THE PROPOSED PLAN FOR REMEDIAL ACTION AT OPERABLE UNIT E, FORT RICHARDSON, ALASKA

September 2004

This Proposed Plan presents cleanup strategies for Operable Unit E (OUE) at Fort Richardson, near Anchorage, Alaska. These cleanup alternatives are being considered by the **U.S. Army (Army)**, *the* ***Alaska Department of Environmental Conservation (ADEC)***, and the ***U.S. Environmental Protection Agency (EPA)***. The Army, ADEC, and EPA are soliciting comments on the information and proposed cleanup alternatives discussed in this document. A glossary of terms is provided on each page for quick reference to the words and abbreviations in ***bold italics*** found throughout this document.

This Proposed Plan fulfills the requirements of Section 117(a) of the ***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)***, also known as Superfund, by providing a discussion about the remedial action plans for OUE. The Army, ADEC, and EPA have selected a preferred remedial alternative for OUE based on criteria found in the ***National Oil and Hazardous Substances Pollution Contingency Plan (NCP)***.

Although this Proposed Plan identifies the preferred remedial alternative for OUE, the agencies will not make a final decision until the public comment period ends and all comments have been reviewed and considered. The public is encouraged to review and comment on all of the alternatives presented in this Proposed Plan. The three ways you can submit comments on the Proposed Plan are listed below.

This Proposed Plan includes a brief history of the contaminated areas investigated as part of OUE, the nature and extent of contamination, the potential risks associated with contaminants, and the rationale for cleanup actions at the source areas, where required.

In addition to summarizing the results of the investigation at OUE, this Proposed Plan:

- Provides a decision regarding cleanup at two sites, Building 955 and Building 796, that were deferred from the Operable Unit D ***Record of Decision (ROD)***
- Reports on the status of nine ***Resource Conservation and Recovery Act (RCRA)*** sites located at Fort Richardson, and provides an overview of the process that will be undertaken for closure of these sites

Alaska Department of Environmental Conservation (ADEC): The state agency responsible for protecting public health and the environment within the state.

U.S. Environmental Protection Agency (EPA): The federal agency responsible for enforcing or overseeing the federal environmental laws.

Groundwater: Water found below the earth's surface that fills pores and other void spaces, creating a saturated zone.

Record of Decision (ROD): A document that explains which cleanup alternative(s) will be used at a site and why. The ROD is based on information gathered during the Remedial Investigation/Feasibility Study and consideration of public comments.

Resource Conservation and Recovery Act (RCRA): A federal law that establishes a regulatory system to track hazardous and solid wastes from their generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous wastes. It also provides a framework for management of non-hazardous solid wastes. RCRA is designed to prevent the creation of new, uncontrolled hazardous waste sites.

HOW YOU CAN PARTICIPATE

The public is encouraged to participate in the decision-making process regarding Operable Unit E (OUE). You can comment on the proposed actions presented in this plan, from September 27 to October 26, 2004, in the following three ways:

1. Attend the Open House public meeting at 6:00 p.m. on September 27, 2004, at Russian Jack Chalet in Anchorage
2. Leave a recorded telephone message at 1-888-591-3677
3. Send written comments to the address at right before the public comment period ends October 26, 2004

Mark Prieksat
Fort Richardson Project Manager
U.S. Army Garrison Alaska
Attn: APVR-RPW-GE-R
730 Quartermaster Road
Fort Richardson, Alaska 99505-6500

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law established in 1980, modified in 1986, also known as Superfund. CERCLA establishes a nationwide process for cleaning up hazardous waste sites that potentially endanger public health and the environment.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The federal regulation that guides the Superfund program.

Administrative Record: A file that is maintained and contains all information used by the agencies to make decisions about site cleanup actions. The file is available for public review.

Responsiveness Summary: A summary of oral and/or written public comments received during a comment period and the responses to those comments. A responsiveness summary is an appendix to a Record of Decision.

National Priorities List (NPL): A list maintained by the EPA of the most serious uncontrolled or abandoned waste sites.

Federal Facilities Agreement (FFA): A legal document signed in 1994 that details the involvement and interaction between the Army, EPA, and ADEC regarding cleanup activities at Fort Richardson.

Operable Units (OUs): At a complex contaminated site, the site may be divided into areas, which are grouped together for ease of investigation and cleanup. These groups are frequently called operable units.

Remedial Investigation (RI): A remedial investigation gathers the data necessary to determine the type and extent of contamination at a site. It precedes and is related to the feasibility study.

Feasibility Study (FS): The feasibility study establishes the criteria for cleaning up a site and identifies and screens possible cleanup alternatives. The FS also analyzes the technologies and costs of the alternatives.

OUE consists of two sites, the Building 35-752 Area and the Armored Vehicle Maintenance Area (AVMA). Site investigations and risk evaluations conducted for the Building 35-752 Area indicate that the contaminants found at the site do not pose a threat to human health or the environment and do not require cleanup action. Therefore, no further action is recommended for the Building 35-752 site. However, site investigations and risk evaluations performed for the AVMA indicate that contaminants detected in groundwater at the site do pose a threat to human health if groundwater is ingested. Therefore an action is recommended for the AVMA site to prohibit use of groundwater and to monitor contaminant trends in groundwater to ensure protectiveness. The preferred cleanup technology for groundwater at the AVMA site is land use controls, natural attenuation, and monitoring.

All public comments during the comment period, whether provided at the public meeting, submitted in writing, or offered over the telephone, will be considered equally by the Army, ADEC, and EPA when reaching a final decision for remedial action. In addition to this Proposed Plan, other documents can be found in the ***Administrative Record*** located at the information repositories. The location of the information repositories and a list of related reports are provided on page 15 of this Proposed Plan.

The Army, ADEC, and EPA will present their responses to all comments received during the comment period in a document called the ***Responsiveness Summary***. The decision on remedial action for OUE will be presented in the OUE Record of Decision (ROD). The Responsiveness Summary will be part of the ROD and will be available for review in the ***Administrative Record*** at the information repositories. Depending on public comments, the actual cleanup action selected may be the preferred alternative, a modification of the preferred alternative, a combination of alternatives, or a different alternative.

SITE HISTORY AND BACKGROUND

Fort Richardson was established as a military staging and supply center during World War II. In 1950, the Post was divided between the Army and the U.S. Air Force. Fort Richardson encompasses approximately 61,376 acres. It is located in south-central Alaska adjacent to the cities of Anchorage and Eagle River and to Elmendorf Air Force Base. The Knik Arm of Cook Inlet borders the north side of the Post and Chugach State Park lies to the south and southeast. The town of Eagle River lies along the northeast border. Anchorage and Elmendorf Air Force Base form the western boundary. The current mission of the Army in Alaska is to provide combat-ready forces for rapid deployment in support of worldwide joint military operations, crisis response, and peacetime engagements; to maintain quality of life and force protection platform; to field Stryker Brigade Combat Team 3; and to serve as the Joint Force Land Component in Alaska.

Fort Richardson was added to EPA's ***National Priorities List*** in June 1994. On December 5,1994 the Army, ADEC, and EPA signed a ***Federal Facilities Agreement (FFA)*** that outlined the procedures and schedules required for a thorough investigation of suspected historical hazardous substance sources at Fort Richardson. The FFA ensures that appropriate actions protect public health and the environment in accordance with state and federal laws. To facilitate an investigation of such a large installation, the FFA divided Fort Richardson's potential hazardous-substance source areas into four ***Operable Units (OUs)***: OUA, OUB, OUC, and OUD. The potential source areas were grouped into OUs based on the amount of existing information, the similarity of potential hazardous-substance contamination, and the level of effort required to complete a ***Remedial Investigation (RI)***.

"CERCLA INVESTIGATIVE PROCESS"

During an RI, information is gathered through field investigations to determine the nature and extent of contamination, and to determine the potential human health and ecological risks associated with that contamination. Following completion of the RI, a ***Feasibility Study (FS)*** is performed to evaluate various cleanup alternatives based on information collected during the RI. All cleanup alternatives developed during the FS are then reviewed by the Army, ADEC, and EPA and evaluated against nine criteria established by the NCP (listed in Table 3 on page 11 of this document).

Originally, OUD was to be the final OU investigated at Fort Richardson. However, while the OUD ROD was being developed, new information was obtained to indicate that one of the OUD sites, Building 35-752, had not been fully characterized. PCB-containing transformer oil had reportedly been burned at the Building 35-752 site, which could have resulted in generation of dioxin and furan contaminants that were not investigated during the OUD RI. Thus, the Building 35-752 site was referred to OUE for further investigation of these contaminants.

In addition, data collected during the OUD RI indicated that groundwater contamination detected at another OUD site, Building 45-590, originated from an up gradient source area that had not yet been investigated. The Building 45-590 site was selected for no further action under CERCLA, and groundwater contamination in that area was referred to OUE for further investigation and delineation. An area formerly used for field maintenance of armored vehicles (tanks) was identified as a potential source for the groundwater contamination. This site, referred to as the Armored Vehicle Maintenance Area (AVMA), was identified for investigation as part of OUE.

Two other OUD source areas, Building 955-Former Sludge Bin and Building 796-Battery Shop, required additional sampling before they could be recommended for no further action under CERCLA. Thus, a decision regarding cleanup at these two sites was deferred to OUE pending confirmation that contaminant levels were less than cleanup standards. Details regarding sampling and cleanup at these two sites are also provided in this Proposed Plan.

OUE SITE EVALUATIONS

AREAS INCLUDED IN OUE

OUE consists of two source areas, the Building 35-752 Area, and the AVMA. The location of these source areas is shown on Figure 1. Detailed information about the OUE source areas can be found in the OUE RI/FS located in the Administrative Record.

OUE is the final operable unit to be investigated at Fort Richardson. Therefore, OUE investigations also included evaluation of potential cumulative human health or ecological risks that may become evident from the combination of exposures to source areas from all operable units investigated at Fort Richardson.

SOURCE AREAS REQUIRING NO FURTHER ACTION

Building 35-752 Area: Potential soil and groundwater contamination in the ***Building 35-752 Area*** was investigated to determine if ***chemicals of concern*** (mainly PCBs, dioxins, and furans) not investigated during the OUD RI were present at the site The Building 35-752 Area is located in an industrial part of Fort Richardson that includes a high-frequency transmitter antenna array. Investigations completed as part of the OUE RI took place within an approximate six-acre area at the site. Building 35-752 is a former generator/power supply building for the high-frequency transmitter Building 35-750. The building is currently vacant and a locked chain-link fence surrounds the area to restrict access.

The potential contaminant source areas at the Building 35-752 Area investigated during the OUE RI are related to transformer maintenance and operation, the discharge and burning of transformer cooling oil containing PCBs, the use of PCB-contaminated soil as a base for the peripheral road, and residual contamination in an area where soil containing PCBs had been stockpiled. Sixty-seven soil borings were drilled at the site and soil samples were collected to assess the nature and extent of contaminants at the site. In addition, the OUE RI included groundwater investigations in the Building 35-752 Area. No specific source for the groundwater contamination in the Building 35-752 Area was identified, but contamination is assumed to have originated from past industrial activities (for example, operation of generators and underground fuel tanks) at the site.

Soil: PCBs were detected in near-surface soils at the site. Contamination in localized areas adjacent to the transformer mounting pad exceeded EPA screening values for industrial sites (concentrations

Building 35-752 Area: After the OUD Proposed Plan was issued, additional potential hazardous source areas were identified related to transformer maintenance and operation, the burning of transformer cooling oil containing PCBs, the use of PCB-contaminated soil in the peripheral road providing access to Buildings 35-752 and 35-750, and a stockpile of PCB-contaminated soil.

Chemicals of concern: Specific chemicals that are identified for evaluation during the RI/FS.

Armored Vehicle Maintenance Area (AVMA): An area formerly used for field maintenance of armored vehicles (tanks) that was suspected as a potential source of the groundwater contamination upgradient of Building 45-590.

ranged to about 100 mg/kg). In general, where PCBs were detected, they decreased with depth and contamination was limited to near-surface soils. Dioxin and furan compounds were also detected in soils at the site, but only two sample results exceeded EPA soil screening values for industrial sites.

Groundwater: Data collected during the OUD RI indicated that the shallow groundwater beneath Building 35-752 was contaminated with low levels of VOCs and metals (primarily aluminum, iron, and manganese). The same constituents were identified in groundwater samples collected during the OUE RI. In general, concentrations of these chemicals are less than cleanup standards, and chemical concentrations decreased or remained static.

Summary: Data collected during the RI were used to evaluate human health and ecological risks associated with the Building 35-752 Area. A conservative risk assessment was conducted for the site and the evaluation determined that contaminants in groundwater at the site do not pose unacceptable risk to human health based on residential exposure scenarios. Therefore, groundwater at the Building 35-752 Area does not require action and will be recommended for no further action under CERCLA.

Although not mandated, the Army has decided to proceed with removal of soil contaminated with PCBs exceeding levels established by regulation (State Regulations and Toxic Substances Control Act). The soil removal will be conducted under the Toxic Substances Control Act [TSCA]) self-implementation rule and will be completed prior to the OUE ROD

SOURCE AREAS REQUIRING ACTION UNDER CERCLA

Armored Vehicle Maintenance Area (AVMA): The OUE investigation at AVMA focused on determining the source of groundwater contamination (volatile organic compounds, [VOCs]) up gradient from Building 45-590. The AVMA site is located in the western region of the cantonment area of Fort Richardson. The area consists of open fields, grasslands, woods, and some buildings covering approximately 140 acres. Suspected source areas within the AVMA included areas of buried debris, vehicle maintenance operations, and laundry operations. Investigation at the site involved excavation of 9 trenches to explore areas of buried debris; installation and sampling of 14 soil borings/monitoring wells; and sampling of 27 existing monitoring wells.

Soil: No significant soil contamination was identified during trench excavation at the AVMA site. Additionally, soil samples collected during installation of 14 groundwater-monitoring wells at the AVMA detected only low-level concentrations of petroleum compounds and arsenic in the vicinity of Buildings 732 and 726. Concentrations of arsenic above the screening value were found in samples from five soil borings, but no source of arsenic could be identified and high levels of arsenic occur naturally in soils in the Anchorage basin. A conservative risk assessment determined that contaminant levels in soils at AVMA do not pose an unacceptable risk to human health based on residential exposure scenarios, nor to ecological receptors. Therefore, soil contamination at the AVMA will be recommended for no further action under CERCLA.

Groundwater: Data collected during the OUE RI confirmed the presence of VOCs in groundwater at the AVMA that exceed cleanup standards. Groundwater contamination extends from the former Building 45-590 site, upgradient to an area near Building 726 (a laundry facility). Figure 2 shows the approximate extent of dissolved VOC contamination in the unconfined aquifer. The highest concentrations of VOCs (specifically tetrachlorethylene, PCE) were observed along a general line between wells AP-4341, AP-4413, and AP-4342. A specific source of PCE contamination in groundwater was not identified, but the source does originate in the area between Buildings 726 and 732. Building 726 was investigated as part of OUD, but results did not indicate a source of PCE contamination in soil adjacent to the building. Figure 3 shows a conceptual model of the proposed release mechanism.

Low level concentrations of carbon tetrachloride were detected sporadically in samples from wells throughout the unconfined zone and in a sample from one deep confined zone well (AP-3534). The spatial distribution of concentrations of carbon tetrachloride detected in samples from various wells does not indicate a specific source area. Additionally, dibenzo(a,h)anthracene was detected in well AP-3893 located cross-gradient from the AVMA site. This contaminant is not considered to be associated with the PCE release, and likely resulted from an unrelated fuel spill in an area east of the AVMA. Metals were also detected in groundwater at the AVMA, but comparison to background

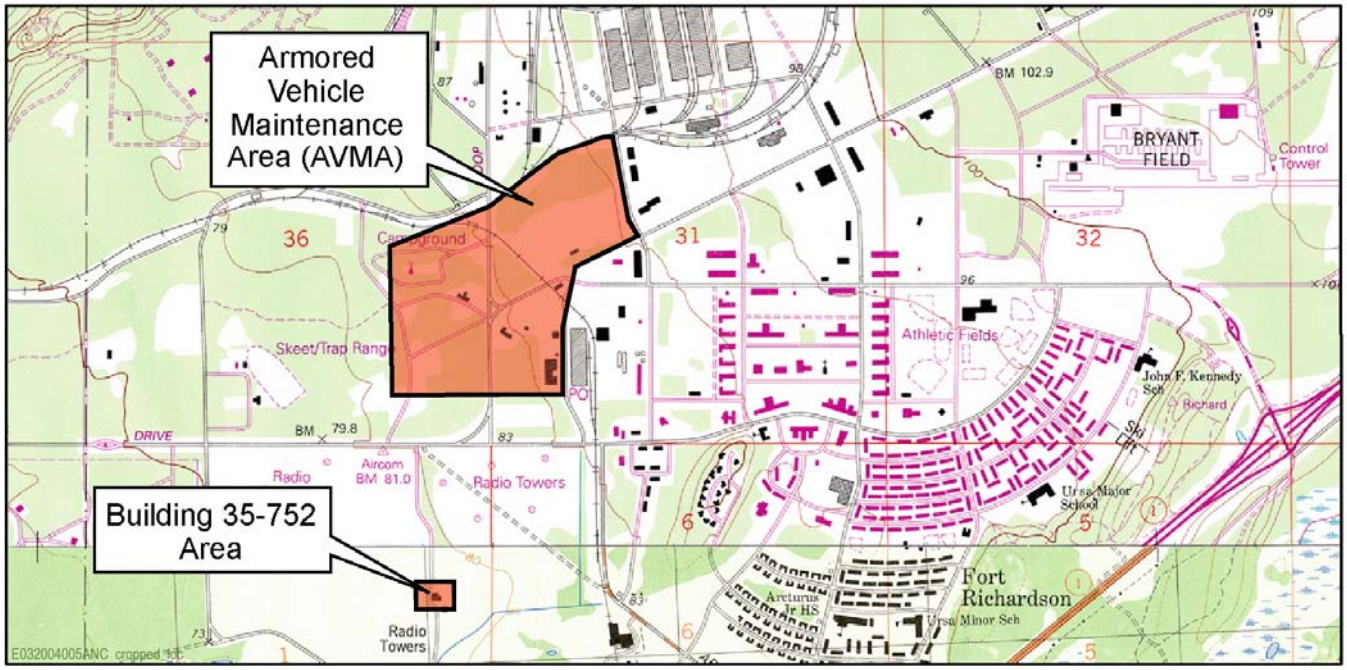

FIGURE 1. LOCATION OF THE TWO INVESTIGATION AREAS

levels indicated that concentrations were similar to levels found to occur naturally in the Anchorage Basin.

A conservative risk assessment determined that contaminant levels in groundwater at AVMA pose an unacceptable risk to human health based on residential exposure scenarios. Unacceptable risk is based on the assumption that groundwater at the site could potentially be consumed by residents living at the site in the future.

Summary: Based on the contaminant data and the risk assessment evaluations, only groundwater at the AVMA requires action under CERCLA. Detailed information about the selection of a groundwater remedial action is provided in this Proposed Plan.

DESCRIPTION OF AVMA GROUNDWATER SOURCE AREA

Groundwater at the AVMA was the only media determined to require action under CERCLA. The chemicals of concern identified in groundwater at the site are ***tetrachloroethylene (PCE)*** and ***dibenzo(a,h)anthracene***. Levels of contamination were evaluated based on potential future residential use of the source area, including domestic use of groundwater. Currently, groundwater is not used as a source of drinking water. However, groundwater at the site could potentially be used as a drinking water source if land use were to change.

Extensive sampling conducted during the RI did not determine a specific source of contamination, but did delineate the boundaries of the groundwater contamination. Detailed information about this fieldwork can be found in the OUE RI report. Figure 2 shows approximate extent of PCE contamination in groundwater at the site. Results of groundwater analysis for the AVMA area are shown in Table 1.

The potential for natural attenuation of groundwater contamination was not evaluated during the RI/FS, but sampling is currently being conducted to determine what aspects of natural attenuation are occurring in groundwater at the site. Comparison of data collected during the OUE RI (2002 and 2003) and the OUD RI (1997 and 1998) show that contaminant levels at the AVMA site have either decreased or remained static over the past 6 years.

Tetrachloroethylene (PCE): A chlorinated solvent with many uses such as dry cleaning and vapor degreasing.

Dibenzo(a,h)anthracene: A product of incomplete combustion that is largely associated with particulate matter, soils, and sediments.

Risk Assessment: A study to determine risks posed by the site if no cleanup action was taken and determines cleanup levels to be protective of human health and the environment. There are two types of risk assessments: human health and ecological.

Remedial action: The actual construction or implementation of the selected cleanup plan.

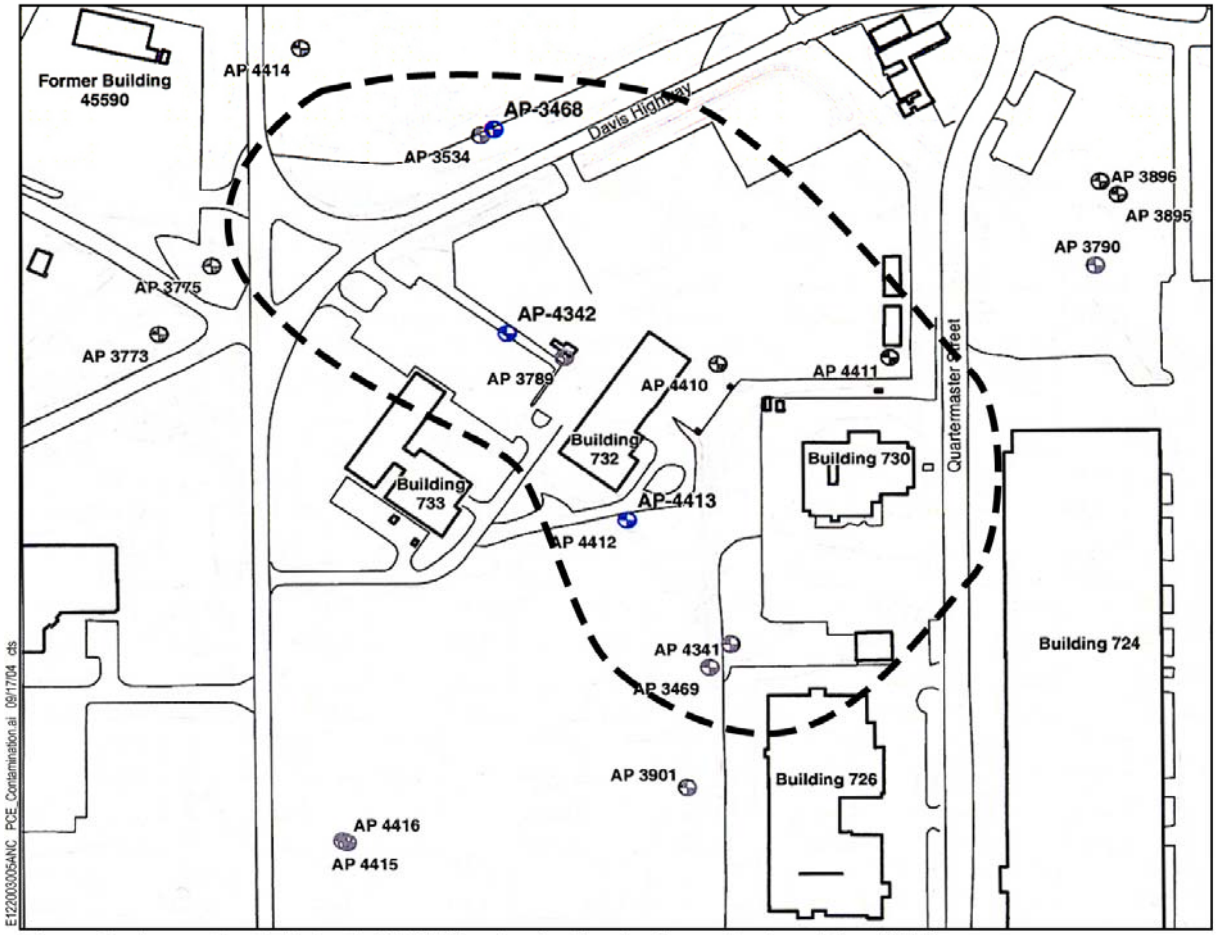

Figure 2. Approximate Extent of PCE Contamination in Groundwater at the AVMA

TABLE 1
Comparison of Exposure Point Concentration to PRGs, MCLs, and ADEC Standards for Groundwater at the AVMA
OUE Feasibility Study
Fort Richardson, Alaska

Chemical of Concern (COC)	Exposure Point Conc. (ug/L)	Preliminary Remediation Goals Tap Water (ug/L)	Federal MCLs[1] (ug/L)	State MCLs[2] (ug/L)	Hazardous Substances[3] (ug/L)
PCE (Wells AP-3468, AP-4342, and AP-4413)	120	0.659	5	5	5
Dibenzo(a,h)anthracene (Well AP-3893)	0.24	0.0092	NA	NA	0.1

Notes:
[1]Safe Drinking Water Act MCLs
[2]18 AAC 80 Drinking Water MCLs (ADEC, 2002)
[3] 18 AAC 75 Oil and Other Hazardous Substances Pollution Control (ADEC, 2003)

Boldfaced type in shaded cells indicates that concentration(s) exceeded cleanup value
ADEC = Alaska Department of Environmental Conservation
AVMA = Armored Vehicle Maintenance Area
COC = chemical of concern
MCLs = maximum contaminant levels
NA = not available
PCE = tetrachloroethylene
PRGs = Preliminary Remediation Goals
ug/L = micrograms per liter

SUMMARY OF OUE RISKS

A ***Risk Assessment*** for OUE was completed as part of the RI. Human health and ecological factors were assessed relative to the contamination detected at each source area. The following sections describe both the Human Health and Ecological Risk Assessments. In addition, because OUE is the final OU at Fort Richardson, potential cumulative health or ecological risks from the combination of exposures from all Fort Richardson OUs were evaluated in a Postwide Risk Assessment. A summary of the Postwide Risk Assessment is presented on page 8 of this Proposed Plan.

HUMAN HEALTH RISK ASSESSMENT

A baseline Human Health Risk Assessment was conducted to evaluate the estimated human health effects that could result if contamination at the OUE source areas is not cleaned up (that is, if no ***remedial action*** is performed). The detailed report discussing this evaluation is the Final *Remedial Investigation/Feasibility Study, Operable Unit E, Fort Richardson, Alaska, Risk Assessment*. The OUE source area evaluations were based on the location and amount of contamination present, toxicity of each contaminant, current and potential future use of each source area, and pathways by which people could be exposed to contaminants. The evaluation results were used to support decisions about the extent of remediation and to aid in the selection of remedial technologies.

The estimated risks from each pathway were added to determine total risk. Risks were evaluated for cancer-causing and noncancer-causing (toxic) effects. The NCP defines the ***acceptable risk range*** for CERCLA sites as Excess Lifetime Cancer Risks ranging from 1 in 10,000 ($1x10^{-4}$) to 1 in a million ($1x10^{-6}$). This risk level means that an individual could face an additional 1-in-10,000 to 1-in-a-million chance of developing cancer because of exposure to chemicals at OUE. Noncancer effects were evaluated by calculating the ratio between the estimated intake of a contaminant and the level at which no adverse health effects are expected to occur. This ratio is called a ***Hazard Index***. If the Hazard Index is less than 1, then noncancer health effects are not expected at the site. The estimated risks associated with contaminants at the AVMA are presented in Table 2 and discussed in the following paragraphs.

Acceptable risk range: Excess Lifetime Cancer Risks ranging from 1 in 10,000 to 1 in a million. This means that an individual could face an additional 1-in-10,000 to 1-in-a-million chance of developing cancer because of exposure to chemicals at a site beyond those cancers expected from other causes.

Hazard Index: An estimate of the likelihood that exposures to a compound will cause health effects other than cancer. A Hazard Index less than 1 indicates that site-related exposures do not present a risk to human health.

Chemicals of potential concern: Those chemicals that should be carried through the human risk quantification process.

Polynuclear aromatic hydrocarbons (PAHs): Chemicals that are typical components of asphalts, fuels, oils, and greases. Dibenzo(a,h)anthracene is a PAH.

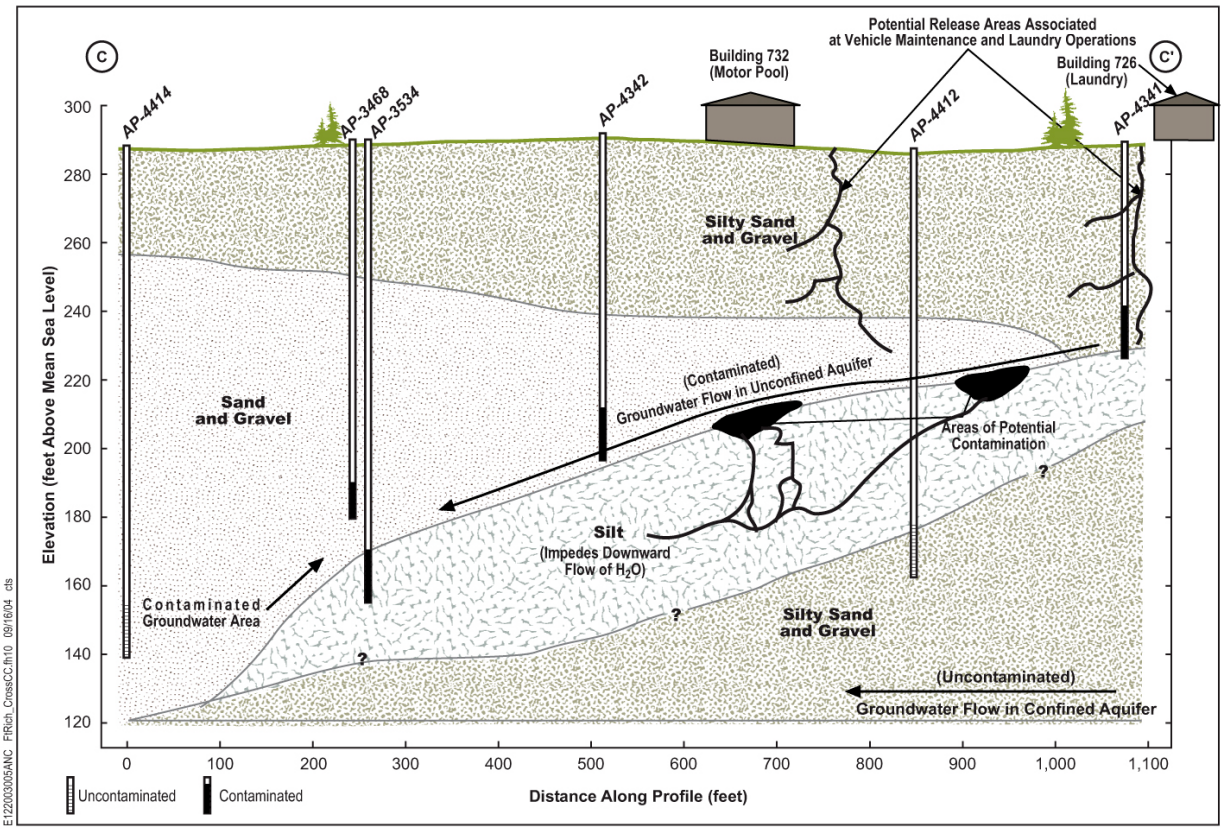

Figure 3. OUE RI Subsurface Soil Profile

The baseline Human Health Risk Assessment for the AVMA concluded that contaminants in groundwater pose an unacceptable risk to human health based on residential exposure scenarios. The estimated risks associated with the contaminants at the AVMA are conservative because they were calculated based on future residential land use. The reasonably anticipated future land use at the AVMA will continue to be industrial. The risks were also based on the assumption that the groundwater would be used as a source of drinking water. Groundwater at the AVMA site is not currently used as a source of drinking water, but the resource could be developed and used if the designated land use changed or the property transferred. Therefore, residential values represented in Table 2 are especially protective of human health.

The human health risk assessment identified several ***chemicals of potential concern*** (COPCs) in groundwater at the AVMA that could pose risk under a residential land use scenario. The primary contributors to human health risks at the AVMA were determined to be dibenzo(a,h)anthracene and tetrachloroethylene (PCE).

TABLE 2
Summary of Source Area Estimated Risks for AVMA Groundwater[1]

Primary[2] Chemicals of Potential Concern	Potential ELCR without Cleanup	Potential HI without Cleanup	Exceeds ADEC Cleanup Level?	Chemical of Concern?
Tetrachloroethylene (PCE)	1.6 in 10,000	Less than 1	Yes	Yes
Dibenzo(a,h)anthracene	1.1 in 10,000	Less than 1	Yes	Yes

Notes:

[1] Hypothetical future land use scenario (residential)
[2] Primary chemicals of potential concern are those that are potentially related to site-related releases and are primary contributors to the Excess Lifetime Cancer Risk.

ELCR = Excess Lifetime Cancer Risk
HI = Hazard Index

ECOLOGICAL RISK ASSESSMENT

Remedial action objective: A specific requirement that must be met by the cleanup remedy.

Applicable or relevant and appropriate requirements (ARARs): State and federal laws and regulations that need to be met or considered in development and implementation of cleanup alternatives at a site. These include cleanup standards, standards of control, and other substantive environmental protection requirements, factors, or limitations under state and federal law.

The Ecological Risk Assessment addressed the current and future impacts and the potential risks posed by source-related contaminants to plants and animals at OUE in the absence of remedial action. Unlike the Human Health Risk Assessment, the Ecological Risk Assessment focuses on the effects to populations or communities, not individuals. If potential risks to individuals of a species are identified during the screening phase of the Ecological Risk Assessment, they are evaluated within a larger context to determine their significance in the ecological risk characterization.

Ecological receptors included in the evaluation consisted of terrestrial plants, terrestrial invertebrates, American robin, bald eagle, masked shrew, coyote, moose, and red-backed vole. These receptors represent different levels in the food chain, habitats, and sizes of home range. No endangered species have been identified on Fort Richardson, nor were there individual risks identified during the screening phase.

The results of the Ecological Risk Assessment indicate that there are no unacceptable risks to plants, birds, or mammals that inhabit either of the OUE sites.

POSTWIDE RISK ASSESSMENT

Postwide risk assessments evaluate any cumulative risk effects posed by the combined total of contaminants throughout Fort Richardson. Postwide Human Health and Ecological Risk Assessments were performed in 1998 for the OUD ROD. For the OUE ROD, a Postwide Ecological Risk Assessment was performed in addition to the risk assessments for the OUE source areas described in this Proposed Plan.

POSTWIDE HUMAN HEALTH RISK ASSESSMENT

The Postwide Human Health Risk Assessment conducted for OUD in 1998 identified exposure scenarios and pathways for an industrial worker, a future construction worker, and a trespasser. Contamination that posed the greatest risk to human health was identified at the Poleline Road Disposal Area (OUB); however, cleanup is underway at that source area. Estimated Excess Lifetime Cancer Risks from exposure to other chemicals detected on Fort Richardson were less than or within the target range specified by EPA. Noncancer risks were also estimated to be less than the threshold Hazard Index. Therefore, there were no risks greater than acceptable levels for human health from the combined total of contaminants throughout Fort Richardson. The Postwide Human Health Risk Assessment was reassessed as part of OUE. Guidance and procedural changes have occurred since the 1998 assessment, but it was determined that the Postwide Human Health Risk Assessment still reflects overall conditions on the Post.

POSTWIDE ECOLOGICAL RISK ASSESSMENT

The Postwide Ecological Risk Assessment evaluates the potential for Postwide cumulative risk associated with environmental releases of chemicals from multiple sources at Ft. Richardson regardless of OU boundaries. Cumulative risk is evaluated for selected wide-ranging terrestrial wildlife receptors including the bald eagle, coyote, and moose. Risk to aquatic receptors, such as the mallard and aquatic organisms living in Ship Creek, was addressed in a previous Postwide Ecological Risk Assessment and is not reevaluated in the current Postwide Ecological Risk Assessment. The results of the updated Postwide Ecological Risk Assessment indicate that population-level risks to all wide-ranging receptors are still within acceptable ranges.

PURPOSE AND SCOPE OF REMEDIAL ACTION

The OUE RI/FS identified groundwater contamination at the AVMA that requires action under CERCLA. The need for remedial action was based on a determination that contaminants in groundwater pose an unacceptable risk to human health if ingested, and that contaminant levels in groundwater exceed state and federal drinking water standards. Concentrations of chemicals in groundwater that primarily contribute to Excess Lifetime Cancer Risks that exceed 1-in-10,000 (based on a hypothetical conservative residential exposure scenario) were considered chemicals of concern. The chemicals of concern in groundwater at the AVMA are PCE and dibenzo(a,h)anthracene. The groundwater areas where these chemicals of concern were detected require remedial action.

The ***remedial action objectives*** for contaminated groundwater in the AVMA are to:

- Prevent exposure to and use of groundwater with chemical concentrations that pose an unacceptable risk or exceed ***applicable or relevant and appropriate requirements (ARARs)***
- Return groundwater to beneficial use within a reasonable time frame

SUMMARY OF ALTERNATIVES

Many technologies were considered for use in cleaning up groundwater at the AVMA that is contaminated with PCE and dibenzo(a,h)anthracene. The most promising options, referred to as alternatives, were evaluated based on their effectiveness, implementability, and relative cost. Most of the alternatives considered in the Proposed Plan consist of a combination of more than one technology. For additional details concerning all technologies and alternatives that were evaluated, consult the OUE FS report located at one of the information repositories. Three potential cleanup alternatives are presented in this Proposed Plan and discussed below.

ALTERNATIVE 1: NO ACTION

CERCLA requires evaluation of a "no action" alternative to reflect current conditions without any cleanup effort. Under this alternative, contaminated groundwater would be left in its present condition to recover over time through natural processes, such as chemical and biological breakdown of contaminants. No ***institutional controls*** or groundwater ***monitoring*** would be implemented to minimize exposure to contamination under this alternative. In addition, no action would be taken to remove potential sources of contamination. There are no costs associated with this alternative.

What Is Natural Attenuation?

The term "natural attenuation" refers to processes that occur without intervention by people. Natural attenuation includes a variety of physical, chemical, or biological processes that act to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These processes can include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

ALTERNATIVE 2: LAND USE CONTROLS, NATURAL ATTENUATION, AND MONITORING

Land use controls for the AVMA could include a restriction that no residential facilities be constructed at the site and that the land use remain industrial. The AVMA is located within an industrial area as recorded in the Post Master Plan, and the reasonably anticipated future land use at OUE is industrial. The Army could update the Master Plan to incorporate land use restrictions specific to OUE following completion of the ROD.

The Master Planning for Army Installations, AR 210-20 (Army, 1993), serves as the guidance document for designing and planning Army installations and is the functional basis for the Post Master Plan. The land use categories presented in AR 210-20 denote major and significant land use. For example, an industrial land use area may contain administration, supply, and storage areas, but not residential areas. Family and unaccompanied personnel housing and medical and community facilities are the land uses least compatible with industrial land use, and AR 210-20 recommends that industrial and residential land uses be widely separated.

To ensure that groundwater at the AVMA site is not used for domestic purposes (i.e. drinking), land use controls will be implemented to restrict access to and use of groundwater at the site. The Army has an existing institutional control (IC) policy that requires clearance to excavate at any location on Fort Richardson. The IC policy also includes restrictions for installation of groundwater wells in contaminated areas.

Natural attenuation, or breakdown of contaminants without artificial stimuli, could occur over time because of physical, biological, and chemical processes. Periodic monitoring would be required to assess the effectiveness of the natural attenuation and to ensure that the changes in site conditions to not present a risk to human health. For costing purposes, monitoring for 30 years has been estimated. While natural attenuation may take more or less than 30 years, it is anticipated that it would require more time for remediation than Alternative 3 (described below). Current data indicate that contaminant levels at the AVMA are decreasing. This is based on comparison of contaminant data collected during the OUD RI (1997 and 1998) and OUE RI (2002 and 2003). The Army is also conducting additional sampling to determine what aspect of natural attenuation may be occurring in groundwater at the AVMA.

The estimated ***present-worth cost*** of this alternative is $201,000.

Institutional controls: Legal and enforceable restrictions or agreements that enhance and complement the permanence of a cleanup remedy. They may also include physical barriers that prevent humans or animals from trespassing on the site, warning signs, zoning, and land use or deed restrictions. They remain in effect as long as protection is needed.

Monitoring: Collection of groundwater samples over a period of time to measure the performance of cleanup systems or until remedial action objectives are met.

Present-worth cost: The total project cost expressed in 2004 U.S. dollars.

Chemical oxidant: A solution that, when placed in contact with contaminants, rapidly transforms the contaminants to harmless byproducts.

ALTERNATIVE 3: CHEMICAL OXIDATION, NATURAL ATTENUATION, AND MONITORING

This alternative involves injecting a commercially prepared ***chemical oxidant*** at approximately 30 locations and various depths in and around the suspected area of PCE contamination. Six groundwater wells would be selected for monitoring to verify the reduction of concentrations of PCE in the groundwater and to monitor for the presence of residual, unreacted chemical oxidants injected upgradient. Depending upon results, a second injection event of chemical oxidant could be needed. For cost purposes it is assumed that monitoring of compliance wells would occur twice per year for 5 years. Wells would be decommissioned as appropriate.

In addition, monitoring would be conducted as appropriate to monitor the natural attenuation of dibenzo(a,h)anthracene for reduction in concentration through degradation. Monitoring wells would be sampled on an annual basis until subsurface conditions warrant that monitoring was no longer necessary. For cost purposes we assumed that monitoring would be conducted over a 30-year period.

The estimated present-worth cost of this alternative is $882,000.

EVALUATION OF ALTERNATIVES AND PREFERRED ALTERNATIVE

The preferred alternative for remediation of groundwater contamination was selected on the basis of the nine remedial alternative evaluation criteria found in the NCP. The nine criteria are divided into three categories: threshold, balancing, and modifying criteria. To be eligible for selection or further consideration, an alternative must meet the two threshold criteria: overall protection of human health and the environment and compliance with ARARs. The next five criteria are "balancing criteria" and are used to weigh trade-offs among alternatives. The final two criteria, "modifying criteria," measure acceptance of the remediation alternatives by the state and the community. The criterion of community acceptance will not be evaluated until after public comments are received. These nine criteria are presented and explained in further detail in Table 3.

The selection of the preferred alternative is preliminary. Public comment is requested to evaluate community acceptance of the remediation alternative. Public input could result in the modification of the remediation alternative. The OUE FS report contains detailed information about each alternative and the comparison of all the alternatives. The information repositories contain copies of the OUE FS report for review.

EPA and ADEC have been involved with the development of the remediation alternative presented in this Proposed Plan, and their concurrence will be demonstrated by signing the ROD.

TABLE 3
Criteria for Evaluation of Alternatives

THRESHOLD CRITERIA: Must be met by all alternatives.
1. Overall protection of human health and the environment. How well does the alternative protect human health and the environment, both during and after construction?
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs). Does the alternative meet applicable or relevant and appropriate state and federal laws?
BALANCING CRITERIA: Used to compare alternatives.
3. Long-term effectiveness and permanence. How well does the alternative protect human health and the environment after completion of remediation? What, if any, risks will remain at the site?
4. Reduction of toxicity, mobility, and volume through treatment. Does the alternative effectively treat the contamination to significantly reduce the toxicity, mobility, and volume of the hazardous substances?
5. Short-term effectiveness. Are there potential adverse effects to either human health or the environment during construction or implementation of the alternative?
6. Implementability. Is the alternative both technically and administratively feasible? Has the technology been used successfully at similar areas?
7. Cost. What are the relative costs of the alternative?
MODIFYING CRITERIA: Evaluated as a result of public comments.
8. State acceptance. What are the state's comments or concerns about the alternatives considered and about the preferred alternative? Does the state support or oppose the preferred alternative?
9. Community acceptance. What are the community's comments or concerns about the alternatives considered and the preferred alternative? Does the community generally support or oppose the preferred alternative?

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternatives 2 and 3 would meet this threshold criterion, which requires that any cleanup remedy considered protects human health and the environment. The primary difference between these two alternatives, with respect to this criterion, may be the length of time required to reach cleanup goals. Both alternatives rely on natural attenuation for treatment of some aspect of the groundwater contamination at the site. Alternative 3 actively treats the PCE contamination, but dibenzo(a,h)anthracene contamination in groundwater would be treated using natural attenuation. It is likely that the dibenzo(a,h)anthracene contamination would attenuate quicker than the PCE contamination, simply based on the current concentrations of the contaminants. However, the rate of natural attenuation is unknown and both alternatives 2 and 3 could take more or less than 30 years to reach completion. Alternative 1 does not meet this threshold criterion because contaminants would remain in place with no method of determining a decrease in concentration.

COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Potential ARARs for OUE include State of Alaska Drinking Water Regulations, the federal Safe Drinking Water Act, and Alaska Oil and Other Hazardous Substances Pollution Control Regulations.

Alternatives 2 and 3 are expected to meet ARARs. Alternative 3 includes active treatment of PCE contaminated groundwater and is expected to achieve state and federal standards for PCE more rapidly than Alternative

2. However, both remedies rely upon natural attenuation of the dibenzo(a,h)anthracene contamination in groundwater that could potentially require 30 years or more of monitoring. Alternative 1 would also rely on natural processes to decrease groundwater contamination. It should be noted, however, that under Alternative 1 no monitoring would be conducted to determine compliance with the ARARs. Since, Alternative 1 does not meet either of the threshold criteria, it will not be discussed in the remaining evaluation of alternatives.

LONG- TERM EFFECTIVENESS AND PERMANENCE

Alternatives 2 and 3 would involve permanent reduction of groundwater contamination and would achieve long-term effectiveness. Current data indicate that contaminant concentrations in groundwater are decreasing and that some aspect of natural attenuation is occurring at the site. This indicates that natural attenuation could be a viable alternative to achieve compliance with remedial goals.

REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT

Alternative 3 would involve a treatment technology that reduces the toxicity, mobility, and volume of PCE contaminated groundwater. Alternative 2 would slowly reduce the toxicity, mobility, and volume of the contaminated groundwater through natural attenuation. Because Alternatives 2 and 3 include monitoring, the rate and degree of contaminant reduction would be known.

SHORT-TERM EFFECTIVENESS

Alternative 3 would pose some short-term potential risk to workers at the source area during the time required for construction and installation of the injections at the source area. These risks could be minimized through engineering and institutional controls. Alternative 2 poses no short-term risks to human health or the environment.

IMPLEMENTABILITY

Both alternatives 2 and 3 rely upon natural attenuation to treat the dibenzo(a,h)nthracene contamination at the site. In this respect both alternatives are equally implementable.

However, Alternative 3 would use readily available technology to treat PCE contaminated groundwater at the AVMA. For this technology to be effective it is generally assumed that a specific source area has been identified. Because groundwater flow is complex and the distribution of the contamination is expected to be quite variable, a treatability study to assess effectiveness might be required. Because, contaminant concentrations are low and isolated, active treatment is anticipated to be difficult and less effective.

COSTS

Costs for each alternative are calculated in terms of present-worth cost over a period of 30 years, although actual monitoring or cleanup goals may be met in more or less time. Capital costs are those required to carry out the remediation. They include the costs of design, construction, and treatment. Operating and maintenance costs cover the labor and maintenance required to ensure remediation remains effective.

The estimated costs for each alternative evaluated are based on the information available at the time the alternatives were developed. The estimated cost for Alternative 2 is $201,000 and the estimated cost for Alternative 3 is $882,000.

STATE ACCEPTANCE

ADEC has been involved with the development of remedial alternatives for OUE and agrees with the preferred alternative for AVMA groundwater.

COMMUNITY ACCEPTANCE

Selection of the preferred alternative is preliminary pending community input and acceptance. Final selection of the cleanup alternative will consider community acceptance as indicated by comments received during the public comment period.

SUMMARY OF THE PREFERRED ALTERNATIVE

The preferred alternative for treatment of groundwater contaminated with PCE and dibenzo(a,h)anthracene at the AVMA is Alternative 2 – Land Use Controls, Natural Attenuation, and Monitoring.

Alternative 2 is expected to achieve overall protection of human health and the environment, would be easily implementable, and would meet ARARs. Additionally, this alternative is a cost-effective and permanent solution to groundwater contamination at the AVMA. This alternative also provides measures to prevent exposure to currently contaminated groundwater and to maintain industrial land use at the site. Because, contaminant concentrations are low and isolated, active treatment is anticipated to be difficult and less effective.

This alternative is subject to public comment and participation. No alternative will be selected until the public comment period ends and all comments are addressed. As with any remedial action under CERCLA, as long as contamination remains on site, the effectiveness of the selected remedy is subject to periodic reviews, not to exceed 5 years. If groundwater monitoring shows a consistent increase in contaminant levels or if the remedy is no longer protective, additional measures will be evaluated.

SOURCE AREAS DEFERRED FROM OUD ROD

Two OUD source areas (Building 796 and Building 955) required further sampling to ensure that contaminants were not present at concentrations that would indicate an unacceptable risk or exceed cleanup standards. Both source areas were resampled in 2000 following completion of the OUD ROD. Results of the sampling at Building 796 indicated that 2-dibromoethane (EDB) contamination in groundwater did not exceed cleanup standards or risk levels. Additionally, soil sampling conducted at the Building 955 site indicated that concentrations of dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), and dichlorodiphenyltrichloroethane (DDT) did not exceed cleanup standards established at the time the OUD ROD was signed. Both sites are therefore eligible for no further action under CERCLA. This determination will be documented in the OUE ROD.

RCRA HAZARDOUS WASTE SITES

In 1991, the Army and EPA entered into a ***Federal Facility Compliance Agreement (FFCA)*** that imposed obligations on the Army regarding closure of a number of waste management sites. Sites addressed under the FFCA, known as ***solid waste management units (SWMUs)***, include: Circle Road Drum Site (OUD), Building 700/718 (OUD), Building 704 (OUD), Building 955 (OUD), Building 35-752 (OUD), Building 45-590 (OUD), the Open Burn/Open Demolition (OB/OD) Pad, Building 755, and Building 986 (OUA).

Pursuant to the terms of the 1994 CERCLA FFA, the Army, ADEC, and EPA agreed that, where feasible, any RCRA corrective actions required at SWMUs at Fort Richardson would be integrated

Federal Facility Compliance Agreement (FFCA): A 1991 agreement between the Army and EPA in which hazardous waste sites were identified. The agreement also indicated that the Army was required to investigate and close each of the identified hazardous waste sites under requirements specified in RCRA regulations.

Solid waste management units (SWMUs): Waste management sites addressed under the FFCA.

with any ongoing CERCLA response actions so that duplication of effort would not occur and the Army could realize cost savings. The 1994 FFA specified that such integration efforts would not obviate the need for the Army to meet its RCRA closure obligations under the 1991 FFCA. However, work performed at these sites under CERCLA was intended to meet or exceed the requirements of the RCRA corrective action program.

Closure plans were developed for many of the solid waste management units and submitted to EPA for comment and review. As part of the CERCLA/RCRA integration effort under the 1994 FFA, the Army has completed investigative sampling, and in some cases performed removal work, at many of these SWMUs. Following submission of the closure plans, EPA requested that additional information be provided that would allow determination for closure. Pursuant to submission of additional information, three sites (Circle Road Drum Storage Area, Building 704, and Building 45-590) have been or will be considered closed under RCRA and the FFCA. The FFCA did not stipulate closure of the Building 700/718 site, and the Army conducted removal actions at Building 700/718 as part of OUD. The Building 700/718 site was closed and documented in the OUD ROD.

A RCRA Interim Status Closure Plan for the OB/OD Pad was submitted in 1999. The OB/OD Pad is in a deferred closure status and will be closed in accordance with applicable regulation. Applicable closure requirements are being completed for the remaining four sites. The status of all RCRA closure sites will be documented in the OUE ROD.

PUBLIC INVOLVEMENT

A public meeting is scheduled at 6:00 p.m. on September 27, 2004, at the Russian Jack Chalet. Representatives from the Army, ADEC, and EPA will be present to answer questions about this Proposed Plan.

The public meeting also will provide an opportunity for interested parties to submit written or verbal comments on this Proposed Plan, the RI/FS, or risk assessment documents. A 30-day comment period is scheduled from September 27 to October 26, 2004.

The Army, ADEC, and EPA will respond to all comments on this Proposed Plan in the Responsiveness Summary, an appendix to the ROD. After consideration of all public comments, a final cleanup decision will be made for OUE. The ROD will detail the decisions made during the CERCLA cleanup process. The ROD will include the Responsiveness Summary containing the public comments received during the comment period. The ROD will be added to the Administrative Record and information repositories. The locations of the record and repositories are listed in the box below.

LIST OF RELATED DOCUMENTS

The following list of source material is provided for readers who want more detailed information than is presented in this Proposed Plan. These documents are available for review by the public at the information repositories listed in the "For More Information…" box below.

- *Remedial Investigation/Feasibility Study, Operable Unit E, Fort Richardson, Alaska* (CH2M HILL, 2004):
  - *Remedial Investigation*
  - *Risk Assessment*
  - *Postwide Risk Assessment*
  - *Feasibility Study*
- *Final Remedial Investigation/Feasibility Study, Operable Unit D, Fort Richardson, Alaska* (ENSR, 1998)
  - *Volume I: Remedial Investigation*
  - *Volume IIa: Risk Assessment*
  - *Volume IIb: Postwide Risk Assessment*
  - *Volume III: Feasibility Study*
- *Five Year Review Report, First Five Year Review Report for Fort Richardson, Alaska* (U.S. Army Alaska, Directorate of Public Works, 2003)
- *Master Planning for Army Installations, AR 210-20* (U.S. Department of the Army, July 30, 1993)

FOR MORE INFORMATION...

Copies of site documents, fact sheets, and other supporting reports are available for public review at the following information repository locations:

U.S. Army Garrison Alaska Directorate of Public Works
Environmental Resources Department
730 Quartermaster Road
Fort Richardson, AK 99505-6500
(907) 384-2176
Hours: Monday through Friday, 8 a.m. to 5 p.m. (This office maintains the Administrative Record in paper form, on microfiche, and on CD-ROM.)

Alaska Resource Library and Information Services
3150 C Street
Anchorage, AK 99503
(907) 272-7547
Hours: Monday through Friday, 8 a.m. to 5 p.m.

University of Alaska Anchorage Consortium Library (Reserve Desk)
3211 Providence Drive
Anchorage, AK 99508
(907) 786-1364
Hours: Monday through Thursday, 7:30 a.m. to 11 p.m.; Friday, 7:30 a.m. to 8 p.m.; Saturday, 10 a.m. to 6 p.m.; Sunday, 12 noon to 11 p.m.

U.S. Army Alaska
APVR-RPW-GE-R
730 Quartermaster Road
Fort Richardson, Alaska 99505-6500
Attn: Mark Prieksat