excavation removed most of the soil contamination above Method Two cleanup levels delineated during the 1998 and 2005 pre-excavation sampling, only the 2005 confirmation soil samples are representative of current site conditions (except at TP7, which was not excavated). The 1998 and 2005 investigations are summarized briefly below.

In 1998, soil samples were collected from 13 locations within the bermed containment area and from 13 test pits and five soil borings outside the bermed area. The samples were analyzed for DRO, RRO, and PAHs. Although soil sample results indicated DRO above ADEC Method Two cleanup levels at four locations, these locations are not shown on Figure 8, because 2005 resampling in those areas showed DRO below the Method Two cleanup level.

In 2005, 34 test pits were dug and sampled to confirm the 1998 results and fill in data gaps to guide the excavation activities. Samples were analyzed in the field for *total petroleum hydrocarbons* (*TPH*), and many of the samples were also analyzed in a laboratory for DRO. DRO were detected above ADEC Method Two cleanup levels at three locations (Figure 8). Based on the soil sample results, excavations removed DRO-contaminated soil to bedrock at TP2 and TP11. However, there was no excavation at TP7, because soil removal at that location is impracticable due to its position on the edge of a steep cliff and depth of the contaminated soil (within weathered bedrock at 10 feet bgs). As shown in Table 7, DRO detected at 11,000 mg/Kg in TP7 was left in-place.

After the 2005 excavation, 14 confirmation samples (eight from TP2 and six from TP11) were collected at the excavation limits and analyzed for DRO. Sample results show that most of the petroleum-contaminated soil was removed by the 2005 field effort. Two samples collected from the top of bedrock at the base of the TP2 excavation (4-5 feet bgs) had DRO results exceeding the ADEC Method Two cleanup level (10,300 mg/Kg and 16,900 mg/Kg). Additional excavation at TP2 was not possible due to the presence of bedrock. Table 7 presents a summary of the 2005 confirmation sample results and test pit sample results from areas that were not subsequently excavated (i.e.., TP7).

### Summary of Site Risks

Although the 2005 confirmation soil sampling indicates DRO remaining at concentrations above the ADEC Method Two cleanup level

(10,250 mg/Kg) in two locations at the bottom of the backfilled excavation and at 10 feet bgs at TP7 (**Figure 8**), there is no complete exposure pathway between this soil and human and ecological receptors. Therefore, the contamination detected at SS014 does not pose unacceptable risk to human health or the environment.

### Proposed Remedy

Under CERCLA, no further action is proposed at the former Dual Fuel Oil AST System (SS014), 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 Dual Fuel Oil AST System (SS014) 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, as of 2005, DRO concentrations in soil exceed ADEC Method Two cleanup levels for unrestricted land use, and that disturbance of DRO-contaminated soil must comply with ADEC regulations.

USAF proposes to implement the IC by the following actions:

- USAF will survey the Dual Fuel Oil AST System (SS014) 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 SS014 (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.

**Table 7: Dual Fuel Oil AST System (SS014)**
**2005 Soil Sample Summary**

| | ADEC Method Two Cleanup Level | # of Samples | # of Detections | Max. Conc. (mg/Kg) | Min. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|---|
| **2005 Test Pit (pre-excavation) Sampling (area not subsequently excavated)** | | | | | | |
| DRO | 10,250 | 19 | 19 | 11,100 | 6.7 | 1 |
| **2005 TP2 and TP11 Confirmation Sampling** | | | | | | |
| DRO | 10,250 | 14 | 14 | 16,900 | 244 | 2 |

## *THREE THOUSAND-GALLON AST SYSTEM (SS016)*

### Site Description

The 3,000-gallon AST system (SS016) is located on the north side of the former dormitory building and was likely used to store heating fuel for the dormitory. **Figure 5** shows the location of the AST system at the Upper Camp.

### Cleanup Actions To-Date

The tank and its support structure were removed from the facility prior to the 1998 RI/FS; however, subsurface piping running parallel to the dormitory was observed during the 1998 RI/FS. During Clean Sweep activities in 2000 through 2004, the subsurface piping was not observed.

### Summary of Site Conditions

Current Site Conditions: Based on the 1998 RI sampling, there is no contamination above ADEC Method Two cleanup levels at the former Three Thousand Gallon AST System (SS016).

Investigation Summary:

In 1998, soil samples were collected from three test pits and analyzed for DRO, RRO, SVOCs, PAHs, PCBs, pesticides, and metals. Soil sample results indicated no contamination above ADEC Method Two cleanup levels; sample results exceeding 1/10 of the Method Two cleanup

level are shown in Table 8.

**Table 8: 3,000-Gallon AST System (SS016) Soil Sample Summary**

| | ADEC Method Two Cleanup Level | # of Samples | # of Detec -tions | Max. Conc. (mg/Kg) | # above ADEC Cleanup Level |
|---|---|---|---|---|---|
| PCBs | 1 | 6 | 4 | 0.44 | 0 |

### Summary of Site Risks

No cumulative risk calculations were performed for Site SS016, because the 1998 sample results indicated no contamination above Method Two (inhalation or ingestion pathway) cleanup levels and only one analyte (PCBs) above 1/10 of the Method Two cleanup levels.

Contamination detected at SS016 does not pose unacceptable potential risk to human health or the environment.

### Proposed Remedy

Under CERCLA, no action is proposed at the former Three Thousand-Gallon AST System (SS016), 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 SS016, 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.

## *WELL AND PUMP HOUSE (SS017)*

### Site Description

The Well and Pump House (SS017) was located approximately 1,000 feet west of the main Upper Camp facility (**Figure 5**). The pump house was a wooden structure with a concrete slab accessible by road from the main road leading to Upper Camp. An above ground pipeline carried water from the well to the water storage tank at Upper Camp.

### Cleanup Actions To-Date

The Well Pump House was removed during Phase II Clean Sweep activities in 2004. The former water supply well was decommissioned in accordance with ADEC regulations.

### Summary of Site Conditions

Current Site Conditions: Based on the 1998 RI sampling, the groundwater at the former Well Pump House (SS017) is not contaminated above ADEC Table C cleanup levels.

Investigation Summary:

In 1998, the Well and Pump House was investigated by collecting a groundwater sample from the well. There is no discernible contamination source at the Well and Pump House (SS017), nor has there been any likely scenario identified for contamination at this site. The groundwater sample was analyzed for DRO, RRO, VOCs, SVOCs, PCBs, pesticides, and metals. Although bis(2-ethylhexyl) phthalate and lead were detected at concentrations slightly exceeding their ADEC Table C groundwater cleanup levels, neither of these detections is likely to represent groundwater contamination at the site for the reasons discussed below.

- Bis(2-ethylhexyl)phthalate is a plasticizer that is ubiquitous in the environment, and the detection is likely the result of cross- contamination of the sample (possibly from sample equipment).
- The lead is interpreted to come from the heavily corroded well components that were present in the well[12].

The groundwater accessed by the former water supply well is not interpreted to be contaminated.

[12] Although the pump was removed to sample the well, the well was not properly developed due to equipment limitations, and the sample is more representative of water within the well casing than ambient groundwater.

### Summary of Site Risks

The groundwater at SS017 is not interpreted to be contaminated above ADEC Table C cleanup levels. Furthermore, the well has been decommissioned so there is no access to the groundwater. SS017 does not pose unacceptable potential risk to human health or the environment.

### Proposed Remedy

Under CERCLA, no action is proposed at the former Well and Pump House (SS017), 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 SS017, 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.

## 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 **(June 14 to July 16, 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 comments in writing or by email. Comments may also be presented at the public meeting.

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

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

**A complete record of all information related to the site is stored in the Administrative Record located at Elmendorf Air Force Base. The Administrative Record is also available on the internet at 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 (800) 222-4137 to make an appointment.**

**A detailed description of site conditions can be found in the February 2001 RI/FS report, entitled *Final Remedial Investigation and Feasibility Study Volume 1 Report, Big Mountain Radio Relay Station.* The RI/FS report is contained in the Administrative Record.**

If you have questions or wish to provide comments on this project, please contact one of the following people:

**Mr. Tommie Baker, USAF Community Relations, at (800) 222-4137 or (907) 552-4506; or (email: tommie.baker@elmendorf.af.mil);**

**Mr. Michael Rhoads, USAF Project Manager, at (907) 552-4490 (email: mike.rhoads@elmendorf.af.mil)**

# 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 Big Mountain RRS.

**AST** - Above ground storage tank.

**bgs** - Below ground surface.

**Benzene** - A colorless, volatile, inflammable, carcinogenic liquid ($C_6H_6$) used in a variety of chemical products, including motor fuel. Compounds containing benzene are called aromatic compounds.

**BTEX** - Benzene, toluene, ethylbenzene, and xylenes Volatile organic chemicals (aromatic compounds) that are constituents of petroleum products.

**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.

**Five-year review** - A review of any cleanup or other response actions that result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure. Reviews are performed within five years following the initiation of a CERCLA response action, and are repeated every succeeding five years so long as future uses remain restricted. The five-year review can be used to recommend modifications to the treatment, monitoring frequency, and other remedial actions.

**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 Controls (ICs)** -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.

**MOGAS - Motor Vehicle Gasoline**

**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 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.

**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.

**RRS - Radio Relay Station**

**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).

**Residual Range Organics (RRO)** - heavy-range petroleum products such a lubricating oils, with petroleum hydrocarbon compounds corresponding to an alkane range from the beginning of C25 to the beginning of C36 and a boiling point range between approximately 400° C and 500° C (definition from 18AAC75.341).

**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

**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.

# PUBLIC MEETING ANNOUNCEMENT

*The United States Air Force Invites You to participate in a Public Meeting in your community to discuss the*

PROPOSED PLAN FOR FINAL ACTIONS FOR SEVEN ERP SITES AT THE BIG MOUNTAIN RRS

*being distributed for Public Comment*

THE AIR FORCE INVITES YOU TO PROVIDE YOUR WRITTEN OR VERBAL COMMENTS DURING THE 30-DAY PUBLIC COMMENT PERIOD FROM JUNE 14, 2007 TO JULY 16, 2007.

Interested stakeholders and residents are invited to attend Public Meetings being held in the following local communities at the dates and times specified:

Igiugig: Monday June 11, 2007 at 4:00pm at the Airport Building

Pedro Bay: Tuesday June 12, 2007 at 2:00pm at the Pedro Bay Village Council Building

Newhalen: Tuesday June 12, 2007 at 7:00pm at the Newhalen Teen Center

Nondalton: Wednesday June 13, 2007 at 2:00pm at the Nondalton Community Building

Iliamna: Wednesday June 13, 2007 at 7:00pm at the Iliamna Community Center

Kokhanok: Thursday June 14, 2007 at 2:00pm at the Kokhanok Village Council Offices

Port Alsworth: Thursday June 14, 2007 at 8:00pm at the PAIC Building

**PUBLIC COMMENT FORM – SEVEN ERP SITES AT BIG MOUNTAIN RRS**

## USE THE SPACE BELOW TO WRITE YOUR COMMENTS

Your comments and suggestions regarding the proposed actions at Seven ERP Sites at Big Mountain RRS are important to USAF and ADEC. Public input provides valuable information in making final restoration decisions for the environmental sites addressed.

Use the space below to provide us your comments. To return your comments, just fold in half with the return address showing, and tape shut (no staples please). Be sure to affix proper postage, and then drop in the mail. **The public review period ends July 16, 2007**. If you would like more information you may contact the USAF Community Coordinator, Mr. Tommie Baker, at (800) 222-4137.

Name _____

Address _____

City _____

State _____ Zip _____

Do not staple. To mail, fold in half and tape closed.

Name_____
Address_____
City_____
State_____ Zip_____

Post office will not deliver without a stamp (Please affix proper return postage)

MR. TOMMIE BAKER
611 CES/CEVR
10471 20TH STREET, SUITE 302
ELMENDORF AFB, AK 99506-2200

# FINAL PAGE

## ADMINISTRATIVE RECORD

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