

***FINAL***  
**RECORD OF DECISION**  
**LHAAP-49, FORMER ACID STORAGE AREA**  
**LONGHORN ARMY AMMUNITION PLANT**  
**KARNACK, TEXAS**

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**Prepared for**  
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**Contract Number W912QR-04-D-0027, Task Order No. DS02**  
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## *Acronyms and Abbreviations*

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BERA	baseline ecological risk assessment
bgs	below ground surface
BHHRA	baseline human health risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
COPC	chemical of potential concern
DPT	direct push technology
FFA	Federal Facility Agreement
HI	hazard index
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
MCL	maximum contaminant level
MOA	Memorandum of Agreement
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	national priorities list
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	remedial investigation
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act
Shaw	Shaw Environmental, Inc.
SVOC	semivolatile organic compound
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
U.S.C.	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

## ***1.0 Declaration***

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### ***1.1 Site Name and Location***

LHAAP-49, Former Acid Storage Area.

Longhorn Army Ammunition Plant  
Karnack, Texas

Comprehensive Environmental Response, Compensation, and Liability Information System, U.S. Environmental Protection Agency (USEPA) Identification Number: TX6213820529.

### ***1.2 Statement of Basis and Purpose***

This document presents the no action decision for Site LHAAP-49 located at the former Longhorn Army Ammunition Plant (LHAAP) in Karnack, Texas. The decision was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300.

The decision was based on the Administrative Record file for this site, including the remedial investigation and baseline risk assessment reports (Jacobs Engineering Group, Inc. [Jacobs] 2002a, 2002b), the Final Site Evaluation Report (Shaw Environmental, Inc. [Shaw], 2009), the installation-wide baseline ecological risk assessment (BERA) report (Shaw, 2007), the Proposed Plan (U.S. Army, 2009), and other related documents contained in the Administrative Record for site LHAAP-49.

This document is issued by the U.S. Army who is the lead agency for this installation. USEPA (Region 6) and the Texas Commission on Environmental Quality (TCEQ) are the regulatory agencies providing technical support, project review and comment, and oversight of the U.S. Army cleanup program. The USEPA and TCEQ concur with the selected No Action decision.

### ***1.3 Description of the Selected Remedy***

The lead agency has determined that no CERCLA action is necessary at LHAAP-49 to protect public health or welfare or the environment. The recommendation for no action is consistent with the criteria required under CERCLA.

The risk evaluation conducted for LHAAP-49 determined that the site is suitable for nonresidential use.


## 1.4 *Statutory Determinations*

CERCLA §121 statutory determinations are not necessary to this decision since no remedy is being selected. No remedial action is necessary to ensure protection of human health and the environment.

The LHAAP-49 risk evaluation, which was based on the reasonably anticipated future use as a national wildlife refuge, does not address unrestricted use. A notification will be recorded in Harrison County records stating that the site is suitable for nonresidential use in accordance with Texas Administrative Code (TAC) Title 30 §335.566. Because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure, a five-year review will be conducted every five years to ensure protection of human health and the environment under CERCLA §121(c), U.S. Code (U.S.C.) Title 42 §9621(c). Although the U.S. Army may later pass these procedural responsibilities to the transferee by property transfer agreement, the U.S. Army shall retain ultimate responsibility for remedy integrity, per the FFA and CERCLA §121.

## 1.5 Authorizing Signatures

As the lead agency, the United States Army issues this no action Record of Decision (ROD) for LHAAP-49. This ROD documents that no remedy is being selected and that no action is necessary at LHAAP-49. The undersigned is the appropriate approval authority for this decision.

 23 Aug 2010  
(Name) (Date)

Thomas E. Lederle  
Industrial Branch Chief  
Base Realignment and Closure Division  
United States Army

The United States Environmental Protection Agency approves the selected remedy as provided in the ROD for LHAAP-49.

 9/7/10  
(Name) (Date)

Samuel Coleman, P.E.  
Director  
Superfund Division  
United States Environmental Protection Agency,  
Region 6

## 2.0 *Decision Summary*

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### 2.1 *Site Name, Location, and Description*

LHAAP-49, Former Acid Storage Area

Longhorn Army Ammunition Plant, Karnack, Texas

Comprehensive Environmental Response, Compensation, and Liability Information System  
USEPA Identification Number: TX6213820529

Lead Agency: U.S. Army, Department of Defense

Source of Cleanup Money: U.S. Army, Department of Defense

The former LHAAP is an inactive, government-owned, formerly contractor-operated and -maintained Department of Defense facility located in central east Texas in the northeast corner of Harrison County. As shown on **Figure 2-1**, LHAAP is approximately 14 miles northeast of Marshall, Texas. The facility is approximately 40 miles west of Shreveport, Louisiana. The former U.S. Army installation occupied 8,416 acres between State Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake and is accessed by State Highways 43 and 134.

LHAAP was placed on the Superfund National Priorities List (NPL) on August 9, 1990. Activities to remediate contamination began in 1990. After its listing on the NPL, the U.S. Army, the USEPA, and the Texas Water Commission (currently known as the TCEQ) entered into a CERCLA Section 120 Federal Facility Agreement (FFA) for remedial activities at LHAAP. The FFA became effective December 30, 1991. LHAAP operated until 1997 when it was placed on inactive status and classified by the U.S. Army Armament, Munitions, and Chemical Command as excess property.

The site addressed in this ROD is LHAAP-49, which is shown in **Figure 2-2** and discussed below.

LHAAP-49 covers approximately 30 acres in the west-central portion of LHAAP. LHAAP-49 is the former Acid Storage Area, which was used from 1942 to 1945 for storage and formulation of acids and acid mixtures in support of trinitrotoluene (TNT) production during World War II. Nitric acid and sulfuric acid were manufactured and handled in large quantities in this area.

The site is surrounded by an area (approximately 7,000 acres) that was transferred by the U.S. Department of the Army to the U.S. Fish and Wildlife Service (USFWS) for management as the



Caddo Lake National Wildlife Refuge. The U.S. Army, the lead agency for environmental response actions at LHAAP, is acting in partnership with USEPA Region 6 and TCEQ in planning and implementing remedial action at LHAAP-49.

## ***2.2 Site History and Enforcement Activities***

### ***2.2.1 Site History***

LHAAP was established in December 1941 with the primary mission of manufacturing TNT. Production of TNT began at Plant 1 in October 1942 and continued through World War II until August 1945, when the facility was placed on standby status until February 1952. In 1952, the facility was reactivated and production of pyrotechnic ammunition, such as photoflash bombs, simulators, hand signals, and tracers for 40 mm ammunition continued at Plant 2 through 1956.

In December 1954, a third facility, Plant 3, began production of solid-fuel rocket motors for tactical missiles. Rocket motor production at Plant 3 continued to be the primary operation at LHAAP until 1965 when Plant 2 was reactivated for the production of pyrotechnic and illuminating ammunition. In the years following the Vietnam conflict, LHAAP continued to produce flares and other basic pyrotechnic or illuminating items for the U.S. Department of Defense inventory. From September 1988 to May 1991, LHAAP was also used for the static firing and elimination of Pershing I and II rocket motors in compliance with the Intermediate-Range Nuclear Forces Treaty in effect between the United States and the former Union of Soviet Socialist Republics.

LHAAP-49 was used from 1942 to 1945 for formulation and storage of acids and acid mixtures in support of TNT production during World War II. Nitric acid and sulfuric acid were manufactured and handled in large quantities in this area. There are no known process releases that took place at LHAAP-49; however, spills could have occurred around the tanks, lines, or buildings.

Due to the release of hazardous substances, pollutants, and contaminants from operations at the facility, the USEPA placed LHAAP on the Superfund NPL on August 9, 1990. Activities to remediate contamination associated with the listing of LHAAP as a Superfund site began in 1990. After the listing on the NPL, the U.S. Army, the USEPA, and the Texas Water Commission (currently known as the TCEQ) entered into a CERCLA Section 120 FFA for remedial activities at LHAAP. The FFA became effective December 30, 1991.

## ***2.3 Community Participation***

The U.S. Army, USEPA, TCEQ and the LHAAP Restoration Advisory Board (RAB) have provided public outreach to the surrounding community concerning LHAAP-49 and other environmental sites at LHAAP. The outreach program has included fact sheets, media

interviews, site visits, invitations to attend quarterly RAB and regulatory review meetings, and public meetings consistent with its public participation responsibilities under Sections 113 (k)(2)(b), 117(a), and 121(f)(1)(g) of CERCLA.

The Proposed Plan (U.S. Army, 2010) for the decision of No Action for LHAAP-49 was released to the Administrative Record file and made available to the public for review and comment on January 25, 2010. The initial 30-day public comment period for the Proposed Plan also began on January 25, 2010. An open house was held on January 26, 2010, and the formal public meeting was held on March 9, 2010. A notice of availability of the Proposed Plan and other related documents in the Administrative Record file was published in both *The Shreveport Times* and the *Marshall News Messenger* on both January 17 and 24, 2010. A notice of the March 9, 2010, public meeting and extension of the public comment period was published in *The Shreveport Times* on February 22 and 28, 2010, and in the *Marshall News Messenger* on February 21 and 28, 2010. Written comments are addressed in the Responsiveness Summary, which is included in this ROD as **Section 3.0**.

Copies of Administrative Record documents were made available to the public at several information repository locations, including USEPA Region 6 Library, TCEQ, and Marshall Public Library. Currently, the public repository of the Administrative Record may be found at the following location:

### **Public Library**

Location: Marshall Public Library  
300 S. Alamo  
Marshall, Texas 75670

Business Hours: Monday – Thursday 10:00 a.m. – 8:00 p.m.  
Friday – Saturday 10:00 a.m. – 5:00 p.m.

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

The land on which this site is located is excess to the Army's needs and is intended for transfer to the USFWS for incorporation into the Caddo Lake National Wildlife Refuge. Future anticipated use is consistent with an industrial/recreational level of exposure. This site can be addressed independent of response actions at other environmental sites at LHAAP.

## ***2.5 Site Characteristics***

This section of the ROD presents an overview of LHAAP-49 site characteristics with respect to physical site features, known or suspected sources of contamination, types of contamination, and affected media. Known or potential routes of contaminant migration are also discussed.

### ***2.5.1 Physical Characteristics at LHAAP-49***

The former Acid Storage Area is a 30-acre site situated in the west-central portion of LHAAP (**Figure 2-2**). The topography is relatively flat with approximately 3 to 5 feet of elevation increase from west to east. The surface features include numerous building foundations and several concrete saddles and platforms previously used for the support of aboveground storage tanks. Runoff from the site eventually enters Caddo Lake via Goose Prairie Creek. Runoff from the northwestern and north-central portions of the site is generally toward the north. The runoff is collected by three ditches that merge near the northern site boundary into a single ditch that conveys the runoff northward into Goose Prairie Creek. In the eastern and southeastern portions of the site, runoff is overland and is captured by small tributaries of Goose Prairie Creek to the east of the site. Runoff from the south-central and southwestern portions of the site is generally to the south or southeast. The runoff is collected by a ditch along the south boundary of the site and carried to Goose Prairie Creek. The total distance from the site to Caddo Lake is approximately 2.3 miles (Jacobs, 2002a).

The current boundaries of LHAAP-49 were established in a U.S. Army report (U.S. Army, 2005) that examined the results of metals sample analyses in and around LHAAP-49. It specifically established the boundaries to include a 2.5 acre parcel north of 4<sup>th</sup> Street that had exhibited elevated mercury concentrations in soil. The remaining areas outside LHAAP-49 were deemed to be suitable for transfer to USFWS, and the USEPA concurred (USEPA, 2005).

At LHAAP, groundwater occurs within thin silty and clayey sands that are interbedded with clayey silt and silty and sandy clays. To approximately 100 feet below ground surface (bgs), three water-bearing zones are typically encountered and described as shallow, intermediate and deep.

Soil at the site consists of interbedded silty and clayey sands, sandy silts, and clays of the Wilcox Group.

### ***2.5.2 Nature and Extent of Contamination***

As part of the Installation Restoration Program, the U.S. Army began an environmental investigation in 1976 at LHAAP followed by installation wide assessments/investigations that included the following:

- Record Search – In 1980, U.S. Army Toxic and Hazardous Material (USATHAMA, 1980) conducted a record search to assess the impact of the LHAAP installation activities including usage, storage, treatment, and disposal of toxic and hazardous materials on the environment, and define conditions that may have adversely affected human health and the environment.

- Contamination Survey – In 1982 as part of the LHAAP contamination survey, Environmental Protection Systems collected six groundwater samples for laboratory analyses. Subsequently in 1987, as part of the Resource Conservation and Recovery Act (RCRA) permit application process, and as a continuation of the contamination survey, U.S. Army Environmental Hygiene Agency (USAEHA) identified, described, and evaluated all solid waste management units at LHAAP (USAEHA, 1987). Units requiring further sampling, investigation and corrective action were delineated.
- RCRA Facility Assessment (RFA) – In 1988, a preliminary RFA was conducted by the U.S. Army (Maley, 1988). Waste at the various sites was characterized but no samples were collected.

In addition to the installation-wide investigations, site-specific investigations were conducted in a phased approach between 1998 and 2009, to identify potential site contamination at LHAAP-49. Media investigated included soil, sediment, surface water, and groundwater.

The initial investigations included a Phase III Remedial Investigation (RI) in 1998 and a field investigation in 2000. The results of these investigations are summarized in the Final Remedial Investigation Report Addendum – Group 2 Sites (Jacobs, 2002a).

During these 1998 and 2000 investigations, dioxins, explosives, metals/anions, polychlorinated biphenyls (PCBs), pesticides, perchlorate, semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs) were analyzed in soil and sediment samples collected at LHAAP-49. Explosives, perchlorate and SVOCs were not detected in any of the soil samples collected. There were low scattered detections of pesticides/PCBs, dioxins, and one VOC (methylene chloride—a common laboratory contaminant) within the soil at LHAAP-49. Elevated levels of metals were detected in soil, including lead and mercury.

In groundwater, PCBs, pesticides, perchlorate, explosives, and SVOCs were not detected in the samples. Detected results in groundwater included inorganics, dioxins, and VOCs. Specifically, antimony, arsenic, chromium, selenium, and nitrate/nitrite were detected above their maximum contaminant levels (MCLs) in one or more samples.

The baseline human health risk assessment (BHHRA) (Jacobs, 2002b) was performed using the data presented in the Group 2 RI (Jacobs, 2002a). The BHHRA identified metals as chemicals of potential concern (COPCs) for soil and groundwater at LHAAP-49.

Additional investigations were conducted after the BHHRA was completed. These investigations include sampling by the USFWS (2 surface soil samples) in 2002, sampling by the U.S. Army Corps of Engineers (USACE) (13 surface soil samples) in 2004, and sampling by Shaw (22 soils samples, 4 sediment samples, and 1 surface water sample) in 2004. The soil

investigations after the BHHRA focused on two metals with elevated concentrations – lead and mercury.

Additional groundwater sampling was conducted in May 2005, October 2007, October and December 2008, and February, April, and May 2009 to address concerns about metals and nitrate/nitrite concentrations in groundwater that sometimes exceed MCLs. The sampling effort included four direct push technology (DPT) borings, installing five monitoring wells, and collecting 14 groundwater samples. Elevated nitrate/nitrite concentrations were associated with a shallow well that was typically dry. Groundwater samples collected from a properly screened replacement well did not exceed the nitrate/nitrite MCL. Chromium was associated with corrosion of a well; the well was replaced with different construction material and the chromium did not recur. Other parameters (e.g., arsenic, manganese, antimony) were found to be naturally occurring and/or associated with solid particulates that were drawn into the samples. Evaluation of these results, together with the 1998 and 2000 groundwater results, demonstrated that the occurrences of metals and nitrate/nitrite above their MCLs are not issues that require further action at the site (Shaw, 2009), and no chemicals of concern (COCs) were identified for the groundwater at LHAAP-49.

## *2.6 Current and Potential Future Site and Resource Uses*

### *2.6.1 Current and Future Land Uses*

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 located to the northeast of LHAAP on the edge of Caddo Lake and is a resort area and an access point to Caddo Lake. The industries in the surrounding area consist of agriculture, timber, oil and natural gas production, and recreation.

LHAAP has been an industrial facility since 1942. Production activities and associated waste management activities continued until the facility was determined to be in excess of the Army's needs in 1997. The plant area has been relatively dormant since that time. 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.

The reasonably anticipated future use of LHAAP-49 is as a national wildlife refuge. This anticipated future use is based on a Memorandum of Agreement (MOA) (U.S. Army, 2004) between the USFWS and the U.S. Army. That MOA documents the transfer process of the LHAAP acreage to USFWS to become the Caddo Lake National Wildlife Refuge. Presently the Caddo Lake National Wildlife Refuge occupies approximately 7,000 acres of the 8,416-acre former installation. In accordance with the National Wildlife Refuge System Administration Act

of 1966 and its amendments (16 USC 668dd), the land will remain as a national wildlife refuge unless there is a change brought about by an act of Congress, or the land is part of an exchange authorized by the Secretary of the Interior.

### *2.6.2 Current and Future Surface Water Uses*

Streams on LHAAP currently support wildlife and aquatic life. While humans may have limited access to some streams during annual hunts, there is no routine human use of streams on LHAAP. The streams do not carry adequate numbers and size of fish to support either sport or subsistence fishing. During the summer months, the streams cease flowing or dry up. When flowing, the streams discharge into Caddo Lake. Caddo Lake is a large recreational area that covers 51 square miles and has a mean depth of 6 feet. The watershed of the lake encompasses approximately 2,700 square miles. It is used extensively for fishing and boating. Caddo Lake is a drinking water supply for multiple cities in Louisiana including Vivian, Oil City, Mooringsport, South Shore, Blanchard, Shreveport, and Bossier City.

The anticipated future uses of the streams and lake are the same as the current uses.

### *2.6.3 Current and Future Groundwater Uses*

Groundwater in the deep aquifer (250-430 feet bgs) near LHAAP is currently used as a drinking water source. There are five active water supply wells near LHAAP. One well is located in and owned by Caddo Lake State Park. The well is completed to a depth of 315 feet and has been in use since 1935. A second well is owned by the Karnack Water Supply Corporation and services the town of Karnack. It is located approximately 2 miles southeast of town. This well is approximately 430 feet deep and has been in use since 1942. The Caddo Lake Water Supply Corporation has three wells located both north and northwest of LHAAP. These wells are identified as Caddo Lake Water Supply Corporation Wells 1, 2, and 3, and all are hydraulically upgradient of LHAAP. These wells are completed deeper in the Wilcox than the deepest zone of contamination at LHAAP. Because of this and the large distance between these wells and LHAAP, water removal from these wells is not expected to affect groundwater flow at the site. In addition, there are several livestock and domestic wells located in the vicinity of LHAAP with depths averaging approximately 250 feet.

Three water supply wells are located within the boundary of LHAAP itself. One well is located at the Fire Station; the second well is located approximately 0.35 miles southwest of the Fire Station. The third well is located north of the USFWS administration building for the Caddo Lake National Wildlife Refuge administration building, near the main entrance to LHAAP. All three water supply wells were completed within a deeper groundwater zone that is not the same zone as the environmental monitoring wells installed and described as deep wells at LHAAP. Water from these three wells is used only for non-potable purposes. Two additional wells previously supplied water to the installation, but these have been plugged and abandoned.

Although the anticipated future use of the facility as a wildlife refuge may not include the use of groundwater at LHAAP-49 as a drinking water source, the State of Texas designates all groundwater as potential drinking water, unless otherwise classified, consistent with 30 TAC §335.563(h)(1). To be conservative, a hypothetical industrial use scenario was evaluated for risk. The future industrial scenario for LHAAP assumes limited use of groundwater as a potential drinking water source.

## ***2.7 Summary of Site Risks***

This section summarizes the results of the baseline human health and ecological risk assessments conducted for LHAAP-49 (Jacobs, 2002b; Shaw, 2007). The risk assessments consist of a BHHRA and a screening ecological risk assessment performed by (Jacobs, 2002b) as well as an installation-wide BERA performed by Shaw (Shaw, 2007).

### ***2.7.1 Human Health Risks***

The baseline risk assessment estimates the risk the site poses if no action is taken. It provides the basis for taking an action and identifies the contaminants and exposure pathways that need to be addressed by a remedial action. The applicable receptor scenario for future use as a wildlife refuge is a hypothetical future maintenance worker. For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen and are expressed in scientific notation (e.g.  $1 \times 10^{-6}$ ). The NCP, 40 Code of Federal Regulations Part 300, established a range of acceptable levels of cancer risk for Superfund sites. The acceptable risk range for site-related exposures is  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . The potential for non-cancer effects is expressed by a ratio of the exposure to the toxicity. An individual chemical ratio less than 1 indicates that toxic non-cancer effects from that chemical are unlikely. A non-cancer hazard index (HI) is calculated when all the ratios for the individual chemicals are summed. An HI greater than 1 indicates that site-related exposures may present a risk to human health. Thus, an HI of less than 1 is acceptable since toxic non-cancer effects are unlikely.

Using the data presented in the RI, the cancer risk and the non-cancer HI were calculated based on a hypothetical future maintenance worker's exposure to the site environmental media (e.g., soil and groundwater) under an industrial scenario in the BHHRA.

The risks and hazards corresponding to contaminant levels in soil were determined to be within acceptable limits for a hypothetical future maintenance worker under the industrial scenario (Jacobs, 2002b). Shaw combined the 2002 data set from the BHHRA with data subsequently collected by USFWS, USACE, and Shaw, and found that the new data did not cause the exposure concentrations to increase (Shaw, 2007).

During the 2004 sampling, two soil sample locations at LHAAP-49 were found to have mercury concentrations that were markedly higher than soil samples elsewhere within LHAAP-49. In 2008, to address TCEQ hotspot concerns, Shaw removed soil in the vicinity of these two sample locations to a depth of 1.0 feet bgs and backfilled the area with clean soil. Shaw completed these activities in October 2008 (Shaw, 2009).

The groundwater was determined to have an acceptable cancer risk that equaled the upper value of the acceptable range. The dioxins through the dermal pathway were responsible for elevating the cancer risk for groundwater to the upper limit of the acceptable range, though the risk is still acceptable.

The non-cancer HI for groundwater was 2, which exceeded the acceptable level of 1, though no individual COPC had a hazard quotient greater than 1. The groundwater results were compared to MCLs, which are specified as cleanup goals for groundwater (TCEQ, 1998; TCEQ 2006), because the HI indicated the need for additional consideration of the groundwater. Several chemicals, including some that contribute to the HI, had occasional MCL exceedances. These are antimony, arsenic, chromium, nitrate/nitrite, and selenium. These COPCs were evaluated in the Site Evaluation Report (Shaw, 2009) with the following findings:

- Antimony was not detected above its MCL in recent sampling events, which used low-flow sampling techniques.
- Arsenic and selenium are naturally occurring under local groundwater conditions.
- Although chromium was detected above its MCL in two wells, evaluation of data suggests that the chromium contamination is associated with corrosion of the well screens. The impact to groundwater quality caused by well corrosion is unlikely to be widespread because the well casing and screen contain a limited amount of chromium. This was documented by the installation and testing of 49WW06, a monitoring well constructed of polyvinyl chloride
- Nitrate/nitrite, which exceeded its MCL at one well, was no longer found at elevated levels when the well was replaced with one properly screened across the shallow groundwater zone.

As a result of these considerations, no COCs were identified for the groundwater at LHAAP-49.

The potential for contamination to migrate from soil to groundwater was also evaluated (Shaw, 2009). The COPCs identified in soil were lead, mercury, and vanadium. Since former facilities at LHAAP-49 were operational in World War II, soil contaminants have had more than 60 years to potentially migrate from the surface soil to the groundwater; however, there are no lead, mercury, or vanadium concerns in the groundwater. Vertical migration of the chemicals with the



most elevated concentrations in soil (lead and mercury) was also examined using a computer model. The results demonstrated that these chemicals would not adversely impact groundwater.

The State of Texas requires that a notification be filed in the county disclosing that the site has been evaluated for nonresidential use in accordance with 30 TAC §335.566 because the risk evaluation was based on the reasonably anticipated future use as a national wildlife refuge. Because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure, a five-year review will be conducted every five years to ensure protection of human health and the environment under CERCLA §121(c), 42 U.S.C. §9621(c). Although the U.S. Army may later pass these procedural responsibilities to the transferee by property transfer agreement, the U.S. Army shall retain ultimate responsibility for remedy integrity, per the FFA and CERCLA §121.

### *2.7.2 Ecological Risks*

The ecological risk for LHAAP-49 was addressed in the BERA (Shaw, 2007). For the BERA, the entire installation was divided into three large sub-areas (i.e., the Industrial Sub-Area, Waste Sub-Area, and Low Impact Sub-Area) for the terrestrial evaluation. Each of the individual sites at LHAAP was grouped into one of these sub-areas, which were delineated based on commonalities of historic use, habitat type, and spatial proximity to each other. Conclusions for individual sites and the potential for detected chemicals to adversely affect the environment are made in the context of the overall conclusions of the sub-area in which the site falls.

Site LHAAP-49 lies within the Industrial Sub-Area, and the BERA concluded that no chemicals exceeded ecological thresholds of concern in the Industrial Sub-Area (Shaw, 2007). Thus, there are no chemicals of ecological concern at LHAAP-49. Therefore, no action is needed at LHAAP-49 for the protection of ecological receptors.

DRAWING NUMBER 117591-A55

APPROVED BY P. SRIVASTAV 10/07/09

CHECKED BY G. JONES 10/07/09

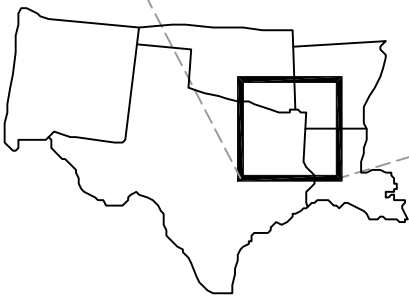
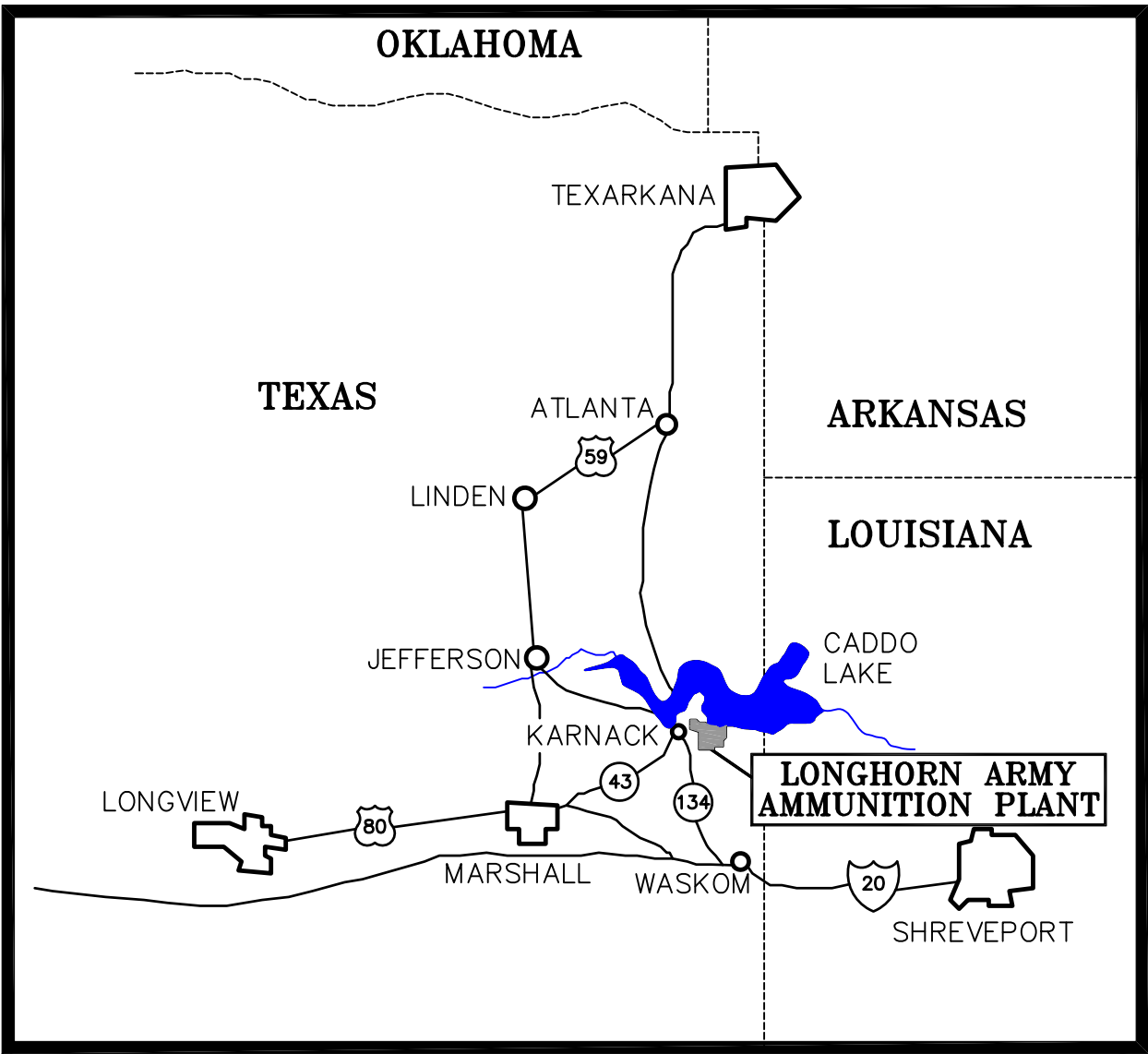
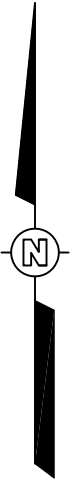
DRAWN BY L. JONES 12/17/03

OFFICE Houston, Texas

X-REF

IMAGE

PLOT DATE: 10/07/09  
FORMAT REVISION 3/25/99



"DRAWING NOT TO SCALE"



U.S. ARMY CORPS OF ENGINEERS  
TULSA DISTRICT  
TULSA, OKLAHOMA

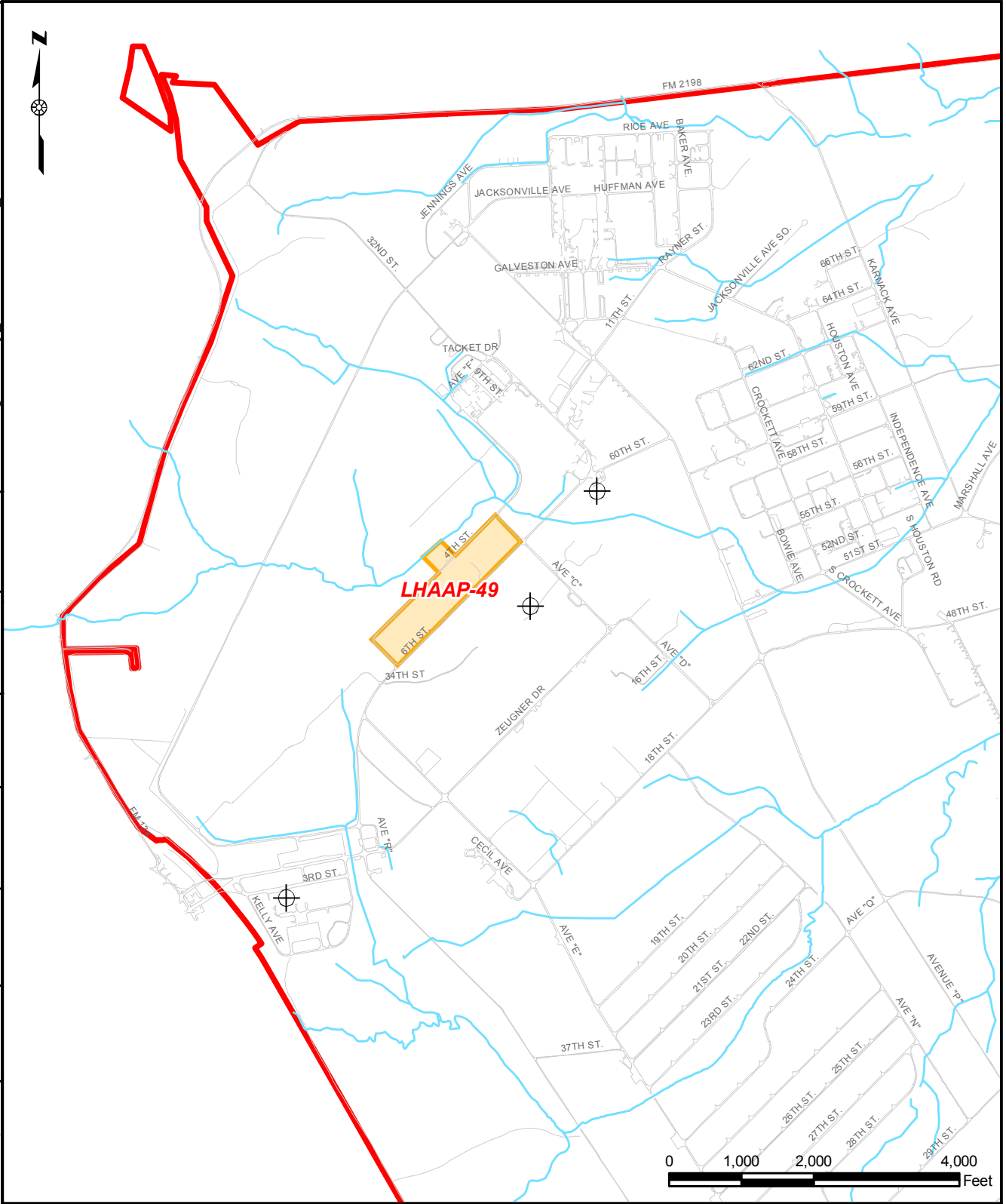
FIGURE 2-1

LHAAP LOCATION MAP







LONGHORN ARMY AMMUNITION PLANT  
KARNACK, TEXAS

OFFICE: Houston, TX  
 DRAWN BY: B. Lu  
 CHECKED BY: G. Jones  
 APPROVED BY: P. Srivastav  
 FILE PATH: T:\GIS\Longhorn\My\_WKSMXD\IS149\_Evaluation\FIG2-1.mxd

Plot Date: 06/07



**Legend**

-  Stream
-  Road
-  Site
-  Lake/Pond
-  LHAAP Boundary
-  LHAAP Water Supply Well



U.S. ARMY CORPS OF ENGINEERS  
 TULSA DISTRICT  
 TULSA, OKLAHOMA

**FIGURE 2-2**  
**SITE LHAAP-49 LOCATION MAP**  
 LONGHORN ARMY AMMUNITION PLANT  
 KARNACK, TEXAS

### ***3.0 Responsiveness Summary***

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The Proposed Plan for LHAAP-49 was released for public comments on January 25, 2010. The public asked several questions regarding LHAAP-49 at the Public Meeting on March 9, 2010, and submitted some written comments about the site via email. The public questions/comments are summarized in **Section 3.1** below, and a response is provided. The full text of the public comments in the form of a transcript is provided in the Administrative Record, available at the Marshall Public Library. No written or verbal comments about LHAAP-49 were received from the regulatory agencies during the public comment period or the Public Meeting. **Appendix A** contains the public announcement for the public comment period as well as its extension to March 25, 2010. These announcements also provide notification of the Open House on January 26, 2010, and the Public Meeting on March 9, 2010.

#### ***3.1 Stakeholder Issues and Lead Agencies Responses***

**Summary of Questions/Comments:** The one issue on LHAAP-49 that received questions/comments was in regard to the removal of a small quantity of mercury-contaminated soil in 2008. Soil samples were not collected as part of that effort, and some members of the community indicated that USFWS is unwilling to accept transfer of the property until sampling is done. The question can be summarized as: Why has the Army not collected a soil confirmation sample below the excavation and analyzed it for mercury content?

**Response:** The Army, USEPA and TCEQ are satisfied that there is no unacceptable risk to the industrial user at Site 49 and so there is no need for confirmation sampling. The elevated concentrations of mercury and lead that were known to exist at the site were subject to a risk analysis and found to be acceptable given the future land use. USEPA concurred with this conclusion. However, TCEQ expressed concerns that the location of the elevated mercury concentration could be a hot spot that may pose potential unacceptable risk if a person(s) were to be exposed to this area repeatedly over a long period of time. Although the Army considered this scenario highly unlikely, in an effort to expedite closure of the site, the Army's contractor performed soil removal at and around the two sample locations with the highest mercury concentrations. This soil removal was not required based on risk calculations and was not done at the direction of the Army. Prior to off-site disposal, the excavated soil was subject to waste characterization using the toxicity characteristic leaching procedure. The soil was determined to be non-hazardous. Lead and mercury results for the leachate were below detection limits. The excavated area was backfilled with clean soil from an off-site source. The backfill soil was tested for lead and mercury as well as six other metals, and the results were below background concentrations. Thus, a site with acceptable risk was made even more acceptable. Although USEPA and TCEQ find no unacceptable risk for the use of the site as a national wildlife refuge,

USFWS has stated that the land will not be accepted without a confirmation sample. Therefore, this is not a CERCLA issue, but a transfer one between USFWS and Army.

While the cost for an additional soil sample seems minor, the Army cannot readily sample without a clear technical basis for doing so. Since the risk has already been evaluated and was found to be acceptable, even while including the two high mercury results, additional samples do not appear to be warranted. The USEPA and TCEQ have reviewed the documents that describe the investigation and risk evaluation for LHAAP-49 and they have accepted the proposed plan for no action at LHAAP-49 as they indicated at the public meeting on March 9, 2010.

### ***3.2 Technical and Legal Issues***

There are no technical and legal issues beyond the issue described in **Section 3.1**.

## 4.0 References

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USEPA, 2005, Letter from C. Villarreal to R. Zeiler, Re: Longhorn Army Ammunition Plant (LHAAP), Evaluation of the West Further Investigation Area, April 18.

## *Glossary of Terms*

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**Administrative Record File** – The body of reports, official correspondence, and other documents that establishes the official record of the analysis, clean up, and final closure of a site.

**Background Levels** – Naturally-occurring concentrations of inorganic elements (metals) that are present in the environment and have not been altered by human activity.

**Characterization** – The compilation of available data about the waste unit to determine the rate and extent of contaminant migration resulting from the waste site, and the concentration of any contaminants that may be present.

**Chemicals of Concern (COC)** – Those chemicals that significantly contribute to a pathway in an exposure model of a hypothetical receptor (e.g., a child that resides on a site). They exceed either the calculated numerical limit for cumulative site cancer risk (1 in 10,000 exposed individuals) or the calculated numerical limit of 1 for non-cancer effects, a value proposed by the USEPA.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)** – CERCLA was enacted by Congress in 1980 and was amended by the Superfund Amendments and Reauthorization Act in 1986. CERCLA provides federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites and established the Superfund Trust Fund.

**Exposure** – Contact of an organism with a chemical or physical agent. Exposure is quantified as the amount of the agent available at the exchange boundaries of the organism (e.g., skin, lungs, gut) and available for absorption.

**Federal Facility Agreement** – A legal binding agreement among USEPA, TCEQ, and U.S. Army that sets the standards and schedules for the comprehensive remediation of Longhorn Army Ammunition Plant.

**Groundwater** – Underground water that fills pores in soil or openings in rocks to the point of saturation.

**Human Health Risk Assessment** – A study conducted as part of a remedial investigation to determine the risk posed to human health by site-related chemicals.

**National Priorities List (NPL)** – The USEPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under



**Superfund.** USEPA is required to update the NPL at least once a year. A site must be on the NPL to receive money from the Trust Fund for remedial action.

**Record of Decision** – A legal document presenting the remedial action selected for a site or operable unit. It is based on information and technical analyses generated during the remedial investigation/feasibility study and consideration of public comments on the statement of basis/proposed plan and community concerns.

**Remedial Investigation** – A study designed to gather data needed to determine the nature and extent of contamination at a Superfund site.

**Resource Conservation and Recovery Act (RCRA)** – Gives USEPA the authority to control the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA focuses only on active and future facilities and does not address abandoned or historical sites.

**Responsiveness Summary** – A summary of oral and/or written comments received during the proposed plan comment period and includes responses to these comments. The responsiveness summary is a key part of a ROD highlighting community concerns.

**Proposed Plan** – A plan for a site cleanup that proposes a recommended or preferred remedial alternative. The Proposed Plan is available to the public for review and comment and the preferred alternative may change based on public and other stakeholder input.

**Superfund Amendments and Reauthorization Act (SARA)** – Amended CERCLA in 1986. SARA resulted in more emphasis on permanent remedies for cleaning up hazardous waste sites, increased the focus on human health problems posed by hazardous waste sites, and encouraged greater citizen participation in making decisions on how sites should be cleaned up.

**Superfund** – The common name used for CERCLA; also referred to as the Trust Fund. The Superfund Program was established to help fund cleanup of hazardous waste sites. It also allows legal action to force those responsible for sites to clean them up.

*Appendix A*

*Public Announcements*

**PUBLIC NOTICE**  
**THE UNITED STATES ARMY INVITES PUBLIC COMMENT ON THE PROPOSED PLANS**  
**FOR ENVIRONMENTAL SITES LHAAP-46, -49, -50, -35A(58), AND THE PISTOL RANGE,**  
**LONGHORN ARMY AMMUNITION PLANT, TEXAS**

The U.S. Army is the lead agency for environmental response actions at Longhorn Army Ammunition Plant (LHAAP). In partnership with Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency Region 6, the U.S. Army has developed Proposed Plans for the following NPL sites: LHAAP-46, LHAAP-49, LHAAP-50, LHAAP-35A(58), and the Pistol Range. Although the Proposed Plans identify preferred remedies for each of the sites, the U.S. Army welcomes the public's review and comments. The public comment period begins January 25, 2010, and concludes February 23, 2010. **On Tuesday, January 26, 2010, from 6:00 to 8:00 p.m., the U.S. Army is inviting all interested parties to attend an open house forum to view the Proposed Plans and ask questions. The open house forum will be held at the Karnack Community Center, Highway 134 and Spur 449, Karnack, Texas.** Copies of the Proposed Plans and supporting documentation are available for public review at the Marshall Public Library, 300 S. Alamo, Marshall, Texas, 75670. Summaries of each of the sites, including discussion of various alternatives that were evaluated, are provided below.

**LHAAP-46**, the former Plant 2 production area, is located in the north-central portion of LHAAP and covers an area of approximately 190 acres. Plant 2 was used to produce pyrotechnic devices from February 1952 to 1956 and was reactivated to produce pyrotechnic and illumination devices from 1964 until approximately 1997. Three alternatives were evaluated for addressing the contaminated groundwater at the site: 1) no action; 2) monitored natural attenuation (MNA) and land use controls (LUCs); and 3) in situ bioremediation, short-term LUCs, and long-term monitoring (LTM). Based on available information, the preferred remedy is MNA and LUCs. The preferred remedy would utilize groundwater use restriction LUCs to protect human health by preventing human exposure to contaminated groundwater and MNA to return the contaminated water to its potential beneficial use as drinking water, wherever practicable.

**LHAAP-49**, a former Acid Storage Area, is located in the west-central portion of LHAAP and covers an area of approximately 30 acres. The site was used from 1942 to 1945 for formulation and storage of acids and acid mixtures in support of trinitrotoluene production. Based on available information, the preferred remedy at this time is no action. The recommendation is based on the existing data and determination of no unacceptable risk to human health or to ecological receptors at LHAAP-49.

**LHAAP-50**, a former sump water tank, is located in the north-central portion of LHAAP and covers an area of approximately 1 acre. Historically, LHAAP-50 contained a 47,000-gallon capacity aboveground storage tank which received wastewater from various industrial waste sumps from 1955 to 1988. Three alternatives were evaluated for addressing the contaminated groundwater and soil at the site: 1) no action; 2) soil - excavation, groundwater - MNA and LUCs; and 3) soil - excavation, groundwater - in situ bioremediation, MNA, and LUCs. Based on available information, the preferred remedy at this time is the second alternative: excavation and off-site disposal of perchlorate-contaminated soils, and MNA and LUCs for groundwater. The preferred remedy would ensure protection of human health by eliminating the soil-to-groundwater and soil-to-surface water pathways, implementing groundwater use restriction LUCs to prevent exposure to contaminated groundwater, and implementing MNA until groundwater cleanup levels are achieved.

**LHAAP-35A(58)**, known as the Shops Area, is located in the north-central portion of LHAAP and covers approximately 11 acres. The Shops Area was established in 1942 as part of the installation's initial construction. Plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical shops served the needs of the overall facility and became inactive in 1996 and 1997. Four alternatives were evaluated for addressing the contaminated groundwater at the site: 1) no action; 2) MNA with LUCs; 3) in situ bioremediation with short-term LUCs and LTM; and 4) in situ bioremediation followed by MNA and LUCs for the eastern plume, and MNA and LUCs for the western plume. Based on available information, the preferred remedy at this time is the fourth alternative: in situ bioremediation followed by MNA and LUCs for the eastern plume, and MNA and LUCs for the western plume. The preferred remedy would ensure protection of human health by 1) implementing groundwater use restriction LUCs which prevent human exposure to contaminated groundwater and 2) returning the contaminated water to its potential beneficial use as a drinking water, wherever practicable, through MNA and in situ bioremediation.

The former **Pistol Range** is located in the southeastern portion of LHAAP and covers an area of approximately 0.4 acres. The area was used by base security personnel as early as the 1950s and intermittently through 2004 as a small arms firing range. The target area was a natural, wooded slope at the eastern side of the site. Soil with contamination above industrial cleanup levels was excavated and disposed off site during a 2009 removal action. Based on available information, the preferred remedy at this time is no action. The recommendation is based on existing data and determination of no unacceptable risk to human health or to ecological receptors.

For further information or to submit written comments, contact: Dr. Rose M. Zeiler, Longhorn Army Ammunition Plant,  
P.O. Box 220, Ratcliff, Arkansas, 72951; phone number 479-635-0110 or e-mail [rose.zeiler@us.army.mil](mailto:rose.zeiler@us.army.mil).

**PUBLIC NOTICE**  
**THE UNITED STATES ARMY INVITES PUBLIC COMMENT ON THE PROPOSED PLANS**  
**FOR ENVIRONMENTAL SITES LHAAP-46, -49, -50, -35A(58), AND THE PISTOL RANGE,**  
**LONGHORN ARMY AMMUNITION PLANT, TEXAS**  
**PUBLIC MEETING AT KARNACK COMMUNITY CENTER MARCH 9, 2010**

The U.S. Army is the lead agency for environmental response actions at Longhorn Army Ammunition Plant (LHAAP). In partnership with Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency Region 6, the U.S. Army has developed Proposed Plans for the following NPL sites: LHAAP-46, LHAAP-49, LHAAP-50, LHAAP-35A(58), and the Pistol Range. Although the Proposed Plans identify preferred remedies for each of the sites, the U.S. Army welcomes the public's review and comments. The public comment period began January 25, 2010, and has been extended to March 25, 2010. **On Tuesday, March 9, 2010, from 7:00 to 9:00 p.m., the U.S. Army is inviting all interested parties to attend a public presentation of the proposed remedies for these sites and to ask questions and provide comments on the Proposed Plans. Questions, comments, and responses on the Proposed Plans will be recorded by a court reporter. This public meeting will be held at the Karnack Community Center, Highway 134 and Spur 449, Karnack, Texas.** Copies of the Proposed Plans and supporting documentation are available for public review at the Marshall Public Library, 300 S. Alamo, Marshall, Texas, 75670. Summaries of each of the sites, including discussion of various alternatives that were evaluated, are provided below.

**LHAAP-46**, the former Plant 2 production area, is located in the north-central portion of LHAAP and covers an area of approximately 190 acres. Plant 2 was used to produce pyrotechnic devices from February 1952 to 1956 and was reactivated to produce pyrotechnic and illumination devices from 1964 until approximately 1997. Three alternatives were evaluated for addressing the contaminated groundwater at the site: 1) no action; 2) monitored natural attenuation (MNA) and land use controls (LUCs); and 3) in situ bioremediation, short-term LUCs, and long-term monitoring (LTM). Based on available information, the preferred remedy is MNA and LUCs. The preferred remedy would utilize groundwater use restriction LUCs to protect human health by preventing human exposure to contaminated groundwater and MNA to return the contaminated water to its potential beneficial use as drinking water, wherever practicable.

**LHAAP-49**, a former Acid Storage Area, is located in the west-central portion of LHAAP and covers an area of approximately 30 acres. The site was used from 1942 to 1945 for formulation and storage of acids and acid mixtures in support of trinitrotoluene production. Based on available information, the preferred remedy at this time is no action. The recommendation is based on the existing data and determination of no unacceptable risk to human health or to ecological receptors at LHAAP-49.

**LHAAP-50**, a former sump water tank, is located in the north-central portion of LHAAP and covers an area of approximately 1 acre. Historically, LHAAP-50 contained a 47,000-gallon capacity aboveground storage tank which received wastewater from various industrial waste sumps from 1955 to 1988. Three alternatives were evaluated for addressing the contaminated groundwater and soil at the site: 1) no action; 2) soil - excavation, groundwater - MNA and LUCs; and 3) soil - excavation, groundwater - in situ bioremediation, MNA, and LUCs. Based on available information, the preferred remedy at this time is the second alternative: excavation and off-site disposal of perchlorate-contaminated soils, and MNA and LUCs for groundwater. The preferred remedy would ensure protection of human health by eliminating the soil-to-groundwater and soil-to-surface water pathways, implementing groundwater use restriction LUCs to prevent exposure to contaminated groundwater, and implementing MNA until groundwater cleanup levels are achieved.

**LHAAP-35A(58)**, known as the Shops Area, is located in the north-central portion of LHAAP and covers approximately 11 acres. The Shops Area was established in 1942 as part of the installation's initial construction. Plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical shops served the needs of the overall facility and became inactive in 1996 and 1997. Four alternatives were evaluated for addressing the contaminated groundwater at the site: 1) no action; 2) MNA with LUCs; 3) in situ bioremediation with short-term LUCs and LTM; and 4) in situ bioremediation followed by MNA and LUCs for the eastern plume, and MNA and LUCs for the western plume. Based on available information, the preferred remedy at this time is the fourth alternative: in situ bioremediation followed by MNA and LUCs for the eastern plume, and MNA and LUCs for the western plume. The preferred remedy would ensure protection of human health by 1) implementing groundwater use restriction LUCs which prevent human exposure to contaminated groundwater and 2) returning the contaminated water to its potential beneficial use as a drinking water, wherever practicable, through MNA and in situ bioremediation.

The former **Pistol Range** is located in the southeastern portion of LHAAP and covers an area of approximately 0.4 acres. The area was used by base security personnel as early as the 1950s and intermittently through 2004 as a small arms firing range. The target area was a natural, wooded slope at the eastern side of the site. Soil with contamination above industrial cleanup levels was excavated and disposed off site during a 2009 removal action. Based on available information, the preferred remedy at this time is no action. The recommendation is based on existing data and determination of no unacceptable risk to human health or to ecological receptors.

For further information or to submit written comments, contact: Dr. Rose M. Zeiler, Longhorn Army Ammunition Plant, P.O. Box 220, Ratcliff, Arkansas, 72951; phone number 479-635-0110 or e-mail [rose.zeiler@us.army.mil](mailto:rose.zeiler@us.army.mil).

## **MEDIA RELEASE**

The United States Army has prepared Proposed Plans for five environmental sites at the Longhorn Army Ammunition Plant: LHAAP-46, -49, -50, -35A(58) and the former Pistol Range. The Proposed Plans are documents that describe the sites and their proposed remedies. The Proposed Plans were developed to facilitate public involvement in the remedy selection process.

Copies of the Proposed Plans and supporting documentation are available for public review at the Marshall Public Library, 300 S. Alamo, Marshall, Texas, 75670 beginning January 25, 2010. The public comment period has been extended to March 25, 2010.

An informal open forum was held on January 26, 2010. A second public meeting, with a formal question and answer session, will be held on March 9, 2010, from 7:00 to 9:00 p.m. at the Karnack Community Center, Highway 134 and Spur 449, Karnack, Texas 75661.

All written public comments on the Proposed Plans must be postmarked on or before March 25, 2010. Written comments may be provided to Dr. Rose M. Zeiler, Longhorn Army Ammunition Plant, P.O. Box 220, Ratcliff, Arkansas 72951 or e-mailed to [rose.zeiler@us.army.mil](mailto:rose.zeiler@us.army.mil). E-mailed comments must be submitted by close of business on March 25, 2010.