

***FINAL***  
**ACTION MEMORANDUM**  
**FOR**  
**FORMER PISTOL RANGE AND**  
**LHAAP-04, FORMER PILOT WASTEWATER TREATMENT PLANT**  
**LONGHORN ARMY AMMUNITION PLANT**  
**KARNACK, TEXAS**

---



**Prepared for**  
**U.S. Army Corps of Engineers**  
**Tulsa District**  
**1645 South 101st Avenue**  
**Tulsa, Oklahoma**

**Prepared by**  
**Shaw Environmental, Inc.**  
**3010 Briarpark, Suite 400**  
**Houston, Texas 77042**

**MARC No. W912QR-04-D-0027, Shaw Project No. 117591**  
**Task Order No. DS02**

**July 2009**

## Table of Contents

---

Acronyms and Abbreviations .....	ii
1.0 Purpose .....	1
1.1 Introduction and Purpose .....	1
1.2 Statement of Basis .....	1
2.0 Site Conditions and Background .....	2
2.1 Site Description .....	2
2.2 Current and Future Land Use .....	4
2.3 Previous Actions .....	4
2.4 Federal, State, and Local Authorities' Roles (Coordination Summary) .....	5
3.0 Threats to Public Health or Welfare or the Environment, and Statutory and Regulatory Authorities ..	5
4.0 Endangerment Determination .....	6
5.0 Proposed Actions and Estimated Costs .....	6
5.1 Former Pistol Range .....	6
5.1.1 Alternative 1 – No Action .....	6
5.1.2 Alternative 2 – Land Use Controls .....	6
5.1.3 Alternative 3 – Excavation and Off-site Disposal .....	7
5.2 LHAAP-04, Former Pilot Wastewater Treatment Plant .....	7
5.2.1 Alternative 1 – No Action .....	7
5.2.2 Alternative 2 – Excavation and Off-site Disposal .....	7
5.3 Selection Criteria .....	8
5.4 Recommended Selected Action .....	8
5.4.1 Former Pistol Range .....	9
5.4.2 LHAAP-04, Former Pilot Wastewater Treatment Plant .....	9
5.5 Trade Off Analysis .....	10
5.5.1 Former Pistol Range .....	10
5.5.2 LHAAP-04, Former Pilot Wastewater Treatment Plant .....	11
6.0 Expected Change in the Situation Should Action Be Delayed or Not Taken .....	12
7.0 Outstanding Policy Issues .....	12
8.0 Enforcement .....	12
9.0 Highlights of Community Participation .....	13
10.0 Recommendation .....	13
11.0 References .....	15

## Acronyms and Abbreviations

---

ACE	Anderson Columbia Environmental
ARAR	applicable or relevant and appropriate requirements
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
GW-Ind	groundwater MSC for industrial use
GWP-Ind	soil MSC for industrial use based on groundwater protection
Jacobs	Jacobs Engineering Corporation
LHAAP	Longhorn Army Ammunition Plant
LUC	land use controls
MARC	Multiple Award Remediation Contract
mg/kg	milligrams per kilogram
MSC	medium-specific concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PBC	performance based contract
RAB	Restoration Advisory Board
RAOs	removal action objectives
RCRA	Resource Conservation and Recovery Act
SAI-Ind	soil MSC for industrial use based on inhalation, ingestion, and dermal contact
Shaw	Shaw Environmental, Inc.
STEP	Solutions to Environmental Problems
TCEQ	Texas Commission on Environmental Quality
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

## 1.0 Purpose

---

### 1.1 Introduction and Purpose

The U.S. Army Corps of Engineers (USACE) contracted Shaw Environmental, Inc. (Shaw), under the Multiple Award Remediation Contract (MARC) Number W912QR-04-D-0027, Task Order No. DS02, to perform remediation activities associated with Site Closure of Multiple Sites at the former Longhorn Army Ammunition Plant (LHAAP) in Karnack, Texas, a Federally-owned facility managed by the U.S. Army under the U.S. Department of Defense (DoD). As part of the activities associated with that task order, Shaw has prepared Engineering Evaluations/Cost Analyses (EE/CAs) for the former Pistol Range at LHAAP (Shaw, 2009a) and for the LHAAP-04, Former Pilot Wastewater Treatment Plant (Shaw, 2009b). This Action Memorandum documents selection of the non-time-critical removal actions recommended in the EE/CAs for the former Pistol Range and LHAAP-04 sites at LHAAP, Karnack, Harrison County, Texas.

### 1.2 Statement of Basis

The U.S. Army Environmental Command provides funding and oversight for the environmental response activities at LHAAP. The U.S. Army Base Realignment and Closure (BRAC) Division is the lead DoD organization for execution of environmental response at the LHAAP.

The removal action alternatives that will be implemented at the former Pistol Range and LHAAP-04 were developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] Part 300).

#### Former Pistol Range

The removal action objective (RAO) for the former Pistol Range can be described as follows:

- Minimize the potential for human contact with soil containing lead at concentrations that could adversely affect future maintenance workers.

This objective was used as the basis for formulating and evaluating removal alternatives and selecting a removal action. The selected action is supported by documents contained in the Administrative Record for LHAAP, which is available at the Marshall Public Library. The U.S. Army will implement the following response at the former Pistol Range:

- Excavate surface and near surface soil contaminated with lead exceeding industrial use levels and dispose of that soil off site at a permitted landfill that is approved to accept the contaminated soil.

#### LHAAP-04, Former Pilot Wastewater Treatment Plant

The RAOs for LHAAP-04 are as follows:

- Protection of human health and the environment by eliminating the threat for potential releases of perchlorate from contaminated soil to groundwater.
- Protection of human health and the environment by eliminating the threat for potential releases of perchlorate and mercury from contaminated soil to surface water.
- Protection of human health by eliminating the potential for exposure to mercury contaminated surface soils for a future maintenance worker.

These objectives were used as the basis for formulating and evaluating removal alternatives and selecting a removal action. The selected action is supported by documents contained in the Administrative Record for LHAAP, which is available at the Marshall Public Library. The U.S. Army will implement the following at LHAAP-04:

- Excavate soil contaminated with perchlorate exceeding the medium-specific soil concentration for industrial use based on groundwater protection levels with the potential to contaminate groundwater and dispose excavated soil off site at a permitted landfill that is approved to accept the contaminated soil.
- Excavate soil contaminated with mercury exceeding industrial use levels and dispose of that soil off site at a permitted landfill that is approved to accept the contaminated soil.

These removal actions are consistent with the intended future use of the LHAAP as a wildlife refuge and are intended to be final actions for the two sites. The U.S. Army, U.S. Environmental Protection Agency (USEPA), and Texas Commission on Environmental Quality (TCEQ) concur with the selected alternatives.

## ***2.0 Site Conditions and Background***

---

### ***2.1 Site Description***

LHAAP is located in central-east Texas in the northeastern corner of Harrison County, approximately 14 miles northeast of Marshall, Texas. The facility occupies approximately 8,416 acres between State Highway 43 in Karnack, Texas, and the western shore of Caddo Lake. Caddo Lake is a large freshwater lake that bounds LHAAP to the north and east. The eastern fence of LHAAP is 3.5 miles from the Texas-Louisiana state border.

The primary tasks performed as part of the EE/CAs included additional investigations to delineate contaminated areas and the preparation of the EE/CA reports (Shaw, 2009a and 2009b). The information gathered during the investigations was used to evaluate risk associated with each site, develop alternatives, and recommend a removal action. Site descriptions and summaries of the investigation activities are presented below for the former Pistol Range and LHAAP-04.

### Former Pistol Range

The former Pistol Range is located in the southeastern portion of LHAAP, approximately 280 feet south of Avenue Q at the end of Robert Avenue. The site is the eastern portion of a rectangular field and is approximately 110 feet north to south by 150 feet east to west (approximately 0.4 acres). The target area was a wooded slope at the eastern side of the site. The area was used as a small arms firing range by base security personnel as early as the 1950s and intermittently through 2004 for small arms qualification and recertification. Preliminary field investigations were conducted at the Pistol Range in 1995, with subsequent site investigations in 2006 (soil sampling for site characterization) and 2007 (groundwater sampling and vertical delineation of soil contamination). The investigations showed that there had been no impact to groundwater, but identified areas where the soil was contaminated at levels that exceed the TCEQ soil medium-specific concentration (MSC) for industrial use based on inhalation, ingestion, and dermal contact (SAI-Ind)(TCEQ, 2006).

### LHAAP-04, Former Pilot Wastewater Treatment Plant

LHAAP-04, Former Pilot Wastewater Treatment Plant, is approximately 0.5 acres and is located in the central portion of LHAAP at the northwest corner of 6<sup>th</sup> and 60<sup>th</sup> Streets near the former fire station. Wastewater treatment operations began at LHAAP-04 in 1984. The demolition of the Former Pilot Wastewater Treatment Facility and disposal of the associated wastes were completed in the Summer of 1997 as part of the Resource Conservation and Recovery Act (RCRA) closure of the plant.

Various sampling events were conducted at LHAAP-04 from 1993 through 2008 to assess the contamination from the operations at LHAAP-04 (Shaw, 2009b) and its impact to the soil and/or groundwater. Following RCRA closure of LHAAP-04, soil sampling was conducted (Anderson Columbia Environmental [ACE], 1997), and LHAAP-04 was approved for closure according to 30 Texas Administrative Code 335 Subchapter S, the Risk Reduction Rule Standard 2 in 1998 with the stipulation that the remaining soil contamination be addressed under CERCLA (Shaw, 2009b). The soil sampling results after 1998 delineated the perchlorate contamination in the soil at concentrations that are above the TCEQ soil MSC for industrial use based on groundwater protection (GWP-Ind) (TCEQ, 2006). Within the perchlorate contaminated soil area is an isolated area of mercury contamination that is above the SAI-Ind (TCEQ, 2006). Currently

available data do not indicate an impact to the groundwater above the groundwater MSC for industrial use (GW-Ind) for perchlorate. Additional evaluation of the groundwater will be performed after the soil removal action to determine the need for any future action for groundwater.

## ***2.2 Current and Future Land Use***

LHAAP is located near the unincorporated community of Karnack, Texas. Karnack is a rural community with a population of 775 people. The incorporated community of Uncertain, Texas, population 205, is a local resort area located to the northeast of LHAAP on the edge of Caddo Lake and is an access point to Caddo Lake. Industries in the surrounding area consist of agriculture, timber, oil and natural gas production, and recreation. The LHAAP acreage that was previously transferred to U.S. Fish and Wildlife Service (USFWS) is part of the Caddo Lake National Wildlife Refuge. The U.S. Army holds the remaining land while environmental restoration takes place in preparation for transfer to the USFWS.

At the present time, the general public does not have unrestricted access to the refuge. The Refuge Manager currently allows limited access to portions of the refuge. Approved access for hunters is very limited. Access to environmental sites is not granted to the general public by the U.S. Army. Physical controls consist of gated access roads with restricted access warning signs at the gates. The former LHAAP's perimeter fence remains in place around the refuge and represents the refuge boundary. The boundary along Caddo Lake is unfenced; however, current conditions discourage public access to areas within LHAAP. Despite the controls in place, trespassing is possible.

The reasonably anticipated future use of the entire facility, including the former Pistol Range and LHAAP-04, is as a wildlife refuge. The applicable receptor scenario for future use as a wildlife refuge is the hypothetical future maintenance worker. Once the former Pistol Range and LHAAP-04 are transferred, their use will be consistent with the rest of the refuge. That includes the following activities: hunting, fishing, wildlife observation, wildlife photography, wildlife education, and wildlife interpretation.

## ***2.3 Previous Actions***

There have been no previous removal actions at the former Pistol Range.

There have been no removal actions undertaken at LHAAP-04; however, a pilot study was conducted in 2000 and 2001. During the study, three different carbon sources were mixed into the top 12 inches of soil. The applications resulted in reductions in perchlorate concentrations in surface soil but results varied in deeper soil.

## 2.4 *Federal, State, and Local Authorities' Roles (Coordination Summary)*

This project was coordinated with several Federal, State, and local agencies, including the U.S. Army, USACE, USFWS, USEPA, and TCEQ (state and local offices), as well as with the Restoration Advisory Board (RAB) before and during the EE/CA process. All stakeholders were encouraged to participate in the EE/CA process, and copies of the EE/CA reports were made available for review and comment.

## 3.0 *Threats to Public Health or Welfare or the Environment, and Statutory and Regulatory Authorities*

---

### Former Pistol Range

Firing of small arms is the only activity known to have occurred at the former Pistol Range, and there is no visual evidence of other activities. Therefore, the potential chemicals of concern at the former Pistol Range are limited to metals associated with small arms use. The results of the Site Investigation indicated that spent small arms ammunition, fragments, and shell casings were present at and near the surface at the former Pistol Range. Though the public does not have unrestricted access to the former Pistol Range, current physical controls do not prevent unauthorized access by trespassers. Workers and refuge visitors may access the site in the future for purposes associated with the wildlife refuge. A removal action is appropriate at the former Pistol Range based on the concentrations of lead in the surface and near-surface soil. The lead concentrations are sufficiently high to constitute a threat to public health and a removal action has been determined to be appropriate to address factor §300.415(b)(2)(i) of the NCP. §300.415(b)(2)(i) refers to “Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.”

### LHAAP-04, Former Pilot Wastewater Treatment Plant

No unacceptable risks to human health or the environment were determined to be associated with LHAAP-04 by the human health risk assessment (Jacobs Engineering Corporation [Jacobs], 2003) or the Baseline Ecological Risk Assessment (Shaw, 2007). However, high perchlorate concentrations in soil indicate the potential for contamination of groundwater in the future (Solutions to Environmental Problems [STEP], 2005) and high mercury concentrations in soil detected during closure activities were above the SAI-Ind levels (TCEQ, 2006). In addition, other sites at LHAAP that have similarly high levels of perchlorate in the soil have had underlying groundwater contamination or contaminated surface water runoff (Jacobs, 2002). Therefore, the soil may present a hazard to human health and to the surrounding surface water/groundwater. It was determined that addressing the perchlorate contamination in soil will prevent potential for future impact to groundwater and surface water resources near LHAAP-04 and that doing so would also address the isolated area of mercury contamination. The site



conditions are such that it has been determined to be appropriate to implement a removal action to address the following two factors of the NCP:

- §300.415(b)(2)(i): “Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.”
- §300.415(b)(2)(iv): “High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate.”

## 4.0 *Endangerment Determination*

---

Actual or threatened releases of pollutants and contaminants from the former Pistol Range, if not addressed by implementing the response actions selected in this Action Memorandum, may present a potential for an imminent and substantial endangerment to public health, or welfare, or the environment.

## 5.0 *Proposed Actions and Estimated Costs*

---

The EE/CAs identify and screen removal action technologies that might be appropriate for satisfying the RAOs at the individual sites. After screening, remedial alternatives were developed from the various technologies. The alternatives were evaluated for effectiveness, implementability, and cost. The sections below present the alternatives that were evaluated for each site.

### 5.1 *Former Pistol Range*

#### 5.1.1 *Alternative 1 – No Action*

The no action alternative is provided to serve as a baseline for comparison with the other alternatives. This alternative would leave the contaminated soil in place with no controls to prevent human exposure. No activities would be undertaken as part of this alternative to contain, remove, or treat the contaminated soil at the former Pistol Range.

#### 5.1.2 *Alternative 2 – Land Use Controls*

This alternative involves the implementation of land use controls (LUCs) at the former Pistol Range to prevent exposure of the future maintenance worker to contaminated soil above permissible levels, but would not provide containment, removal, or treatment of the contaminated soil. LUCs would be maintained to prevent human exposure to soil in those areas where lead remains at concentrations exceeding the SAI-Ind value of 1,000 milligrams per kilogram (mg/kg) through access controls (i.e., legal restrictions, administrative controls, and physical mechanisms such as fencing or warning signs). LUCs would limit subsurface activities

such as drilling and excavation in the designated area. The county would also be notified that areas less than the SAI-Ind level at the former Pistol Range would be suitable for nonresidential use since soil contamination above residential cleanup levels would remain at the site.

Long-term operational requirements under this alternative would be minimal, and would involve surveillance activities and maintenance of the LUCs. Effectiveness of the controls would be evaluated and documented in 5-year reviews. A period of 30 years has been assumed for surveillance and maintenance for cost estimation purposes.

### 5.1.3 *Alternative 3 – Excavation and Off-site Disposal*

This alternative involves the removal of soil at the former Pistol Range containing lead concentrations exceeding the SAI-Ind value of 1,000 mg/kg from affected areas, and the subsequent transport of these soils to an appropriately licensed off-site facility for disposal. Once confirmation sampling results meet the cleanup level, the excavation area would be backfilled with clean soil and reseeded. No fencing or signs would be installed under this alternative since soil with lead concentrations exceeding the SAI-Ind value would be permanently removed from the site.

This alternative requires five year reviews because the soil removal is only to industrial levels and soil contamination above unrestricted use would remain at the site.

## 5.2 *LHAAP-04, Former Pilot Wastewater Treatment Plant*

### 5.2.1 *Alternative 1 – No Action*

The no action alternative is provided to serve as a baseline for comparison with the other alternatives. This alternative involves no actions to prevent impacts to groundwater or surface water resources, or to prevent human exposure.

### 5.2.2 *Alternative 2 – Excavation and Off-site Disposal*

This alternative involves the excavation and disposal of contaminated soil from LHAAP-04 that exceeds the following cleanup levels:

Chemical	Cleanup Level (mg/kg)	Basis
Perchlorate	7.2	GWP-Ind
Mercury	0.15	SAI-Ind

Notes and Abbreviations:

mg/kg      milligrams per kilogram

GWP-Ind      soil MSC for industrial use based on groundwater protection

SAI-Ind      soil MSC for industrial use based on inhalation, ingestion, and dermal contact

All excavated material would be transported and disposed of at a permitted disposal facility. After excavation, confirmation samples will be collected and analyzed for perchlorate and

mercury (only select locations). Once confirmation sampling results meet the cleanup level, the excavation area would be backfilled with clean soil and reseeded.

This alternative requires five year reviews because the soil removal is only to industrial levels and soil contamination above unrestricted use would remain at the site.

### 5.3 Selection Criteria

Each removal action alternative was evaluated against the following criteria: effectiveness, implementability, and cost. These criteria are discussed in greater detail in Section 5.0 of each of the EE/CA reports (Shaw, 2009a and 2009b). These criteria are defined as follows:

**Effectiveness.** This evaluation criterion assesses the degree of protection to human health and the environment provided by an alternative. The evaluation determines if the alternative achieves the RAOs and explains how the alternative reduces, eliminates, and/or controls risks posed by each of the potential exposure pathways identified for the site. Compliance with applicable or relevant and appropriate requirements (ARARs) is also assessed along with the potential effects the construction and implementation of the alternative may have on human health and the environment (e.g., what are the risks to worker health and safety). Factors to be evaluated include protection of the workers and the community during the implementation of removal actions, environmental impacts resulting from the implementation of the removal actions, and the length of time required to implement the action.

**Implementability.** This evaluation criterion assesses the technical and administrative feasibility of implementing an alternative. Technical feasibility addresses the difficulties and unknowns associated with a technology, the reliability of a technology, the ease of undertaking future removal actions, and the ability to monitor the effectiveness of the system. Administrative feasibility refers to the activities required to coordinate with regulatory agencies and the availability of equipment and services.

**Cost.** This criterion evaluates the capital, and operation and maintenance costs associated with an alternative. Present worth analysis is used to evaluate expenditures that occur over multiple years (maximum 30 years).

### 5.4 Recommended Selected Action

This section presents descriptions of the removal action alternatives that were selected at each of the sites. These actions are expected to protect human health and the environment from soil contamination at the sites.

### 5.4.1 *Former Pistol Range*

Investigation results and modeling for the former Pistol Range led to the following conclusions about the nature of the threat posed by the site:

- Surface and near-surface soil at and near portions of the target embankment are contaminated with lead at levels exceeding the SAI-Ind.
- Sediment, surface water, and groundwater have not been adversely impacted.
- Vertical migration of lead will not cause the groundwater to exceed the GW-Ind (i.e., the maximum contaminant level) for lead in the future.
- If excavated, soil exceeding the SAI-Ind will also likely be a RCRA hazardous waste due to lead contamination.

Alternative 3, Excavation and Off-site Disposal, addresses the soil contamination at the former Pistol Range in a manner that is cost-effective, consistent with future land use as a wildlife refuge, and protects the future maintenance worker. Alternative 3 activities include development of work plans, delineation and excavation of the contaminated soil, collection of confirmation samples from the excavation, characterization/transport/disposal of waste, restoration of the site, and notification recordation of the suitability for nonresidential use with Harrison County. Limited monitoring in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years will take place to document that site use is consistent with nonresidential use. This alternative completely removes and disposes of soils containing lead at concentrations that exceed the SAI-Ind. The removal of lead contaminated soil above the industrial cleanup level would preclude the necessity for physical mechanisms such as fencing to prevent human access and/or exposure to these soils, and the necessity for inspection/maintenance of the physical mechanisms over the long term.

The estimated cost to implement this removal action, including the 5-year reviews, is approximately \$381,000. The cost details are included in the EE/CA (Shaw, 2009a).

### 5.4.2 *LHAAP-04, Former Pilot Wastewater Treatment Plant*

The investigations and assessment of data revealed that even though there has been no impact to the groundwater from the high concentrations of perchlorate in soil, the soil movement over land or leaching to groundwater may occur from the high perchlorate concentrations in the soil. Additionally, there was localized mercury contamination identified after closure activities (ACE, 1997). Alternative 2, Excavation and Off-site Disposal, addresses the soil contamination at LHAAP-04 in a manner that will be protective of the hypothetical future maintenance worker and of the surrounding surface waters/groundwater. Alternative 2 activities consist of development of work plans, delineation of excavation area, excavation of the contaminated soil, collection of confirmation samples from the excavation, characterization/transport/disposal of

waste, restoration of the site, installation of a groundwater monitoring well after soil removal, and notification recordation of the suitability for nonresidential use with Harrison County. Limited monitoring in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years will take place to document that site use is consistent with nonresidential use.

The estimated cost to implement this removal action, including the 5-year reviews for a 30-year period is approximately \$473,000. Details about the alternative can be found in the EE/CA (Shaw, 2009b).

As noted in Section 3.0, perchlorate contaminated soil does not yield unacceptable risks under the current and reasonably anticipated land use at LHAAP-04. The Army, however, is implementing the CERCLA removal action for this site using a performance based contract (PBC). The PBC contractor has proposed excavation of perchlorate-contaminated soil as a means of addressing the potential for future groundwater contamination so that the need for continued monitoring of groundwater in areas where elevated perchlorate soil concentrations are currently located will be minimized or eliminated.

## 5.5 Trade Off Analysis

The selected removal action alternatives were chosen because they were determined to be effective at protecting human health and the environment while also being implementable and cost effective. The basis for these determinations is provided in the EE/CA reports (Shaw, 2009a and 2009b) and is discussed below.

### 5.5.1 Former Pistol Range

The comparative analysis of the removal action alternatives for the former Pistol Range is summarized below.

**Effectiveness.** Each of the alternatives provides varying levels of human health protection. Alternative 1, No Action, does not achieve the RAOs and does not comply with the chemical-specific ARAR for lead (the TCEQ SAI-Ind value of 1,000 mg/kg for lead [TCEQ, 2006]). Alternatives 2 and 3 both satisfy the RAO for the former Pistol Range and comply with the ARAR for lead. Alternative 2 relies on LUCs and does not provide contaminant removal or treatment, but would be protective of human health because LUCs would prevent unacceptable human exposure to soil contaminants through physical, legal, and administrative mechanisms. However, Alternative 2 is not fully compatible with future use as a wildlife refuge since it would restrict maintenance worker access to certain portions of the former Pistol Range. Alternative 3 provides a higher level of overall protection than Alternative 2 by excavating lead contaminated soils above the cleanup level and transporting them to an off-site disposal facility.

Alternative 3 may pose potential short-term risks associated with construction activities and handling of contaminated soils. The use of engineering controls (e.g., covering stock piles or wetting exposed soil), air monitoring, and adequate personal protective equipment may minimize such risks. With the exception of truck traffic during material transport to the disposal facility, the local community would not be significantly impacted by remediation activities.

**Implementability.** All three alternatives can be readily implemented from both technical and administrative perspectives.

**Cost.** No cost is associated with Alternative 1. Alternative 2, LUCs, has a total net present value of \$285,000. Alternative 3 has the highest cost – total net present value of \$381,000 – because it involves excavation and off-site disposal.

While Alternative 3 is the highest cost alternative, it meets the RAO and the chemical-specific ARAR for lead in a manner that is compatible with the future use of the site. It is the alternative with the greatest long-term effectiveness and has manageable short-term risks. Therefore, Alternative 3 is selected as the most appropriate removal action for the former Pistol Range.

### 5.5.2 LHAAP-04, Former Pilot Wastewater Treatment Plant

The two alternatives evaluated for LHAAP-04 were compared to one another as follows:

**Effectiveness.** Alternative 1, No Action, involves no activities to prevent impacts to groundwater or surface water resources and does not meet the chemical-specific ARARs because contaminants remain in soil above cleanup levels. The chemical-specific ARAR for mercury is the TCEQ SAI-Ind value 150 µg/kg and the chemical-specific ARAR for perchlorate is 7,200 µg/kg, the soil GWP-Ind MSC protective of groundwater (TCEQ, 2006). Alternative 2, Excavation and Off-site Disposal, meets the RAOs, is permanently effective in preventing impacts to groundwater and surface water because contamination above the remedial goals is removed from the site, and meets chemical-specific ARARs.

The short-term impacts of Alternative 2 can be mitigated through the use of proper dust suppressant measures that will control windblown emissions of contaminated dust. Proper personal protective equipment will be required for site workers. The length of time required to implement and complete Excavation and Off-site Disposal is estimated to be less than nine months.

**Implementability.** Both No Action and Excavation and Off-site Disposal are considered to be administratively and technically implementable.

**Cost.** While the No Action alternative has no associated cost, Excavation and Off-site Disposal has a total net present value of approximately \$473,000.

While Alternative 2 is the higher cost alternative, it meets the RAOs and the chemical-specific ARARs for perchlorate and mercury. It is also compatible with the future use of the site, has long-term effectiveness, and has minimal short-term impacts. Therefore Alternative 2 is selected as the most appropriate removal action for LHAAP-04.

## ***6.0 Expected Change in the Situation Should Action Be Delayed or Not Taken***

---

If the removal actions outlined in this Action Memorandum are delayed or are not implemented, the potential exists for the following:

### Former Pistol Range

- (1) Human contact with soil containing lead at concentrations exceeding the SAI-Ind. That level is sufficiently high to constitute a threat to public health as defined by factor (i) under §300.415(b)(2) of the NCP: “Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contamination.”

### LHAAP-04, Former Pilot Wastewater Treatment Plant

- (1) Human contact with soil in localized areas containing mercury at concentrations exceeding the SAI-Ind. Mercury concentrations constitute a threat as defined by factor (i) under §300.415(b)(2) of the NCP: “Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contamination.”
- (2) Contamination of groundwater/surface water via leaching and migration of perchlorate. The site conditions constitute a threat as defined by factor (iv) under §300.415(b)(2) of the NCP: “High levels of ... pollutants or contaminants in soils largely at or near the surface that may migrate.”

## ***7.0 Outstanding Policy Issues***

---

None.

## ***8.0 Enforcement***

---

The U.S. Army’s BRAC Division is the lead DoD organization for execution of the environmental response at the LHAAP.

## 9.0 *Highlights of Community Participation*

---

All public involvement requirements have been satisfied in conjunction with development of the EE/CAs. A RAB was formed in 2004 to provide for the discussion and exchange of information related to the closure of the LHAAP between government agencies and the public. The RAB meetings are held quarterly and are open to the public. The public was informed of the administrative record file location at the Marshall Public Library in Marshall, Texas that has been established for the LHAAP. Status of field investigations have been discussed during quarterly RAB meetings when investigation activities occurred.

The EE/CA reports for the former Pistol Range (Shaw, 2009a) and LHAAP-04 (Shaw, 2009b) were available to the public at the Marshall Public Library before March 13, 2009, and at the public meeting held in conjunction with the quarterly RAB meeting on March 24, 2009, at the Karnack Community Center in Karnack, Texas. The public was notified of availability, review period, and public meeting for the EE/CA reports in the Marshall News Messenger on March 8, 2009, and the Shreveport Times on March 15, 2009. The formal 30-day public review and comment period began on March 15 and extended through April 15, 2009. No public comments were received during this period.

## 10.0 *Recommendation*

---

This decision document represents the selected removal actions for the former Pistol Range site and LHAAP-04, the former Pilot Wastewater Treatment Plant at LHAAP, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. The recommendations presented in this document are based on the administrative record for the file. The removal actions, as presented in the EE/CAs, were endorsed by the regulatory agencies; based on the analysis presented, the regulatory agencies agree that the recommended actions are appropriate and will be implemented in accordance with CERCLA and the NCP.

*Former Pistol Range.* Conditions at the former Pistol Range meet §300.415(b)(2)(i) of the NCP for a removal, and approval is requested for the proposed removal action. The total cost of this action is approximately \$381,000.

*LHAAP-04.* Conditions at LHAAP-04, the former Pilot Wastewater Treatment Plant, meet §300.415(b)(2)(i) and §300.415(b)(2)(iv) of the NCP for a removal, and approval is requested for the proposed removal action. The total cost of this action is approximately \$473,000.



This Action Memorandum was developed in accordance with CERCLA, as amended, and the NCP. The U.S. Army approves the following removal actions as the most appropriate response at each site:

- **Former Pistol Range** – Excavation and off-site disposal of soil with greater than 1,000 mg/kg lead to prevent human ingestion, inhalation, and dermal contact.
- **LHAAP-04, Former Pilot Wastewater Treatment Plant** – Excavation and off-site disposal of soil with greater than 7.2 mg/kg perchlorate to prevent possible cross-contamination of groundwater and greater than 0.15 mg/kg mercury to prevent human ingestion, inhalation, and dermal contact.

The document has been approved by the undersigned.



**Thomas E. Lederle**  
Chief, Industrial Branch  
Base Realignment and Closure Division

30 July 2009  
Date

## 11.0 References

---

Anderson Columbia Environmental (ACE), 1997, *Closure Report, Pilot Wastewater Treatment Plant, Longhorn Army Ammunition Plant, Karnack, Texas, EPA Identification No. TX6213820583, Solid Waste Registration No. 30990*, September.

Jacobs Engineering Corporation (Jacobs), 2002, *Final Remedial Investigation Report Addendum for the Group 4 Sites Remedial Investigation Report, Site 04, 05, 67 and Hydrocarbon Study), Longhorn Army Ammunition Plant, Karnack, Texas, Oak Ridge, Tennessee, February.*

Jacobs, 2003, *Final Baseline Human Health and Screening Ecological Risk Assessment for the Group 4 Sites (Sites 04, 08, 35A, 35B, 35C, 46, 47, 48, 50, 60, 67, Goose Prairie Creek, Saunder's Branch, Central Creek and Caddo Lake), Longhorn Army Ammunition Plant, Karnack, Texas, Oak Ridge, Tennessee, June.*

Shaw Environmental, Inc. (Shaw), 2007, *Final Installation-Wide Baseline Ecological Risk Assessment, Longhorn Army Ammunition Plant, Karnack, Texas, Houston, Texas, November.*

Shaw, 2009a, *Final Engineering Evaluation/Cost Analysis, Former Pistol Range, Longhorn Army Ammunition Plant, Texas, February.*

Shaw, 2009b, *Final Engineering Evaluation/Cost Analysis, LHAAP-04, Former Pilot Wastewater Treatment Plant, Group 4, Longhorn Army Ammunition Plant, Texas, March.*

Solutions to Environmental Problems (STEP), 2005, *Plant-Wide Perchlorate Investigation, Longhorn Army Ammunition Plant, Karnack, Texas, Final, Oak Ridge, Tennessee, April.*

Texas Commission on Environmental Quality (TCEQ), 2006, *Updated Examples of Standard No. 2, Appendix II Medium-Specific Concentration, March 31, 2006.*