Proposed Plan

OU2 Ham Lake (Area 43)
Former Fueling Station (Area 40)

Formerly Used Defense Sites (FUDS)
Northway Staging Field
FUDS #F10AK0347-06 HTRW Project 06

US Army Corps of Engineers **September 2011**

INTRODUCTION

The United States Army Corps of Engineers, Alaska District invites the public to review and comment on the Proposed Plan for the Northway Staging Field, Formerly Used Defense Sites (FUDS) Ham Lake (Area 43) and the Former Fueling Station (Area 40) known collectively as the Ham Lake Site, Northway, Alaska. This Proposed Plan presents the cleanup alternatives proposed for contaminated soil and groundwater at the Northway Staging Field in Northway, Alaska. The Corps is soliciting comments on the cleanup alternatives and the proposed remedial action presented in this plan.

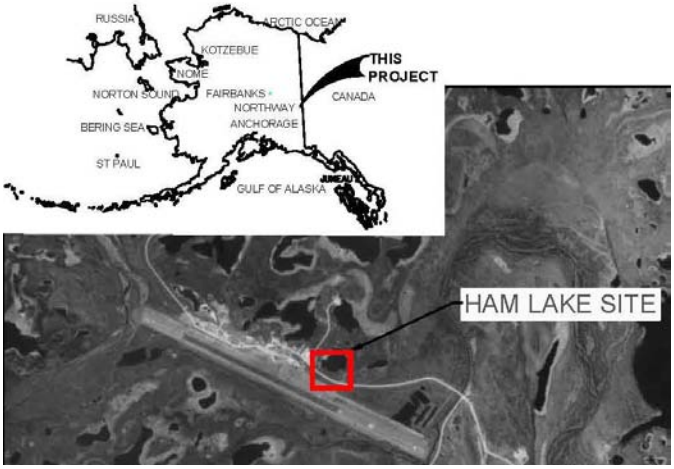


Figure 1 Ham Lake Site Project Location Map

Although the site is not a Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) site, this project is being implemented consistent with CERCLA including preparation of this Proposed Plan and the public comment process. Alaska Department of Environmental Conservation (ADEC) is the lead regulatory agency for this site in accordance with and in satisfaction of 18 Alaska Administrative Code (AAC) 75 for release of contamination.

The Department of Defense (DOD) is authorized to carry out a program of environmental restoration at former military sites pursuant to the Defense Environmental Program (DERP) (10 United States Code 2701 et seq.). Under that Program, FUDS properties are defined as real property that was owned by, leased by, or otherwise possessed by the United States and that were transferred from DoD control prior to 17 October 1986.

The Northway Staging Field Site is a petroleum, oil, and lubricants (POL) contaminated site, which falls under the CERCLA petroleum exclusion and is therefore being addressed under the authority of the DERP. The DERP provides authority to cleanup petroleum contamination when it may pose an imminent and substantial endangerment to public health, welfare or the environment. Alaska's Site Cleanup Rules (18 AAC 75 Article 3 Oil and Other Hazardous Substances Pollution Control) are risk based and indicative of when an imminent and substantial endangerment to the public health or welfare or the environment has been mitigated, and will be the basis for the proposed actions described herein.

Although this Proposed Plan identifies a preferred remedial alternative of institutional controls for soil and groundwater and monitored natural attenuation for groundwater at the site, a final selection will not be made until the public comment period ends and all comments are reviewed and addressed. Changes to the proposed approach may be made if public comments or additional information indicate that such changes would result in more appropriate solutions.

This Proposed Plan will provide a brief summary of the history, data, and actions conducted at the Ham Lake Site. Additional details concerning this site are available for review in the documents on file at the Walter Northway School Library. After considering all public comments, USACE will prepare a Decision Document that describes the selected remedy. The Decision Document will include responses to all significant public comments in a section called the Responsiveness Summary.

PURPOSE

The purpose of this Proposed Plan is to:

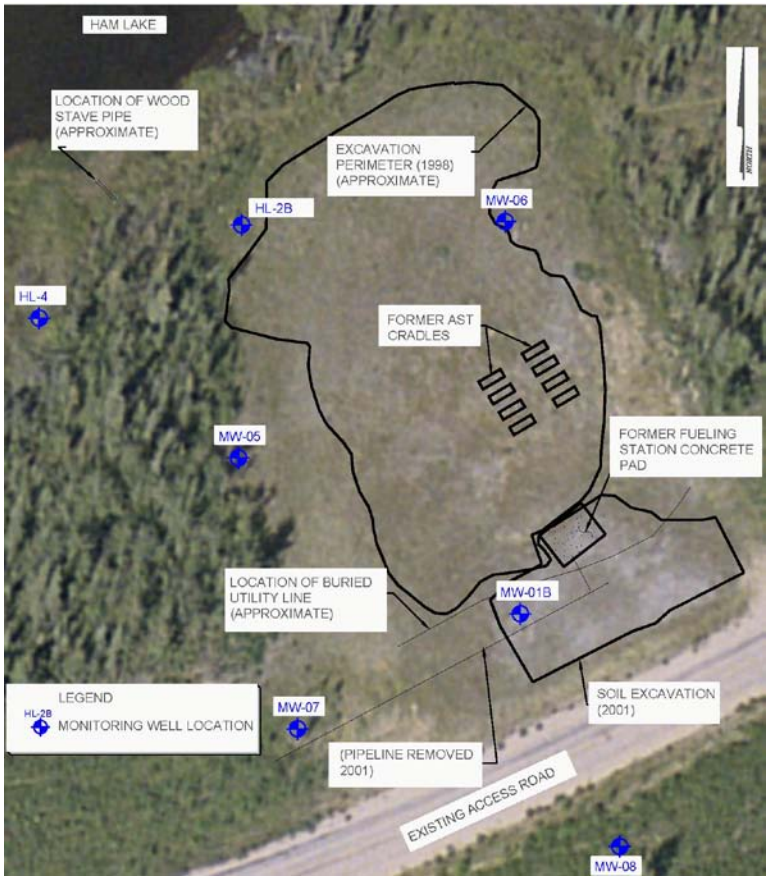
- Describe the location and environmental conditions of the site;
- Describe the history of the site;
- Describe the site-specific cleanup criteria;
- Present the recommended remedial alternative for the site;
- Request public comment; and
- Provide information on how the public can be involved in the final decision.

SITE LOCATION AND HISTORY

The Ham Lake Site consists of two sites, Area 40 and 43 which are located in Northway, Alaska along Northway Road, between Northway Junction and Northway Village. The local community, Northway Village, is accessible by road from the Alaska Highway, approximately nine miles southeast of Northway Junction (Figure 1).

The Northway Staging Field Site consists of approximately 6,334 acres in the vicinity of the Northway Airport. Ham Lake is located within the central portion of the Northway Staging Field. The Ham Lake Site (shown on Figure 2) is adjacent to Northway Road, just north of the Northway Airport. Ham Lake borders the site on the northwest. The Ham Lake Site is the former location of aboveground storage tanks (AST), a fueling station, and associated pipeline that were previously part of the U.S. Department of the Army's operations at the Northway Staging Field.

Figure 2 Ham Lake Site Map



The Northway Staging Field was acquired for use by the U.S. Army from the Bureau of Land Management (BLM) and Civil Aeronautics Administration (CAA became Federal Aviation Administration [FAA] after World War II). Construction of military facilities at Northway began in 1941 and during the height of operations at Northway; hundreds of buildings were built, including aircraft hangars, warehouses, garages, powerhouse, machine shop, and dozens of barracks. In 1966, the FAA transferred the right to use the lands and airport facilities to the State of Alaska. The current landowner is the State of Alaska Department of Transportation (AKDOT).

The primary contaminant sources at the Ham Lake Site include the former ASTs, the former fueling station, and associated pipelines. The primary release mechanisms were spills at the ASTs and leaks along the pipeline connections to the filling station. Secondary contaminant sources include the movement of contaminants through soil into groundwater, surface water and through soil or groundwater into the air.

SITE CHARACTERIZATION

The Ham Lake Site is located within a flat swampy floodplain that was once a channel of the Nabesna River. Discontinuous permafrost exists throughout the area ranging in thickness from 90 to 150 feet (ft). Groundwater at the Ham Lake Site is shallow, typically between three and eight feet deep depending upon the distance from the lake, and is in unfrozen sediments above the permafrost. Ham Lake is located immediately adjacent to the project site and is presumed to have strong influences on groundwater flow in the immediate area.

Subpermafrost wells, wells that are screened in groundwater below permafrost, provide the principal source of drinking water in the Northway area and range in depth from 90 ft to 340 ft below ground surface. A 265 foot deep subpermafrost drinking water well is located at the airport, approximately 2,000 ft southwest of the Ham Lake Site. This well was sampled in 1994 and did not contain contaminant concentrations that exceeded the ADEC cleanup levels.

Remedial Investigations (1994 - 1997)

Investigations were conducted in phases during this time period to evaluate the presence of contamination in soil and groundwater in the Ham Lake Area. Debris was inventoried, sediment and surface water samples were collected, and monitoring wells were installed. Soil and soil gas sampling was also conducted around the project site. Fuel related contaminants were detected in all media sampled.

Focused Feasibility Study (1996)

A Focused Feasibility Study (FFS) was prepared for the Ham Lake Site in 1996 to support the development of a Proposed Plan. The FFS used data available from the investigations to evaluate eight remedial alternatives for inclusion in the Proposed Plan. USACE developed the alternative cleanup levels (ACLs) using ADEC guidance that was available at the time. ACLs were established for diesel range organics (DRO), residual range organics (RRO), and benzene.

Proposed Plan (1997)

A Proposed Plan was prepared in 1997 to present the remedial action for contaminated soil at Ham Lake (Area 43) and the nearby Grease Pit (Area 27). The proposed plan recommended two remedial alternatives; Removal and Off Site Treatment, or Removal and On Site Treatment. The recommended remedial actions were completed during 1998 and 2001.

Soil Excavations (1998 and 2001)

Approximately 5,800 cubic yards of soil was excavated in 1998. The excavation surrounded the former AST area and fuel-contaminated soil was removed to groundwater, approximately 6 ft below ground surface. Annual groundwater monitoring began in 1999 for wells located within the Ham Lake area. In 2001, contaminated soil was excavated from the area around the former filling station, along the southern edge of the 1998 excavation. Approximately 780 cubic yards of benzene-contaminated soil was excavated. Confirmatory results indicate highest benzene concentration in the 2001excavation investigation was 0.84 mg/kg.

Focused Remedial Investigations (1999)

The 1999 RI was conducted to determine the impact of previous excavation activities on the surface water and sediments of Ham Lake, impact to groundwater of DRO and benzene in soil, and extent of DRO and benzene contamination remaining in soil at the site. Fuel components were found in lake sediments and groundwater. It was estimated that approximately 285 cubic yards of DRO contaminated soil and 870 cubic yards of benzene contaminated soil remained at the site. A layer of product approximately 1.8 feet thick was found in one monitoring well, but the source of the free product was not determined.

ROST Investigations (2003 and 2004)

Rapid optical screening tool (ROST) investigations were conducted by the USACE during 2003 and 2004 to further delineate the extent of remaining contamination at the site. The investigations determined that the bulk of the remaining fuel contaminated soil lies within the saturated zone, approximately 6 to 10 ft in depth.

Feasibility Study Report (2010)

A Feasibility Study was prepared to identify and evaluate remedial alternatives for the Ham Lake Site, Areas 40 and 43. The FS summarized previous site activities, identified remedial action objectives, evaluated applicable remedial technologies, and analyzed nine alternatives to address soil and groundwater contamination.

SITE CONTAMINANTS

Extent of Remaining Soil Contamination

Previous removal actions results indicated that contaminated soil remained along the north end of the excavation (nearest Ham Lake) following the 1998 soil removal with DRO concentrations up to 110,000 mg/kg. Contaminated soil also remained along the southern extent of the 2001 excavation, with benzene concentrations up to 0.84 mg/kg. Confirmation samples were not collected from below the water table so saturated zone contamination could not be evaluated.

The ROST investigation identified three continuous areas of remaining soil contamination as shown on Figure 3. The ROST investigations concluded the following regarding remaining soil contamination at the Ham Lake Site:

- Area 1A - This area was not excavated in 1998 due to the proximity of Ham Lake to the excavation boundary. The diesel impacted soils in this area is generally found between 2.5 and 6 ft bgs with an estimated volume of 1,000 cubic yards. The highest DRO concentration in the ROST investigation was 28,300 mg/kg.
- Area 1B - The bulk of the contamination at the Ham Lake Site now lies within the groundwater zone 6 to 10 ft bgs with an estimated volume of 2,800 cubic yards. The highest DRO concentration in the ROST investigation was 6,980 mg/kg.
- Area 2 - Contaminated soil near MW-1B appears to be very limited in nature and extent and is approximately 5 to 7 ft bgs with an estimated volume of 200 cubic yards. The highest benzene concentration in the 2001excavation investigation was 0.84 mg/kg.
- Area 3 - Fuel impacted soils near MW-07 ranged in depth from 1.3 to 7.5 ft bgs with an estimated volume of 1,000 cubic yards. The highest DRO concentration in the ROST investigation was 7,050 mg/kg.

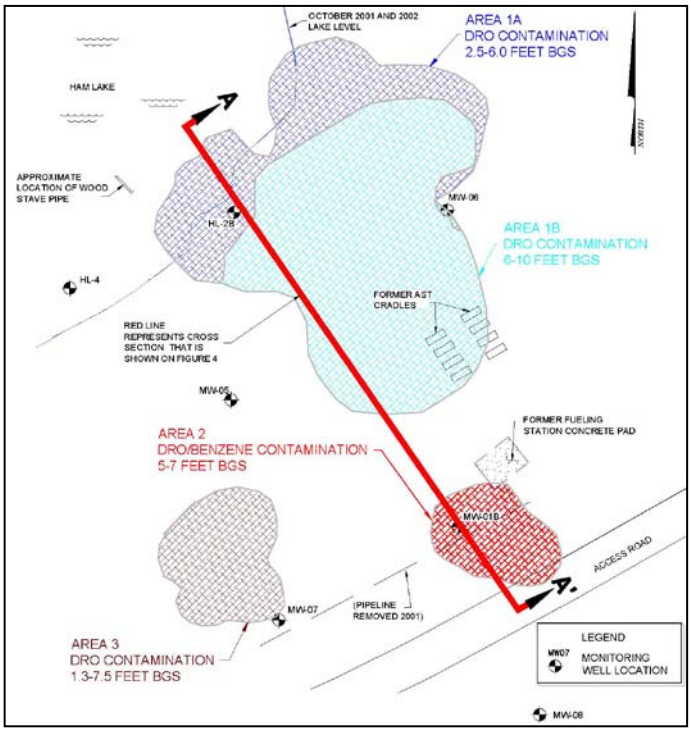


Figure 3 Remaining Contaminated Soil at the Ham Lake Site

Utilizing the results of the confirmation sampling and the ROST investigation, sectional views identifying regions of contaminated soil were created. Figure 4 shows a north-south section through Areas 1 and 2.

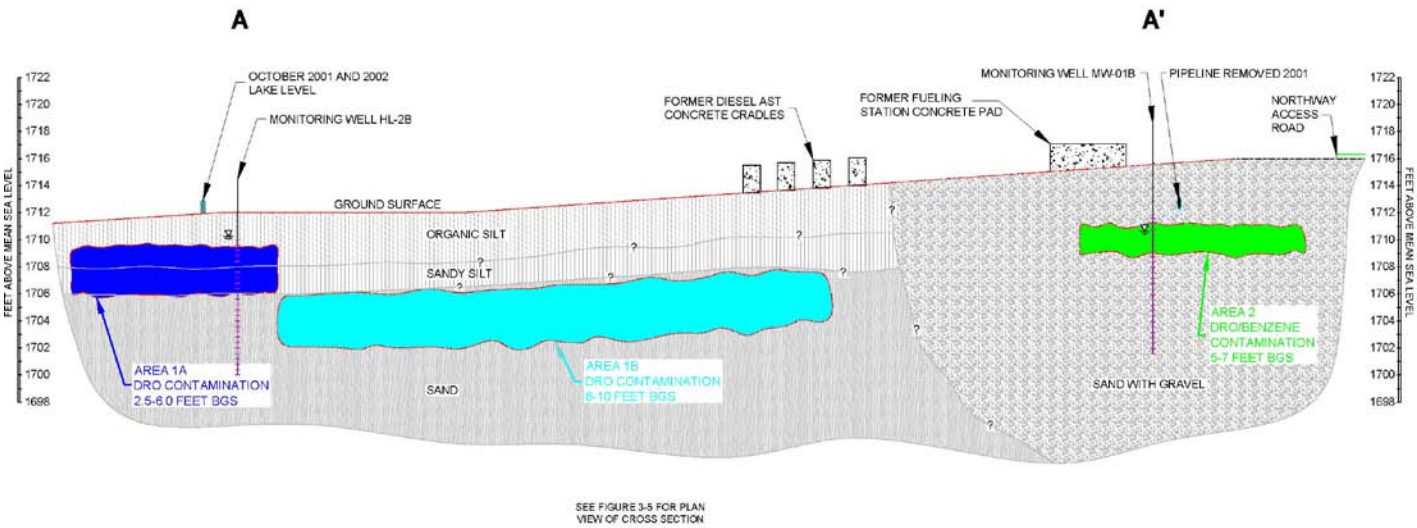


Figure 4 Conceptual Site Model - Cross Section of Contaminated Soil at the Ham Lake Site

Extent of Remaining Groundwater Contamination

The contaminated groundwater plume is relatively well delineated, with the exception of defining the easterly extent of the DRO groundwater plume. In 2010 there were two wells that exceeded the ADEC cleanup levels for DRO concentrations. Four wells have historically had DRO concentrations exceeding the ADEC cleanup level of 1.5 mg/L with concentrations up to 20.8 mg/L. Since the easterly extent of the DRO plume is not well delineated, it is difficult to accurately estimate the plume extent exceeding the ADEC cleanup level. The DRO plume exceeding 5 mg/L covers approximately 35,000 square feet and is shown on Figure 5.

One well (MW-01B) has had benzene concentrations up to 0.296 mg/L, exceeding the ADEC cleanup level of 0.005 mg/L. Benzene concentrations in this well have apparently rebounded in the past few years after decreasing following the 2001 excavation in this area. Benzene contamination is only detected in well MW-01B, where the former fueling station was located.

Rapid Optical Screening Tool (ROST)

ROST technology sends ultraviolet (UV) light through optical fibers that are strung through hollow direct push steel rods. The light reflects off a tiny mirror within the probe and as the probe is advanced, soil sliding past the window becomes exposed to UV light. Contaminant compounds will fluoresce and the fluorescence response is then analyzed. Hydrocarbon bonds will fluoresce at different wavelengths. These unique patterns are the 'fuel signatures' of the petroleum hydrocarbon within the soil matrix and can be used to differentiate differing petroleum contaminants (such as diesel, gasoline, coal tar, etc).

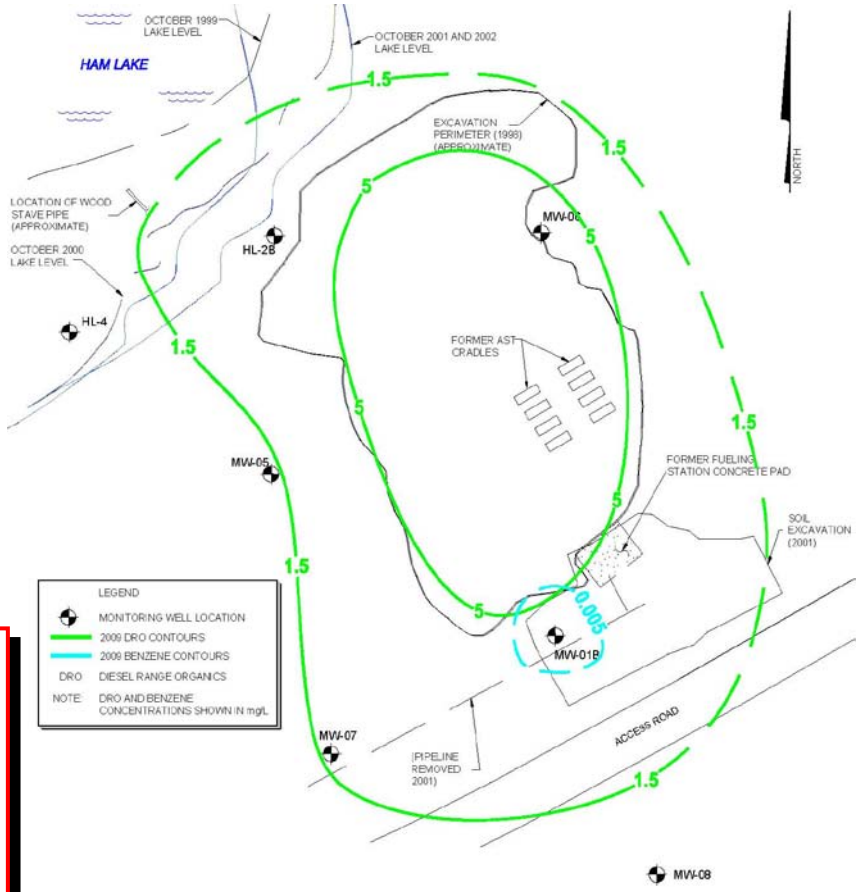


Figure 5 Extent of Remaining Groundwater Contamination at the Ham Lake Site

SUMMARY OF SITE RISKS

The 1996 RI sampling results were used to evaluate the risk to human health and the environment associated with contaminants found at the site. The potential for human health effects associated with contacting the soil or inhaling the contaminants in the contaminated area was measured in two ways: excess cancer risk and hazard index (HI). The 1999 RI sampling results helped to resolve data gaps and complete the risk assessment.

Potential exposure pathways include the ingestion of contaminated groundwater, soil, or sediments, dermal contact with contaminated groundwater, soil, or sediments, ingestion or dermal contact with contaminated surface water, and inhalation of volatilized contaminants in outdoor air. Potential receptors at the Ham Lake Site include future residents, future commercial, industrial, or construction workers, site visitors, trespassers, and recreational users, and subsistence harvesters or consumers.

Human Health Risk Assessment

The cancer risk level is the additional chance that an individual exposed to a contaminant for a long period (30 years) will develop cancer over the course of a lifetime. It is expressed as a probability such as $1x10^{-6}$ (one in a million). Typically, the Environmental Protection Agency (EPA) requires an action when risks exceed the range of $1x10^{-4}$ to $1x10^{-6}$. State of Alaska cleanup levels are based on a cancer risk of 1×10^{-5}. The hazardous index (HI) estimates the likelihood that exposure to the contaminant will cause some health effect other than cancer. If the HI score is less than 1.0, then health effects are not expected at the site.

The most significant exposure at the Ham Lake site was found to be through soil ingestion and soil vapor inhalation assuming a house or building were placed on top of the contaminated soil. The chemicals associated with these risks are some of the volatile components of diesel fuel. The HI for the Ham Lake site, assuming someone living, recreating, and harvesting food directly on site, is 87. Likewise, the cancer risk is $1x10^{-4}$. Based on the exposure potential of these chemicals it was decided to clean up the contaminants that could lead to significant exposure.

Alternate risk-based soil cleanup levels were developed for the Ham Lake Site during the 1999 RI based on residential exposure assumptions. Although groundwater exists above permafrost beneath the site, it is not likely that it would ever be used for drinking water purposes. Based on this and the fact that drinking water wells near the Ham Lake Site are completed in groundwater that is below permafrost, human health risk screening of shallow groundwater and surface water at the Ham Lake site was performed using 1999 ADEC non-drinking water criteria. The concentrations of all petroleum constituents measured in Ham Lake surface water and sediments were below human health cleanup levels in 2000. In 2010, groundwater concentrations for DRO ranged from 0.457 to 5.1 mg/L; RRO ranged from 0.421 to 2.73 mg/L; and benzene ranged from non-detect to 0.00236 mg/L.

Ecological Risk Assessment

An ecological risk assessment was conducted to determine if contaminated soil at Ham Lake poses a significant risk to the ecosystem. Results of the ecological risk assessment indicated that it is unlikely the contamination found in the soil at Ham Lake will have an adverse effect on the environment.

Concentrations of petroleum-related constituents in surface water and sediment samples collected from Ham Lake were below available clean up levels for the protection of aquatic life. These findings suggest that the residual levels of petroleum contamination in soils associated with the site are not significantly impacting aquatic life in Ham Lake. However, drinking, agriculture, and water recreation require that contaminants do not cause a visible sheen on the surface of the water. During annual groundwater sampling events, observations of the lake surface have not identified the presence of sheens

Drinking water usage of surface water is also subject to the 18 AAC 75 Table C groundwater cleanup levels. Aquaculture and aquatic life usage requires that the total aqueous hydrocarbons (TAqH) concentration in the water column may not exceed 15 µg/l. Total aromatic hydrocarbons (TAH) in the water column may not exceed 10 µg/l. Five surface water samples collected during the 2000 RI had non-detectable TAH concentrations; and TAqH concentrations ranging from 0.005 to 0.024 ug/L, all below the July 2008 AWQS 18 AAC 70 standards.

Risk Associated with Subsistence Activities

The shallow depth of soil contamination could potentially impact subsistence activities. However, the most heavily contaminated soils are greater than two feet deep so the transport of contaminated soils during rain events is not considered an exposure pathway. The outdoor inhalation pathway is a minor concern in Area 40 where benzene contamination is present.

Unacceptable Risk to Human Health

The contaminant of concern is DRO based on the 2005 ROST report with an analytical sample with the maximum concentration of 28,300 mg/kg. The soil sample location is near well HL-2B. Currently the land is not being used by the landowner. Assuming that the appropriate Institutional Controls are adopted and enforced there would not be unacceptable risk to human health and the environment.

Potential Future Land Use Restrictions

The area surrounding Ham Lake is currently owned by the AKDOT making it unlikely that the site would ever be

developed for residential or commercial purposes. AKDOT does not expect the land use around Ham Lake to change. AKDOT has agreed to adopt the land use restrictions associated with the institutional controls that are included in several of the recommended remedial alternatives. As a result of land use restrictions it is unlikely that the site would be developed for residential or commercial purposes, limiting human receptors to subsistence and recreational users. The land use restrictions will also prevent use of groundwater at the site.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are goals the remedial alternatives are designed to achieve. For this site the remedial action objectives are to be protective of human health and the environment. Protectiveness may be achieved by reducing exposure to the contaminated media, as well as through reduction of contaminant concentrations. Specifically, the objectives are to reduce contaminant levels to below ADEC cleanup levels and prevent human exposure to contaminated soil and groundwater above ADEC cleanup levels.

The cleanup objectives for the Ham Lake Site are established to be protective of human health and the environment, and to comply with Federal, State and local laws and regulations.

The primary contaminant of concern at the Ham Lake Site is DRO, due to its widespread presence in soil and groundwater at the site. Benzene also exceeds the ADEC cleanup level in soil and groundwater in a relatively small area and RRO has been detected after the RI above cleanup levels in three wells.

As part of the remedial investigation process, the levels of contaminants are compared to State cleanup criteria. The ADEC regulates the cleanup of contaminated sites and has established soil and groundwater cleanup levels in Title 18 of the Alaska Administrative Code, Chapter 75 (18 AAC 75). The selected cleanup criteria for soils were taken from the Table B1 and Table B2 soil cleanup levels in 18 AAC 75, based on the Under 40-Inch Zone.

Soil

18 AAC 75 specifies different cleanup levels depending upon the applicable exposure pathway. For petroleum hydrocarbons there are three categories; ingestion, inhalation, and migration to groundwater. For other contaminants like benzene, the exposure pathways are categorized as direct contact, outdoor inhalation, and migration to groundwater.

Since the groundwater at the Ham Lake Site is relatively shallow and is in contact with contaminated soil, remedial alternatives are evaluated based on the more conservative migration to groundwater pathway cleanup levels. The cleanup levels for the migration to groundwater pathway in the under-40-inch precipitation zone are 250 mg/kg for DRO and 11,000 mg/kg for RRO. The migration to groundwater pathway cleanup level for benzene is 0.025 mg/kg.

Groundwater

The 18 AAC 75 Table C groundwater cleanup levels for DRO, RRO, and benzene are 1.5 mg/L, 1.1 mg/L, and 0.005 mg/L, respectively.

Cleanup Goals for the Ham Lake Site are presented in the following table.

Table 1 Cleanup Goals for Contaminants of Concern

Contaminants of Concern	Soil Cleanup Goals	Groundwater Cleanup Goal
Benzene	0.025 mg/kg	0.005 mg/L
Diesel Range Organics (DRO)	250 mg/kg	1.5 mg/L
Residual Range Organics (RRO)	11,000 mg/kg	1.1 mg/L

REMEDIAL ALTERNATIVES

Soil and groundwater treatment technologies were combined to create nine remedial alternatives as presented in the 2010 Feasibility Study. These alternatives were further evaluated against United States EPA guidance criteria and were ranked appropriately. The remedial action alternatives are analyzed using the evaluation criteria outlined in the EPA's National Contingency Plan (NCP) (Table 2). Each alternative is evaluated relative to the others based on the nine criteria.

Alternative 1. No Action

This alternative involves no action or costs at the site; it is used as a baseline for comparison to the active remedial alternatives at the site. Although natural processes may reduce hydrocarbon contamination to acceptable levels over time, this alternative does not include any long-term monitoring or modeling at the site.

Alternative 2. Soil: Institutional Controls; Groundwater: Institutional Controls with MNA

In Alternative 2 the contaminated soil will be left in place, and Institutional Controls (ICs) will be implemented that limit excavation work within the contaminated areas. ICs that limit access to the contaminated aquifer will also be put in place. Contaminant degradation in the groundwater would be monitored using monitored natural attenuation (MNA).

The following assumptions were made in estimating the cost for implementing this alternative:

- ICs would include deed restrictions limiting development of the site and preventing usage of groundwater.
- ICs would also include the provision for appropriate signage and public notifications.
- Groundwater monitoring would be conducted at three year intervals and MNA of the groundwater would be conducted for 30 years.
- IC inspections and reporting would continue until RAOs are met or throughout the 30 year timeframe, after which the remedy would be re-evaluated.

The total estimated present worth cost of Alternative 2 is $271,000.

Institutional Controls (ICs)
Institutional controls limit human exposure to the contaminated soil and groundwater. The types of ICs appropriate to this site include signs and deed restrictions preventing excavation and other construction activities. Institutional controls are often used in combination with other general response actions. The ICs will include routine inspection, monitoring and reporting to verify they are being maintained and are effective. Prior to any soil removal or construction activities DEC must grant approval.

Monitored Natural Attenuation (MNA)
Natural attenuation consists of naturally occurring destructive and non-destructive processes that act to reduce dissolved contaminant concentration in groundwater. Biologic activity is the primary destructive process. For hydrocarbon contamination, both aerobic and anaerobic biological processes are important degradation mechanisms.

Alternative 3. Soil: Removal of Contaminated Soil in All Areas and Thermal Treatment; Groundwater: Institutional Controls with MNA

In Alternative 3, all contaminated soil will be excavated and thermally treated at an off-site Low Temperature Thermal Desorption (LTTD) facility. ICs limiting future access to the contaminated aquifer will be put in place. Contaminant degradation in the groundwater would be monitored using MNA.

The following assumptions were made in estimating the cost for implementing this alternative:

- The limits of the contaminated soil to be excavated would be based upon the ROST investigations and confirmation sampling conducted following previous soil excavations.
- Removal of contaminated soil would require dewatering. Water removed during dewatering would be treated onsite through activated carbon and discharged outside of the excavation area. Sheet piles would be driven on the lakeside of the excavation to prevent water infiltration from Ham Lake.
- Soil would be thermally treated at the Organic Incineration Technology, Inc (OIT) facility in Moose Creek, Alaska. Locally available material would be used for backfill.
- ICs would include deed restrictions limiting development of the site and preventing usage of groundwater. ICs would also include the provision of appropriate signage and public notifications. The ICs may be removed from the site once cleanup goals are achieved.
- MNA for the groundwater would be conducted biennially for 10 years to evaluate contaminant degradation.

The total estimated present worth cost of Alternative 3 is $3,083,000.

Alternative 4. Soil: Removal of Contaminated Soil in All Areas and Biocell Treatment; Groundwater: Institutional Controls with MNA

Alternative 4 is similar to Alternative 3 except that the contaminated soil would be excavated and treated on site using a biocell. Contaminant degradation in the groundwater would be monitored using MNA.

The following assumptions were made in estimating the cost for implementing this alternative. Excavation and dewatering assumptions are the same as the Alternative 3 assumptions:

- Soil would be treated in a biocell constructed on site. Treatment would be completed within 5 years based upon the results from the Ex-Situ Treatment Cell at the Northway Site.
- Annual soil sampling would evaluate the effectiveness of the biocell. Upon achievement of treatment goals the cell would be decommissioned and the soil spread on site.
- MNA for groundwater would be conducted biennially for 10 years to evaluate contaminant degradation.
- ICs would include deed restrictions limiting development of the site and preventing usage of groundwater. ICs would also include the provision of appropriate signage and public notifications. The ICs may be removed from the site once cleanup goals are achieved.

The total estimated present worth cost of Alternative 4 is $3,115,000. Operation and maintenance (O&M) costs for this alternative are associated with operation of the biocell.

Alternative 5. Soil: Removal of Soil from Area 2 only (benzene contaminated soil) and Thermal Treatment. Institutional Controls in Other Areas; Groundwater: Institutional Controls with MNA

In Alternative 5 the contaminated soil within Area 2 (benzene contaminated area) would be excavated and thermally treated off-site. ICs would be maintained for contaminated soil in

other areas of the site. Contaminant degradation in the groundwater would be monitored using MNA.

The following assumptions were made in estimating the cost for implementing this alternative. Excavation and dewatering assumptions are the same as Alternative 3 assumptions:

- Soil would be thermally treated at the OIT facility in Moose Creek, Alaska. Locally available material would be used for backfill.
- MNA for groundwater would be conducted for 30 years. Groundwater monitoring would be conducted at three year intervals.
- ICs would include deed restrictions limiting development of the site and preventing usage of groundwater. ICs would also include the provision of appropriate signage and public notifications. The ICs may be removed from the site once cleanup goals are achieved.

The total estimated present worth cost of Alternative 5 is $553,000.

Remedial Alternative Development

The following discusses the treatment technology options that were included in the remedial alternatives.

Institutional Controls for Soil *– This would involve instituting deed restrictions for future use of the site and erecting signage to identify the site hazards.*

Institutional Controls for Groundwater with MNA *– Deed restrictions for use of groundwater at the site would be instituted. Groundwater monitoring would be conducted periodically to evaluate natural attenuation at the site.*

Removal of Contaminated Soil in All Areas of the Site with Thermal Treatment *– Contaminated soil would be excavated and transported off-site for thermal treatment. Since a significant portion of the contaminated soil lies beneath the water table, the excavation would require dewatering. Contaminated soil present in close proximity to Ham Lake would require the installation of a sheet pile fence to prevent infiltration of surface water during excavation.*

Removal of Contaminated Soil in All Areas of the Site with Biocell Treatment *– This treatment option would be similar to the preceding option except that soils would be treated on-site in a biocell. The expected large size of the cell and lower permeable soils at the Ham Lake site present technical challenges.*

Removal of Contaminated Soil Above the Water Table in All Areas of the Site with Thermal Treatment *– This soil treatment option would remove only contaminated soil above the water table. This option would eliminate the need for dewatering.*

Removal of Contaminated Soil in Area 2 with Thermal Treatment *– This treatment option would remove contaminated soil, including benzene contaminated soil, from Area 2. The goal of this treatment option is to eliminate benzene as a contaminant of concern from the site.*

In-Situ Bioremediation of Groundwater *– In-situ bioremediation of groundwater would involve the application of an oxygen releasing chemical to the subsurface to promote the biodegradation of contaminants.*

Alternative 6. Soil: Removal of Contaminated Soil in All Areas from Above the Water Table and Thermal Treatment; Groundwater: In-Situ Bioremediation of All Areas and Institutional Controls

In Alternative 6 the contaminated soil above the water table would be excavated and thermally treated. Contaminant degradation in groundwater would be monitored using MNA.

The following assumptions were made in estimating the cost for implementing this alternative. Excavation assumptions are the same as the Alternative 3 assumptions:

- Soil would be thermally treated at the OIT facility in Moose Creek, Alaska. Locally available material would be used for backfill.
- An oxygen releasing chemical would be applied as a powder across the excavated area prior to backfilling.
- Groundwater sampling would be conducted biennially for 10 years to evaluate contaminant degradation.
- ICs would include deed restrictions and provisions for appropriate signage and public notifications. ICs may be removed from the site once cleanup goals are achieved.

The total estimated present worth cost of Alternative 6 is $1,782,000.

Alternative 7. Soil: Removal of Soil from Area 2 (benzene contaminated area) and Thermal Treatment, Institutional Controls in Other Areas; Groundwater: In-Situ Bioremediation of Area 2 only (benzene contaminated area), Institutional Controls with MNA in Other Areas

In Alternative 7 the contaminated soil above the water table in Area 2 (benzene contaminated soil) would be removed and thermally treated off-site. ICs would be implemented in other soil contaminated areas and would limit access to the contaminated groundwater. In-situ biodegradation would be conducted in Area 2 by applying an oxygen releasing chemical in the excavated area prior to backfilling. MNA would be conducted to monitor groundwater contaminant degradation.

The following assumptions were made in estimating the cost for implementing this alternative: Excavation assumptions are the same as the Alternative 3 assumptions:

- Soil would be thermally treated at the OIT facility in Moose Creek, Alaska. Locally available material would be used for backfill.
- An oxygen releasing chemical compound would be applied across Area 2 excavation prior to backfilling.
- MNA for groundwater would be conducted for 30 years in other areas of the site. Groundwater monitoring would be conducted at three year intervals.
- ICs would include deed restrictions limiting development of the site and preventing usage of groundwater. ICs would also include the provisions for appropriate signage and public notifications. ICs may be removed once cleanup goals are achieved.

The total estimated present worth cost of Alternative 7 is $600,000.

Alternative 8. Soil: Institutional Controls; Groundwater: In-Situ Bioremediation of All Areas and Institutional Controls

In Alternative 8 the contaminated soil would be left in place, and ICs limiting excavation work within the contaminated areas would be implemented. In-situ bioremediation would be conducted on contaminated groundwater in all areas of the site. Institutional controls limiting access to the contaminated groundwater would be put in place until treatment goals are achieved. Contaminant degradation in the groundwater would be monitored using MNA.

The following assumptions were made in estimating the cost for implementing this alternative.

- An oxygen releasing chemical would be injected across the contaminated groundwater plume in all contaminated areas. The chemical would be injected on a 10 foot by 10 foot grid. A single injection event is assumed to be effective in treating the contaminated groundwater.
- MNA for groundwater would be conducted biennially for 10 years to evaluate contaminant degradation.
- ICs would include deed restrictions and provisions for appropriate signage and public notifications. ICs may be removed from the site once cleanup goals are achieved.

The total estimated present worth cost of Alternative 8 is $906,000.

Alternative 9. Soil: Institutional Controls; Groundwater: In-Situ Bioremediation of Area 2 (benzene contaminated area) only, Institutional Controls with MNA in Other Areas

In Alternative 9 the contaminated soil would be left in place, and ICs limiting excavation work within the contaminated areas would be implemented. In-situ bioremediation would be conducted for contaminated groundwater within Area 2. Institutional controls limiting access to the contaminated groundwater would be put in place. Contaminant degradation in the groundwater would be monitored using MNA.

The following assumptions were made in estimating the cost for implementing this alternative.

- An oxygen releasing compound would be injected across the contaminated groundwater plume within Area 2. The chemical would be injected on a 10 foot by 10 foot grid. A single injection event is assumed to be effective in treating the contaminated groundwater.
- MNA for groundwater would be conducted for 30 years at three year intervals to continue to evaluate contaminant degradation.
- ICs would include deed restrictions and provisions for appropriate signage and public notifications. ICs may be removed from the site once cleanup goals are achieved.

The total estimated present worth cost of Alternative 9 is $465,000.

EVALUATION OF REMEDIAL ALTERNATIVES

Remedial action alternatives were developed for the site and discussed in detail in the Feasibility Study. The Feasibility Study defines remedial action objectives, volume of impacted media to be addressed, and potential methods for addressing the impacted area. The following provides a summary of remedial action alternative evaluation.

Table 2 Remedial Alternative Evaluation Criteria

Criteria Type	Evaluation Criteria	Definition
Threshold Criteria	Protective of human health and the environment	Protection of both human health and the environment is achieved through the elimination, reduction, or control of exposures to contaminated media. All migration pathways must be addressed.
	Compliance with Cleanup Levels	Attainment cleanup levels under federal environmental laws and state environmental of facility siting laws, or provide grounds for invoking applicable waivers.
Balancing Criteria	Long-term effectiveness and permanence	Protects human health and the environment after the remedial objectives have been met.
	Reduction in toxicity, mobility, or volume through treatment	The degree to which recycling or treatment reduces the toxicity, mobility, or volume of the contaminated media.
	Short-term effectiveness	Protects human health and the environment during construction and implementation. Degree of threat and the time period to achieve RAOs are also considered.
	Implementability	The ease or difficulty of implementing the alternative. Considers technical and administrative feasibility as well as the availability of services and materials.
	Cost	Costs include design, construction, startup, and present-worth costs for long-term monitoring and maintenance. Accuracy to within –30% and +50% (EPA, 2000).
Modifying Criteria	State Acceptance	The state's position and key concerns related to the preferred alternatives.
	Community Acceptance	The community's preferences for or concerns about alternatives.

These alternatives were evaluated against United States EPA guidance criteria and were ranked appropriately. The remedial action alternatives are analyzed using the evaluation criteria outlined in the EPA's NCP. Each alternative was evaluated relative to the others based on the nine NCP criteria. The preferred alternative was selected considering cost, acceptable risk, and resulting potential ecological damage.

Table 3 summarizes the scores for each of the alternatives. Alternatives 3 and 6 had the highest scores but also had the higher costs. Variations of these alternatives have been implemented in the past and have not achieved cleanup levels. Current site use favors Alternative 2 as it has the lowest cost with acceptable risk assuming that implementation of ICs are successful.

Table 3 - Summary of Ham Lake Site Remedial Alternative Evaluation

Remedial Alternative	NCP Evaluation Criteria Total Score	Estimated Present Worth (in thousands)
Alternative 1 No Action	14	$0
Alternative 2 Soil: Institutional Controls Groundwater: Institutional Controls with MNA	14.5	$271
Alternative 3 Soil: Contaminated Soil Removal from all Areas and Thermal Treatment Groundwater: ICs with MNA	18	$3,083
Alternative 4 Soil: Contaminated Soil Removal from all Areas and Biocell Treatment Groundwater: ICs with MNA	15	$3,115
Alternative 5 Soil: Contaminated Soil Removal from Area 2 and Thermal Treatment, ICs in Other Areas Groundwater: ICs with MNA	15.5	$553
Alternative 6 Soil: Contaminated Soil Removal Above the Water Table from All Areas and Thermal Treatment Groundwater: *In-Situ* Bioremediation of Groundwater in All Areas	21	$1,782
Alternative 7 Soil: Contaminated Soil Removal Above the Water Table from Area 2 and Thermal Treatment. ICs in Other Areas. Groundwater: *In-Situ* Bioremediation of Groundwater in Area 2. ICs with MNA in Other Areas	15	$600
Alternative 8 Soil: ICs Groundwater: *In-Situ* Bioremediation of Groundwater in All Areas	17.5	$906
Alternative 9 Soil: ICs Groundwater: *In-Situ* Bioremediation of Groundwater in Area 2. ICs with MNA in Other Areas	16	$465

PREFERRED ALTERNATIVE

The preferred alternative for the Ham Lake FUDS Site is **Alternative 2, Institutional Controls for Soil and Institutional Controls with Monitored Natural Attenuation for Groundwater**.

In Alternative 2 the contaminated soil will be left in place, and Institutional Controls (ICs) will be implemented that limit excavation work within the contaminated areas. ICs that limit access to the contaminated aquifer will also be put in place. Contaminant degradation in the groundwater would be assessed using monitored natural attenuation (MNA).

There have been significant contaminated soil excavations and treatment efforts previously completed at the Ham Lake site. Essentially, all contaminated soil above the groundwater table and outside of the limits of Ham Lake has been excavated and treated. These removal actions meet the preference for treatment under CERCLA. The MNA and IC's are the follow on to the removal actions to assure protectiveness.

The AKDOT has agreed to adopt the land use restrictions that is included as part of Remedial Alternative 2. AKDOT does not expect the land use around Ham Lake to change. The institutional controls will both educate the land owners and lease holders and inform the public. Natural attenuation will continue to reduce the petroleum contamination over time. Groundwater monitoring would be conducted at three year intervals and MNA of the groundwater would be conducted for 30 years. The long-term monitoring will verify that the concentrations are decreasing. The estimated cost to implement Alternative 2 is $271,000.

Institutional Controls

This approach limits potential for risk to public and the environment from unnecessary invasive actions. Notification to the landowner will include the rationale for this determination as well as a description of the contamination remaining at the site, the spatial location of the contamination (including the coordinate system, datum, and units), the depth and lateral extent of the contamination, the potential health risks associated with the contaminants, and the activities to avoid and prevent exposure. A copy of this notification will be provided to ADEC.

The landowner will be requested to implement deed notice to document areas with residual contamination, properly manage excavated soil in accordance with 18 AAC 75.325, and restrict installation of drinking water wells.

The landowner will be requested to provide, on a five year basis, confirmation of existing land use. The landowner will also be requested to provide immediate notification to ADEC in the event of planned land use change in order to appropriately manage existing residual contamination. These activities collectively comply with 18 AAC 75.375 and shall hereinafter be referred to as "Institutional Controls." This will assist the landowner in managing the land and residual contamination properly in the future.

The need for landowner management of residual contamination will be removed if future site investigations are undertaken that determine that natural attenuation processes have reduced contaminant concentrations to below the ADEC Method Two cleanup levels.

COMMUNITY PARTICIPATION

The public is encouraged to provide comments on any of the alternatives presented in this Proposed Plan for the Ham Lake Site in Northway, Alaska.

The public comment period ends October 27, 2011.

Comments can be submitted to USACE by any of the following methods:

- Mail or email a written comment to the following address.

NAME:	**David Jadhon (CEPOA-PM-ESP)**
ADDRESS:	**P.O. Box 6898**
CITY, STATE, ZIP	**Elmendorf AFB, Alaska 99506-0898**
David.A.Jadhon@usace.army.mil	

For your convenience, the last page of this document provides an area for you to write out your comments. The return address has been provided on the back of this page so that it can be folded, stapled, stamped and placed in the mailbox.

- Leave a recorded message by calling:

PHONE NUMBER: 907-753-2595

- Attending the public meeting

DATE	**September 27, 2011**
TIME	**2:00 PM**
PLACE	**Village of Northway Community Center**

A final decision for the site will be made only after all public comments are considered. USACE will provide a written response to all significant comments. A summary of the responses will accompany the Decision Document and will be made available in the Administrative Record and at the Walter Northway School Library in Northway, Alaska.

ACRONYMS

AAC	Alaska Administrative Code
ACL	Alternative Cleanup Level
ADEC	Alaska Department of Environmental Conservation
AKDOT	Alaska Department of Transportation
AST	aboveground storage tank
bgs	below ground surface
DRO	diesel range organics
EPA	United States Environmental Protection Agency
FES	Fairbanks Environmental Services
FFS	Focused Feasibility Study
FS	Feasibility Study
ft	Feet
FUDS	Formerly Used Defense Site
IC	Institutional Controls
ISCO	In-Situ Chemical Oxidation
LTTD	Low Temperature Thermal Desorption
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
µg/L	micrograms per liter
MNA	Monitored natural attenuation
NCP	National Contingency Plan
O&M	Operations and maintenance
OIT	Organic Incineration Technology
POL	Petroleum, oils and lubricants
RAO	Remedial action objective
RI	Remedial Investigation
ROST	Rapid Optical Screening Tool
SVE	Soil vapor extraction
TAH	Total Aromatic Hydrocarbons
TAqH	Total Aqueous Hydrocarbons
TSD	Treatment Storage Disposal Facility
USACE	United States Army Corps of Engineers

GLOSSARY

Administrative Record The legal file of documents upon which any decision regarding contaminated sites is based. It contains site documents, newsletters, the Community Relations Plan, and other supporting documentation that may be used by federal, state, and local government agencies and private parties to determine appropriate actions for each contaminated site.

ADEC Alaska Department of Environmental Conservation. The state of Alaska government agency responsible for environmental quality regulation and enforcement.

EPA United States Environmental Protection Agency

FS Feasibility Study. A study of the results of the remedial investigation to establish criteria for the cleanup and to identify and evaluate cleanup alternatives for a site.

Proposed Plan A document prepared to inform the public about alternatives being considered for cleaning up a contaminated site. It identifies which alternative or alternatives have been proposed as the preferred alternative(s). The document encourages public comment on all alternatives.

Responsiveness Summary A summary of oral and/or written public comments received during a comment period and the responses to those comments.

RI Remedial Investigation. An investigation conducted to determine sufficient information on the nature and extent of contamination at a site necessary to identify cleanup alternatives.

Decision Document Documentation of the selected remedy for a site and the rationale for its selection.

USE THIS SPACE TO WRITE YOUR COMMENTS

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

If you would like to mail your comments, you may use the space below to prepare 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 27, 2011**. If you have questions about the comment period, please contact David Jadhon at (907) 753-2595 or by email at David.A.Jadhon@usace.army.mil.

Name _____
Address _____
City _____
State _____ Zip _____

PUBLIC COMMENT SHEET

Fold along dashed lines, staple, stamp, and mail.

Name _____
Address _____
City _____
State _____ Zip _____

PLACE
STAMP
HERE

US Army Corps of Engineers
David Jadhon (CEPOA-PM-ESP)
P.O. Box 6898
Elmendorf AFB, Alaska 99506-0898