DP98004406 – DP98004419
File: DP98
Category 4.30
Document Date: Aug 1, 2003

August 2003

Elmendorf Air Force Base, DP98

The Proposed Plan for Remedial Action

PUBLIC COMMENT PERIOD
September 1 through September 30, 2003

OPEN HOUSE and PUBLIC MEETING
7:00 pm Thursday, September 25, 2003
Sheraton Anchorage Hotel
401 East 6th Avenue
Anchorage, Alaska

INTRODUCTION

The United States Air Force (Air Force), Region 10 of the U.S Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC) are requesting public comments on this Proposed Plan. This Proposed Plan describes cleanup of contaminated soil, surface water, sediment, and groundwater at DP98, located on Elmendorf Air Force Base (AFB), Alaska.

The public comment period begins on September 1, 2003 and ends on September 30, 2003. A public meeting will be held September 25, 2003 at the Sheraton Anchorage Hotel, Anchorage, Alaska to discuss the Proposed Plan, answer questions, and receive public comment.

The Proposed Plan has the following purposes:

- Provide basic background information;
- Identify and explain the reasons for the preferred alternative for remedial action;
- Describe the remedial options that were evaluated;
- Solicit public review of and comment on all of the alternatives described; and
- Provide information on how the public can be involved in the remedy selection process.

The Proposed Plan is based upon the *Remedial Investigation/Feasibility Study for DP98* and highlights key information from this report. The DP98 RI/FS report and other information are contained in the Administrative Record file. Copies of the Administrative Record file are available for public review at the locations listed under the Community Participation section of this Proposed Plan.

Public input on all alternatives and on the rationale for the Preferred Alternative is very important to the remedy selection. New information the Air Force learns during the public comment period could result in the selection of a final remedial action that differs from the **Preferred Alternative**. Therefore, the public is encouraged to review and comment on all alternatives in this Proposed Plan. Following public comment a Record of Decision (ROD) will be issued that selects the final cleanup remedy. Public comments and responses to those comments will be included in the ROD.

This document has been prepared by the Air Force, in consultation with ADEC and the EPA. The Proposed Plan fulfills public participation requirements under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Definitions of environmental terms **in bold** are included in the glossary at the end of this document.

SITE BACKGROUND

Elmendorf AFB is located about 2 miles north of downtown Anchorage, Alaska (Figure 1). It is bordered to the north and west by the Knik Arm, to the east by Fort Richardson Army Post, and to the south by a light industrial area and land owned by the Alaska Railroad Corporation. Elmendorf AFB, which was opened in 1940, provides defense for the United States through air superiority, surveillance, logistics, and communications support.

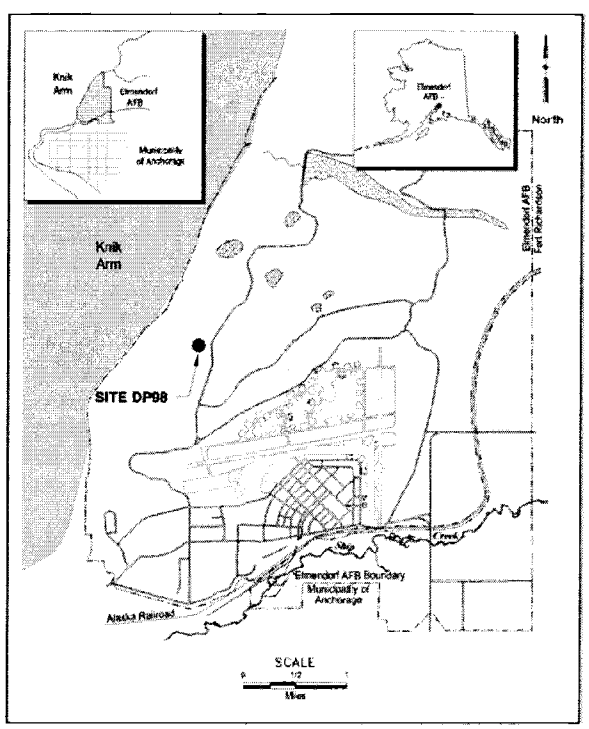

Figure 1. Location Map of Elmendorf AFB and DP98.

DP98004406

In August 1990, the EPA added Elmendorf AFB to the **National Priorities List (NPL)** of Superfund sites. On November 22, 1991, the Air Force, ADEC, and EPA signed a Federal Facility Agreement for Elmendorf AFB. This document sets forth a process and schedule for making cleanup decisions for NPL sites on Elmendorf AFB.

DP98 is situated in the northwestern portion of Elmendorf AFB (Figure 2). The facilities at the site were built in the early 1950s and consist of several buildings and support structures. DP98 also includes undeveloped land north of the facilities. The contamination at the site, which will be described below, appears to originate from Building 18224, which was used as a vehicle maintenance shop in the 1950s. In 1995, a 3,000-gallon diesel underground storage tank (UST) was replaced by a new double-walled 4,000-gallon UST. During the replacement of the UST, **petroleum hydrocarbon** (fuel and oil compounds) contamination was discovered. During the UST excavation, soil surrounding the tank was sampled and analyzed for diesel range organics (DRO) and gasoline range organics (GRO). Diesel fuel was detected in the soil above **cleanup levels**. Approximately 65 cubic yards of contaminated soil was removed and treated off-site. During the UST removal, a 25,000-gallon diesel tank was also emptied and abandoned in place.

The Air Force conducted field investigations from 1996 through 1999 to determine the extent of fuel contamination in the soil and groundwater. During the 1997 field investigation, chlorinated solvents (cleaning and degreasing chemicals) such as tetrachloroethene (PCE), trichloroethene (TCE), 1,1,1-trichloroethane (TCA) and cis-1,2-dichloroethene (DCE) were discovered at very low levels in the soil approximately 400 feet northwest of the USTs. As a result of this discovery, the Air Force in 2000 evaluated the extent of the chlorinated solvent contamination in both soil and groundwater. This study identified TCE, cis-1,2-DCE and 1,1-DCE contamination at levels higher than previously identified and above state and federal cleanup levels.

The Air Force completed a remedial investigation/feasibility study (RI/FS) in 2003. The results of the RI/FS revealed that soil, sediment, surface water and groundwater contamination exists above cleanup levels at DP98. To more completely describe the site conditions, data from all new and past investigations are included in the 2003 RI/FS.

The contamination is a result of releases of petroleum hydrocarbons and chlorinated solvents to the environment. Petroleum hydrocarbons were likely released to soil and groundwater from leaks and overfilling of the original USTs that serviced Building 18224. These leaks migrated down through soil to groundwater. Chlorinated solvents were most likely released from Building 18224 when it was used as a vehicle maintenance shop.

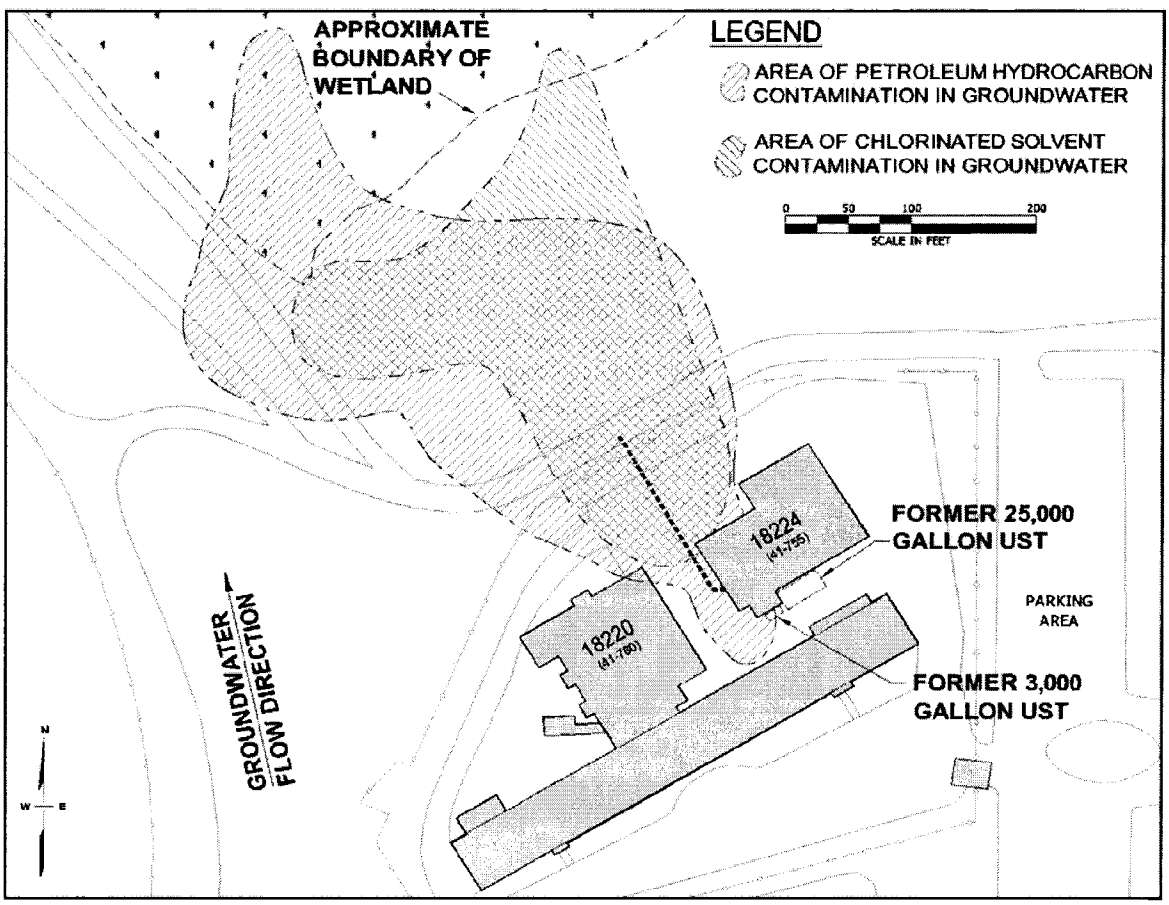

Figure 2. Site Diagram of Areas Requiring Remedial Action at DP98

Members of the Elmendorf AFB **Community Environmental Board (CEB),** until recently known as the **Restoration Advisory Board or RAB,** have been routinely briefed on the status of DP98 during meetings open to the general public. Also, during the summer, board members have been given the opportunity to visit DP98. Site updates have been provided to the CEB, ADEC and the EPA in the form of "Quarterly Progress Reports" since December 1998. Those reports are available on the Elmendorf web site and in the Information Repositories. The Administrative Record for DP98 was established in September 2002, at which time notices were published inviting the community to view copies of these comprehensive site records in the Information Repositories. (See "Community Participation" for more about the web site, Administrative Record and Information Repositories.)

SITE CHARACTERISTICS

DP98 sits on a local topographic rise that slopes downward to the north into a wetland area approximately 400 feet from Building 18224. Groundwater follows the topography and flows north (Figure 2).

Groundwater is found in two separate **water bearing units** in the same **unconfined aquifer.** The depth to groundwater near Building 18224 is around 5 feet below ground surface (bgs), dropping to about 15 feet bgs to the north, before surfacing at the edge of the wetland at the bottom of the slope. At the point of surfacing, the groundwater becomes surface water. The bottom of this unconfined aquifer is defined by a blue silty clay formation known as the Bootlegger Cove Formation, located 45 to 90 feet bgs. The Bootlegger Cove Formation prevents the downward movement of contaminants into the **regional groundwater aquifer.**

Soil

DRO and TCE are the most common contaminants in the soil. **Daughter compounds** from PCE and TCE are also present in the soil at concentrations above cleanup levels (see Table 1).

The highest levels of chlorinated solvents in soil are located at the end of the dry well drain system, north of Building 18224. The plume extends about 400 feet north-northwest.

There are two areas of petroleum hydrocarbons above cleanup levels. One is beneath Building 18224 where the UST was located, and the other is a small area adjacent to the wetland area, about 600 feet northwest of Building 18224. The extent of these plumes can be seen in Figures 2 and 3.

Groundwater

Groundwater contaminated by chlorinated solvents is located northwest of Building 18224 as shown in Figure 2. TCE is the primary chlorinated solvent found above cleanup levels. The DRO contamination in groundwater covers an area similar to the DRO soil contamination, extending north from Building 18224 to the edge of the wetland.

Surface Water and Wetland Sediments

In the wetland sediments, petroleum hydrocarbons and chlorinated solvents are found above cleanup levels. The source of these contaminants is probably contaminated groundwater surfacing near the edge of the wetland. Petroleum hydrocarbons found in surface water are below cleanup levels.

TYPICAL CONTAMINANTS FOUND AT DP98

The following terms describe major contaminants found at DP98.

Diesel Range Organic Compounds (DRO):

Mid range petroleum hydrocarbon compounds such as diesel fuel; contains some constituents that may evaporate; typical uses included fuel for generators and heavy equipment and as heating oil.

Gasoline Range Organic Compounds (GRO):

Light range petroleum hydrocarbon compounds and fuel additives that are commonly found in gasoline; they are volatile and may evaporate; typically used as fuel for vehicles and gas powered equipment.

Residual Range Organic Compounds (RRO):

Heavy range petroleum hydrocarbon compounds such as lubricating oils; also may be the result of old fuel spills after the more volatile materials have evaporated; examples are lube oils and motor oil.

Chlorinated Solvents:

Compounds used as solvents to clean engine parts; they evaporate easily. Types of chlorinated compounds found at DP98 include PCE and TCE that break down due to natural processes into **daughter compounds** such as cis 1,1-DCE, cis 1,2-DCE, and TCA.

SCOPE AND ROLE OF THE REMEDIAL ACTION

The remedial action or method used to clean up the contamination at DP98 is part of a basewide effort to clean up contaminated areas. In addition to DP98, there are six other areas, known as operable units (OUs), in various stages of cleanup. Records of decision have previously been signed for these six OUs.

The RI/FS for DP98 identified both petroleum hydrocarbon and chlorinated solvent contamination in soil, groundwater, sediment, and surface water. A remedial action (cleanup) strategy has been developed to address the two types of contaminants (petroleum hydrocarbons and chlorinated solvents) at DP98. The strategy places a priority on treating the chlorinated solvents first for the following reasons:

- Fuel compounds assist with the breakdown of chlorinated solvents;
- Fuel contamination may be preventing further movement of the chlorinated solvents; and
- The chlorinated solvents pose a higher risk to human health when compared to the petroleum hydrocarbon contaminants.

Table 1. Summary of Contaminants of Concern and Clean up Levels for DP98

Media	Analyte	Units	Maximum Detected Concentration	Cleanup Standard	Source of Cleanup Level
Groundwater	Diesel range organics (DRO)	mg/L	1,300	1.5	18 AAC 75
	Gasoline range organics (GRO)	mg/L	4.4	1.3	18 AAC 75
	Benzene	mg/L	0.16	.005	MCL
	Trichloroethene (TCE)	mg/L	5	.005	MCL
	Tetrachloroethene (PCE)	mg/L	6.4	.005	MCL
	cis-1,2-Dichloroethene (DCE)	mg/L	5.7	70	MCL
	Vinyl Chloride	mg/L	.015	.002	MCL
Surface Water	Total aromatic hydrocarbons (TAH)	µg/L	0.9	10	18 AAC 70
	Total aqueous hydrocarbons (TAqH)	µg/L	1.78	15	18 AAC 70
Sediment	Cis-1,2-DCE	mg/kg	.27	0.2	18 AAC 75
	TCE	mg/kg	.037	.027	18 AAC 75
Soil	DRO	mg/kg	42,000	250	18 AAC 75
	GRO	mg/kg	616	300	18 AAC 75
	Benzene	mg/kg	0.3	0.02	18 AAC 75
	PCE	mg/kg	0.095	0.03	18 AAC 75
	TCE	mg/kg	59.63	0.027	18 AAC 75
	cis-1,2-DCE	mg/kg	2.084	0.2	18 AAC 75
	1,1-DCE	mg/kg	0.058	0.03	18 AAC 75

mg/kg – Milligrams per kilogram
mg/L – Milligrams per liter
AAC – Alaska Administrative Code
MCL – maximum contaminant levels (Safe Drinking Water Act)

When the levels of chlorinated solvents in both groundwater and soil are below cleanup levels, active remedial actions can be used to remediate any petroleum hydrocarbon contaminants remaining above cleanup levels.

SUMMARY OF SITE RISKS

As part of the RI/FS, the Air Force conducted a baseline risk assessment to determine the current and future effects of contaminants on human health and the environment. The baseline risk assessment estimates the risks the site poses if no action is taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

The Air Force considered two different land uses while evaluating the risk to humans. The first is the current, or industrial use, and assumes daily work by civilian and military people and occasional work by contractors. The second, a possible future residential use, assumes construction of family housing in the area.

Human Health Risks

Two important measures used in health risk assessments are the **excess cancer risk** and **hazard quotient**. These measures express risk as a number, such as one in one hundred (written as 0.01 or 1 $x10^{-2}$) or one in one million (written as 0.000001 or 1 x 10^{-6}). Excess cancer risk measures the likelihood that one additional person above the nationwide average will develop cancer from exposure to contamination. For example, a 1 x 10^{-6} cancer risk means the likelihood of cancer is one in a million. Typically the level at which action is required is between at 1 x 10^{-4} (one in ten thousand) and 1 x 10^{-5} (one in a hundred thousand). The hazard quotient expresses the likelihood that exposure to contaminants will cause some negative health effect other than cancer. A hazard quotient score above 1 indicates a potential cause for concern for non-cancer health effects.

Under the current land use, no significant health risks were found for workers who might be exposed to contaminants in soil. Health risks are a potential concern from exposure to contaminants in groundwater, either by drinking, by breathing vapors inside Building 18224, or by direct skin contact during construction activities. Although groundwater is not used as a drinking water source, to be conservative, health risks were estimated assuming people do drink the groundwater. In such case, the excess cancer risks would be 3 in 1,000 (3 $X10^{-3}$) for civilian workers and 5 in 10,000 (5 $X10^{-4}$), for military workers. Civilian workers are assumed to have a greater exposure as they may work at the site for many years. Military workers are assumed to have less exposure as they typically move after three years. Drinking water risks are due primarily to chlorinated solvents (TCE, cis-1,2-DCE, and PCE) and petroleum hydrocarbons (DRO).

For non-cancer risk, adding all contaminants together results in a **hazard index** of 84. Like the excess cancer risk, this is mostly due to the contaminant TCE.

Indoor air exposure was modeled as part of the human health risk assessment for Building 18224. However, actual sampling indicated that no risk is present and the exposure pathway is not complete.

Under the future land use, risks to children or adult residents who would live and play in a residential setting, as well as occasional recreational users, were also evaluated. As with current land use, no health risks were found for exposure to contaminants in the soil. Exposure to contaminants in groundwater, however, would be a potential health concern. If future residents used groundwater as their domestic water source (drinking, bathing, washing), the total excess cancer risk would be 6 occurrences in 100 (6×10^{-2}) with a non-cancer hazard index of 476. Ninety-five percent of the total excess cancer risks would be due to the chlorinated solvent TCE. Of this number, 80 percent of this risk would be from breathing vapors given off by the contaminated groundwater during use. Other contaminants that contributed to the total cancer risk include:

gasoline range organics (GRO)	benzene
diesel range organics (DRO)	cis-1,2-DCE
1,2,4-trimethylbenzene	ethylbenzene
1,3,5-trimethylbenzene	naphthalene
tetrachloroethene (PCE)	vinyl chloride

Ecological Risks

An ecological risk assessment was conducted to determine if plants or animals might be exposed to contaminants and if the exposure could have negative effects. Animals may be exposed to contaminants by eating contaminated plants and animals, contact with their skin, and (if they burrow) soil and vapors from soil or surface water. Plants can be exposed to contaminants in soil, water, or sediment. A contaminant is considered to be potentially harmful to the environment if it has a hazard quotient greater than 1.

For freshwater aquatic animals and plants, a hazard quotient above 1 was estimated for exposures to surface water or sediment contaminated with petroleum hydrocarbons. Almost all of the ecological risk is from a small area adjacent to the wetland, north of Building 18224. Contaminants that led to a hazard quotient greater than 1 were:

diesel range organics (DRO)

residual range organics (RRO)

2-Methylnaphthalene

Fluorene

It is the Air Force's current judgment that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

REMEDIAL ACTION OBJECTIVES (RAO's)

These objectives consist of environmentally protective cleanup goals specific to DP98's media: soils, groundwater, surface water, and sediments. Each medium may have one or more separate objectives. At DP98, contaminants in each type of media are greater than the cleanup levels. Table 1 defines those cleanup levels.

The RAOs for this site are to:

- Reduce both chlorinated solvent and fuel concentrations in soils, surface water, sediments, and groundwater to meet cleanup levels;
- Reduce risk to human health and ecological receptors caused by exposure to contaminated groundwater surfacing near the wetland;
- Reduce or eliminate the exposure of ecological receptors to contaminated sediments in the wetland area by reducing the concentrations of contaminants; and
- Select remedial action alternatives that will minimize the damage to the wetland.

SUMMARY OF ALTERNATIVES

To clean up the contaminated soil and water at DP98, a wide range of possible alternatives were considered. The most promising options were evaluated in terms of effectiveness, implementability, and relative cost. These options were then grouped together into the alternatives described below. The six remedial alternatives focus on the chlorinated solvents since these contaminants are a much greater potential human health risk than fuel contaminants at DP98. Alternative 4 is the preferred alternative as explained below. No matter which alternative is selected, land use controls will be required until remedial action goals are achieved.

Alternative 1, No Action

Estimated Capital Cost: $0

Estimated Annual Operation and Maintenance (O&M) Cost: $0

Total Present Worth Cost: $0

CERCLA requires that the "No Action" alternative be evaluated to establish a baseline for comparison. Under this alternative, the Air Force would take no action at Site DP98 to prevent exposure to the soil and groundwater contamination.

Alternative 2, Monitored Natural Attenuation

Capital Costs: $370,000

Estimated Annual O&M: $80,000 to $120,000

Total Present Worth Cost (75 years with 7% discount rate): $1,790,000

Time To Complete Cleanup: Preliminary estimate is 23 –48 years for soil and 35-75 year for groundwater.

This alternative would use physical, chemical and biological processes (natural attenuation) to restore groundwater to drinking water standards. Groundwater and surface water would be monitored periodically by collecting samples. With

the data available, it is estimated that it could take up to 75 years to meet remediation goals. After the first five years, the cleanup timeframe have been re-evaluated. The Air Force has implemented land use controls at this site. These controls restrict the use of groundwater and surface water. Digging restrictions will be implemented to prevent cross contamination between the unconfined and semi-confined aquifers. Under Alternative 2, these land use controls would continue until remediation goals are met. After groundwater and surface water remediation goals have been reached, soil and sediment sampling would be conducted to confirm soil and sediment remediation goals have been met.

Alternative 3, Limited Steam Stripping of Soils and Groundwater to Remove Chlorinated Solvents, and Groundwater Monitored Natural Attenuation

Capital Costs: $1,790,000

Estimated Annual O&M: Year 1 $813,000
Year 2 and beyond $80,000 to $120,000

Total Present Worth Cost (75 years with 7% discount rate): $3,920,000

Time To Complete Cleanup: 1 year within treatment zone; preliminary estimate of 9 – 48 years for soil outside the treatment area, and 25-75 years for groundwater areas outside the treatment zone.

This alternative would use steam stripping to treat the highest levels of chlorinated solvent contamination in both soil and groundwater. This area is located within a 25-foot radius of the end of the dry well drain system that serviced Building 18224 (Figure 2). Steam stripping involves injecting hot steam into the ground through wells to enhance the removal of contaminants. When the hot steam contacts the soil, the contaminants are released as vapor. This vapor is then removed under vacuum, condensed into liquid and treated. It is estimated approximately 2,500 cubic yards of soil and aquifer media would be treated over a period of 45 days using steam-stripping technology. Also, contaminated groundwater would be removed from select wells at high volumes and will help to control contaminant migration.

Soil and groundwater outside the treatment area would be remediated by natural attenuation, to restore groundwater to drinking water standards. The monitoring requirements and land use controls summarized in Alternative 2 would be used for this alternative. With the data available, it is estimated that it could take up to 75 years to meet remediation goals. After the first five years, the cleanup timeframe would be re-evaluated.

Alternative 4, Limited Source Removal of Contaminated Soils, Off-Site Treatment to Remove Chlorinated Solvents, Disposal, and Groundwater Monitored Natural Attenuation

Capital Costs: $1,240,000

Estimated Annual O&M: $80,000 to $120,000

Total Present Worth Cost (75 years with 7% discount rate): $2,660,000

Time To Complete Cleanup: 45 days within treatment zone; preliminary estimate of 18-48 years for soil outside the excavated area and 35-75 years for groundwater.

Alternative 4 is the preferred remedial alternative for the site. Under this alternative, the highest levels of chlorinated solvent contaminated soil would be excavated and treated at an EPA approved treatment facility in the lower 48 states. The highest concentrations of contaminated soils are likely located within a 25-foot radius of the end of the dry well drain system that serviced Building 18224. The depth of the soil excavation would be determined by the presence of contaminated soils, but would not extend below the water table, which is located approximately 10 feet below ground surface. It is estimated that a total of 360 cubic yards of contaminated soil will be excavated. The excavation would be backfilled with clean soil.

Soil and groundwater outside the treatment area would be remediated by natural attenuation, to restore groundwater to drinking water standards. After completion of excavation and backfill operations, additional limited characterization of subsurface hydrogeology will be undertaken in the area of the 190 - foot groundwater contour. During this time, the addition of carbon sources to the plume will be evaluated to see if enhanced natural attenuation of soils and groundwater is needed. Therefore, additional carbon sources may be added in the future to enhance natural attenuation. The monitoring requirements and land use controls summarized in Alternative 2 would be used for this alternative.

It is estimated that it would take one field season to excavate and dispose of the contaminated soils. With the data available, it is estimated that it could take up to 75 years for groundwater to meet remediation goals. After the first five years, the cleanup timeframe would be re-evaluated.

Alternative 5, Limited Source Removal of Contaminated Soils, On-Site Thermal Treatment to Remove Chlorinated Solvents, and Groundwater Monitored Natural Attenuation

Capital Costs: $1,170,000

Estimated Annual O&M: $80,000 to $120,000

Total Present Worth Cost (75 years with 7% discount rate): $2,650,000

Time To Complete Cleanup: 45 days within treatment zone; preliminary estimate of 18-48 years for soil outside the treatment zone, and 35-75 years for groundwater.

This remedial alternative is the same as Alternative 4, except the excavated contaminated soil would be treated on Elmendorf AFB using a mobile thermal treatment unit. The thermal treatment unit would heat the soil and drive off contaminants. Air quality control equipment would be used to control these contaminated emissions. The treated soils would be reused on Elmendorf AFB after post-treatment soil samples indicate that cleanup levels have been met. The excavation would be backfilled with clean soil.

Alternative 6, Soil Vapor Extraction for Soil and Groundwater Monitored Natural Attenuation

Capital Costs: $800,000

Estimated Annual O&M: Year 1 through 5 $246,000
Year 6 and beyond $80,000

Total Present Worth Cost (75 years with 7% discount rate): $2,760,000

Time To Complete Cleanup: 5 years within treatment zone; preliminary estimate of 15-48 years for soil outside the treatment zone, and 35-75 years for groundwater.

All soils containing chlorinated solvents above cleanup levels at DP98 would be treated using soil vapor extraction. This would not include contaminated soils located in the north and northwest portions of the site where the ground is too steep to install soil vapor extraction wells. The treatment process includes the installation of extraction wells above the water table in contaminated areas. Vapors containing chlorinated solvents would be removed under vacuum and treated using carbon filters. The treated soil vapors would be monitored for compliance with applicable state and federal regulations prior to release into the atmosphere.

Soil and groundwater outside the treatment area would be remediated by natural attenuation, thus restoring groundwater to drinking water standards. The monitoring requirements and land use controls summarized in Alternative 2 would be used for this alternative.

It is estimated that it would take approximately five years for the soil within the SVE treatment area to reach remediation goals. With the data available, it is estimated that it could take up to 75 years for groundwater to meet remediation goals.

After the first five years, the cleanup timeframe would be re-evaluated.

EVALUATION OF ALTERNATIVES

Nine criteria (Table 2) are used to evaluate the different remediation alternatives individually and against each other in order to identify a Preferred Alternative. This section of the Proposed Plan discusses the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are explained in Table 2. A detailed analysis of alternatives can be found in the RI/FS.

1. Overall Protection of Human Health and the Environment – All of the alternatives except the "no action" alternative would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through treatment and/or land use controls. Alternatives 3, 4, 5, and 6 are the most protective of human health or the environment by accelerating overall cleanup timeframes. These alternatives target the highest concentrations of chlorinated contaminates in the soil by either limited steam stripping (Alternative 3), excavation and off-site thermal destruction (Alternative 4), excavation and on-site thermal desorption (Alternative 5) or soil vapor extraction (Alternative 6). Although Alternative 2 (monitored natural attenuation) would be protective of human health and the environment it would take longer to reach remediation goals. Because the "no action" alternative (Alternative 1) is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

Table 2 – Nine Criteria for Evaluating Cleanup Alternatives

Overall Protectiveness of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment.
Compliance with ARARs evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State Agency Acceptance considers whether the State agrees with the preferred alternative identified in the Proposed Plan.
Community Acceptance considers whether the local community agrees with the preferred alternative identified in the Proposed Plan. Comments received on the Proposed Plan are an important indicator of community acceptance.

2. Compliance With Applicable or Relevant and Appropriate Requirements (ARARs) – All alternatives would meet their respective state and federal ARARs.

3. Long-Term Effectiveness and Permanence – All alternatives would be effective in the long term by reducing contaminant concentrations in soil and groundwater. Alternative 3 was ranked the highest since it would actively treat soil and groundwater in the contaminant source area, whereas Alternatives 4, 5, and 6 only actively treat soil contamination. Alternative 2 was less favorable since it does not involve active treatment. For all alternatives, once cleanup goals have been reached land use controls and monitoring would not be needed.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment – Alternatives 3, 4, 5, and 6 would remove or destroy high concentrations of chlorinated solvents in the soil. Alternative 3 would also remove chlorinated solvents from the groundwater through treatment. Carbon units from Alternatives 3 and 6 would need to be thermally destroyed or recycled, and managed in accordance with the Resource Conservation and Recovery Act (RCRA). Alternative 5 would require air scrubbers to ensure air emissions from the low temperature thermal desorption (LTTD) unit meet air emission standards. All alternatives would use natural processes to achieve remediation goals.

5. Short Term Effectiveness – Alternatives 4 and 5 involve the excavation of contaminated soils and therefore present a potential for short-term exposure to construction workers. Alternative 4 would have added short-term risks because approximately 360 cubic yards of contaminated soil would be transported off-site to a treatment facility. Alternative 3 would have a relative high potential short-term exposure associated with the steam stripping treatment and the potential to spread contaminants in water or to the surface and air. Alternative 6 would have potential short term risks associated with sampling and air emissions. All alternatives would have some degree of short-term risk due to potential contaminant exposure during natural attenuation sampling events.

6. Implementability – All of the other alternatives would require some management to implement land use controls and long term monitoring. Alternatives 4 and 5 were more favorable in comparison to Alternatives 3 and 6 since they only require a high degree of management and oversight over a short amount of time. Alternative 4 is more desirable than Alternative 5 because it would not require the mobilization and operation of a LTTD unit. Alternative 3 was scored less favorable than Alternative 6 because it would require continual onsite monitoring and management during the operation of the steam stripping system. Very significant power requirements would be needed for steam stripping and a portable generator might be required to provide reliable power. Alternative 6 would require the operation and maintenance of a SVE system for 5 years. Alternatives 3, 5 and 6 would have air emissions associated with the onsite treatment systems. Although no permits would be required to operate these systems, the emissions could cause Elmendorf AFB to exceed existing requirements, which in turn could trigger the need for air permits for other facilities on base. Also, the onsite treatment system could interfere with the ongoing mission at DP98. Therefore, alternatives 3, 5 and 6 were scored less favorably than alternatives 2 and 4.

7. Cost – Alternative 2 has the lowest estimated present worth cost. Of the remaining alternatives, Alternatives 4 and 5 would be the next least expensive followed by Alternatives 6. Alternative 3 had the highest estimated present worth costs.

8. State Acceptance – ADEC has participated in the development of this plan. Final state acceptance will be evaluated following public comment.

9. Community Acceptance – Community acceptance of the preferred alternative will be evaluated after the public comment period ends. Community comments and responses will be included in the ROD for DP98.

Table 3 compares the cleanup alternatives for DP98 using the nine evaluation criteria using symbols to reflect scoring. An explanation of the symbols is provided at the bottom of the table.

PREFERRED ALTERNATIVE

The preferred cleanup alternative for DP98 is Alternative 4, Limited Source Removal of Chlorinated Contaminated Soils, Off-site Treatment and Disposal, and Monitored Natural Attenuation. The Preferred Alternative is expected to achieve substantial and long-term risk reduction through treatment and natural attenuation, at a reasonable cost. This alternative provides active treatment to the area that has the highest concentration of chlorinated compounds in the soil and is relatively simple to implement when compared to the other alternatives. It is expected to cause the least impacts to the overall operations at Elmendorf AFB. Until remedial action goals are achieved, land use controls will be required under this Preferred Alternative.

Based on information currently available, the Air Force, ADEC and EPA believe the Preferred Alternative meets the threshold criteria (Criteria 1 and 2) and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Air Force expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA § 121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element. The Preferred Alternative can change in response to public comment or new information. Because contamination will remain on site above cleanup levels for more than 5 years, a 5 year review will be conducted until cleanup levels have been met.

COMMUNITY PARTICIPATION

We invite you to comment on this proposed plan. Comments from the public will be used to help determine what action to take. You may comment verbally or in writing at the public meeting on September 25, 2003. If you prefer, you may submit written comments during the public comment period, September 1 through September 30, 2003, by sending them to:

Table 3– Comparison of Alternatives to Evaluated Criteria

Criterion	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation	Alternative 3 Limited Steam Stripping of Chlorinated Contaminated Soils and Groundwater and MNA	Alternative 4 Limited Source Removal of Chlorinated Contaminated Soils, Off-Site Treatment and Disposal and MNA	Alternative 5 Limited Source Removal of Chlorinated Contaminated Soils, On-Site Treatment and Disposal and MNA	Alternative 6 SVE for Soil and MNA
Overall protection of human health and the environment	○	◑	◕	◕	◕	◕
Compliance with ARARs	No	Yes	Yes	Yes	Yes	Yes
Long-term effectiveness	NE	◔	◕	◑	◑	◑
Reduction of toxicity, mobility, and volume of contaminants	NE	◔	◕	◑	◑	◑
Short-term effectiveness—risk	NE	◑	◔	◑	◑	◑
Implementability	NE	◕	◔	◕	◑	◔
Cost	$0	$1,420,000	$3,920,000	$2,660,000	$2,650,000	$2,760,000
State acceptance	NE	NE	NE	NE	NE	NE
Community acceptance	NE	NE	NE	NE	NE	NE
Total score	○	◕	◑	●	●	◑

○ Poor ◔ Fair ◑ Good ◕ Excellent ● Superior

ARARs – Applicable or relevant and appropriate requirement
MNA – Monitored natural attenuation
NE – Not evaluated at this time, but will be evaluated once public comments are received
RAOs – Remedial action objectives
SVE – Soil vapor extraction

MSgt Jon K. Scudder
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Comments postmarked by October 1, 2003 will be addressed.

After considering public comments, the Air Force, in consultation with ADEC and the EPA, will select the final cleanup remedies. The preferred cleanup remedy may be modified based on public comment or new information. The chosen remedy will be described in the ROD. The Air Force will respond to your comments in the ROD, in a section called the Responsiveness Summary. The ROD will be available for your review at the information repositories listed below once the ROD has been signed.

PUBLIC MEETING:

The public meeting is scheduled from 7:00 to 9:00 p.m. on September 25, 2003, at the Sheraton Hotel, the Kuskokwim Room, located at 401 East 6th Avenue in Anchorage, Alaska. Representatives from the Air Force will be present to discuss the Proposed Plan and answer questions.

WHERE DO I GET MORE INFORMATION?:

This Proposed Plan for DP98 summarizes information contained in the remedial investigation/feasibility study. All site-related documents are contained in the Administrative Record file, which is the official collection of all site-related documents, correspondence and other information. You may review a copy of the Administrative Record file by visiting either of the Information Repositories that Elmendorf maintains in the Anchorage community:

Alaska Resources Library
& Information Services (ARLIS)
3150 C Street Suite 100
(907) 272-7547
(Hours: 8:00 a.m. to 5:00 p.m., Monday through Friday)

University of Alaska Anchorage
Consortium Library
Reserve Desk
3211 Providence Drive
(907) 786-1871
(Hours 7:30 a.m. to 8:00 p.m., Monday through Friday
Noon to 5:00 p.m. Saturdays)

Another source of information on the environmental cleanup process is the Elmendorf AFB Community Environmental Board. The CEB is a group of community volunteers who act as a focal point for exchange of information about environmental cleanup issues. The CEB has been meeting for several years to discuss subjects such as the investigations on Elmendorf and the cleanup strategies. The public is welcome to attend the board's meetings. Please contact MSgt Jon Scudder at the number shown on page 9 for information on the CEB.

Additional information about cleanups at Elmendorf can be found on the base's public web site. The address for the Environmental Restoration page is www.elmendorf.af.mil/othrorgs/rcstorat/webdocs/index.htm

The back page of this plan can serve as a comment form, but you do not have to use this form to submit comments. Please send written comments to the Environmental Community Relations Coordinator listed on page 9.

GLOSSARY

Clean up Levels: Concentration levels at which contaminants can not exceed to ensure protection of human health.

Community Environmental Board: Chartered in April 2003 as the successor to the Elmendorf AFB **Restoration Advisory Board** (see definition) to provide a forum for public involvement on environmental restoration, compliance, natural resources and cultural resources issues on the base.

Daughter Compounds: A contaminant that is the result of the direct breakdown of another contaminant such as during natural attenuation.

Excess Cancer Risk: Measures the likelihood that one additional person above the national average will develop cancer from exposure to contamination.

Hazard Index: Is the sum of non-cancer risks for all contaminants within a certain exposure pathway, such as contact with soil or domestic use of groundwater.

Hazard Quotient: Expresses the likelihood that exposure to contaminants will have some negative health effect other than cancer.

Monitored Natural Attenuation: Natural attenuation is the cleanup of chemicals by natural processes. Primarily occurring through mico-organisms breaking down the chemicals into harmless constituents. Groundwater and surface water monitoring verifies if this process is taking place.

National Priorities List: The EPA's list of hazardous waste sites identified for possible long-term remedial action under Superfund.

Petroleum Hydrocarbon: Fuel contaminants such as diesel, gasoline, or heavy oils.

Regional Groundwater Aquifer: A groundwater aquifer that is usually found at depth and covers a large geographic area and commonly used for water supply wells.

Restoration Advisory Board: A committee of community members who want to be involved in the cleanup activities at Department of Defense sites, such as Elmendorf AFB. The RAB serves as a bridge for communications between the Air Force and the community. Elmendorf's Restoration Advisory Board has transitioned into the Elmendorf AFB **Community Environmental Board** (see definition).

Total Cancer Risk: A sum of all cancer risks from all cancer causing contaminants in an exposure pathway, such as contact with soil or consumption of groundwater.

Total Present Worth Cost: The total amount of money estimated to be necessary to complete a remedial action. This includes both capital and operation and maintenance costs estimated from start to finish of the action. This includes capital and operation and maintenance costs as well as a 7% discount rate estimated from the start to the finish of the action.

Unconfined Aquifer: A groundwater aquifer that does not have a confining unit above the water table, and is often found at shallow depths.

Water Bearing Units: Geologic soil units that are porous and hold water

COMMENT FORM

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the remedial alternatives discussed in this Proposed Plan is important to the Air Force. Comments provided by the public are valuable in helping the agencies select a final remedy for DP98.

You may use the space below to write your comments. When you are finished, please fold and mail. A return address has been provided on the back of this page for your convenience. Comments must be postmarked by October 1, 2003. If you have questions about the comment period, please contact MSgt Jon K. Scudder at (907) 552-8986.

Name_____

Address _____

City_____

State _____ Zip code_____

If you would like to be added to the Elmendorf AFB Environmental Community Relations list to receive notices of Community Environmental Board meetings and other environmental news by e-mail, please include your preferred e-mail address:

_____

Mail your comments no later than October 1, 2003.

DP98004410

Name_____

Address_____

City_____

State_____ZIP_____

PLACE
STAMP
HERE

MSgt Jon K. Scudder
Environmental Community Relations Coordinator
3rd Wing Public Affairs (3 WG/PA)
10480 22nd Street Room 121
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PUBLIC MEETING
A public meeting will be held at the
Sheraton Anchorage Hotel
401 East 6th Avenue, Anchorage, Alaska
7pm, Thursday, September 25, 2003

ELMENDORF AIR FORCE BASE
3 WG/PA
10480 22nd Street, Room 121
Elmendorf AFB, AK 99506-2500

Attn: MSgt Jon K. Scudder