

**DRAFT FINAL
PROPOSED PLAN
FOR LHAAP-03
FORMER WASTE COLLECTION PAD
BUILDING 722-P PAINT SHOP
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS**

Prepared For:



U.S. Army Corps of Engineers

Prepared By:

AECOM

AECOM Technical Services

April 2013

**THE U.S. ARMY ANNOUNCES THE PROPOSED PLAN FOR
LONGHORN ARMY AMMUNITION PLANT LHAAP-03
(FORMER WASTE COLLECTION PAD NEAR BUILDING 722-P, PAINT SHOP)**

1.0 INTRODUCTION

The United States (U.S.) Army is issuing this Proposed Plan for public comment and participation in accordance with Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Title 40 Code of Federal Regulations Part 300).

The primary purpose of the Proposed Plan is to facilitate public involvement in the remedy selection process for environmentally impacted sites. It provides the public with basic background about Longhorn Army Ammunition Plant (LHAAP) and Site LHAAP-03, the rationale for selecting the Preferred Alternative, and summaries of other alternatives considered for protecting human health and the environment from the chemicals of concern, arsenic and lead, detected in the soil. The LHAAP-03 Site is estimated to contain between 50 and 150 cubic yards of soil exceeding screening levels and is contained entirely within the LHAAP-58 boundary. For this reason, this proposed plan addresses the soil removal action at LHAAP-03 only and all other monitoring and reporting requirements associated with groundwater and land use, including CERCLA five year reviews, will be met under LHAAP-35A(58). The Preferred Alternative for the LHAAP-03 Site is Alternative 2: Excavation and Off-Site Disposal. Additional detail on the Preferred Alternative is provided below. Because of the extremely limited extent of the soil contamination, No Action was the only other alternative considered.

The U.S. Army, the lead agency for environmental response actions at LHAAP, is acting in partnership with the United States Environmental Protection Agency (USEPA) Region 6 and the Texas Commission on

Environmental Quality (TCEQ). As the lead agency, the U.S. Army is charged with planning and implementing remedial actions at the LHAAP. Regulatory agencies assist the U.S. Army by providing technical support, project

DATES TO REMEMBER

PUBLIC COMMENT PERIOD:

May 13, 2013 to June 12, 2013

The U.S. Army invites you to participate during the public comment period by submitting comments on the LHAAP-03 Proposed Plan. The U.S. Army will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING: The U.S. Army will hold a public meeting to explain the Proposed Plan for LHAAP-03. Oral and written comments will be accepted at the meeting. The meeting will be held on May 30, 2013 from 6:00 p.m. to 8:00 p.m. at Karnack Community Center.

For more information, see the Administrative Record at the following 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.)

For further information on LHAAP-03, please contact:

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review, project comment, and oversight in accordance with the CERCLA as amended by Superfund Amendments and Reauthorization Act and the LHAAP Federal Facilities Agreement (FFA).

Contaminated soil at the LHAAP-03 Site will be removed under the Preferred Alternative, Alternative 2, eliminating the potential threat to groundwater at the Site. This Plan addresses soil contamination and is the planned final remedy for contamination at the LHAAP-03 Site. A groundwater sample from the monitoring well located at the Site (03WW01) in November 2008 showed arsenic concentrations above the groundwater Maximum Contaminant Level (MCL). With removal of the impacted soil acting as a potential source of groundwater contamination and because LHAAP-03 consists of a small area located within the larger LHAAP-35A(58) Site, groundwater monitoring for arsenic will be completed as part of the planned Remedial Action for LHAAP-35A(58).

The U.S. Army, in consultation with the USEPA Region 6 and the TCEQ, will select a final remedy for the LHAAP-03 Site after reviewing and considering all information submitted during the 30-day public comment period (see details on Page 1). The U.S. Army may modify the Preferred Alternative or select another response action presented in the Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on both alternatives presented in the Proposed Plan.

This Proposed Plan summarizes LHAAP-03 Site information contained in the Administrative Record file and Remedial Investigation/Focused Feasibility Study (RI/FFS) report for LHAAP-03. Relevant information in this Proposed Plan is presented in the following sections:

- 1.0 Introduction
- 2.0 Site Background
- 3.0 Site Characteristics
- 4.0 Scope and Role
- 5.0 Risk Summary
- 6.0 Remedial Action Objectives
- 7.0 Summary of Remedial Alternatives
- 8.0 Evaluation of Alternatives
- 9.0 Summary of the Preferred Alternative

- 10.0 Community Participation
- 11.0 References and Documents Reviewed

2.0 SITE BACKGROUND

The LHAAP is located in central-east Texas in the northeastern corner of Harrison County (Figure 1). The installation occupies approximately 1,400 of its former 8,416 acres between State Highway 43 at Karnack, Texas, and the western shore of Caddo Lake. The nearest cities are Marshall, Texas, approximately 14 miles to the southwest, and Shreveport, Louisiana, approximately 40 miles to the southeast.

Caddo Lake, a large freshwater lake situated on the Texas-Louisiana border, bounds LHAAP to the north and east.

The U.S. Army has transferred nearly 7,000 acres to the U.S. Fish and Wildlife Service for management as Caddo Lake National Wildlife Refuge. The property transfer process is continuing as response actions are completed at individual sites. The Longhorn Restoration Advisory Board has been kept informed of investigations and progress at LHAAP and Site LHAAP-03 through regular quarterly meetings. Additionally, the Administrative Record is updated at least twice per year and is available at the Marshall Public Library (see details on Page 1).

LHAAP-03 was not listed on the National Priorities List (NPL) when LHAAP was initially added in 1990. However, due to releases of chemicals from operations at the facility, LHAAP-03 was added to the NPL by the FFA parties in 2011. Activities to remediate contamination associated with the listing of LHAAP as a NPL site began in 1990. The U.S. Army, the USEPA, and the Texas Water Commission (currently known as the TCEQ) have entered into a CERCLA Section 120 FFA since that time 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.

A Site description of LHAAP-03, Site characteristics, and a summary of Site risks are provided below followed by a discussion of remedial alternatives and the Preferred Alternative recommendation.

LHAAP-03, known as Site 03, or the Former Waste Collection Pad, is approximately 50 feet to the west of former Building 722-P, paint shop (Figure 2). LHAAP-03 was a waste collection Site outside of the paint shop at Building 722-P, which was at the Maintenance Shop Area within the boundary of LHAAP-35A(58). Building 722-P was used for paint spraying and polyurethane spray coating of various items. Heavy metal-based primers, other waste paint, waste solvents and contaminated rags were collected in a 55-gallon drum on a gravel pad in an open-sided shed. Full drums were taken to Building 31-W for disposal. Building 722-P has been demolished. Potential Site-related chemicals at LHAAP-03 were metals, volatile organic compounds (VOC), and semi-volatile organic compounds (SVOC) (Plexus Scientific Corporation, 2005).

Various investigations have been conducted at LHAAP-03 to evaluate the nature and extent of soil and groundwater impact at the Site. These investigations have included multiple rounds of soil sampling and analyses, installation of a groundwater monitoring well, and groundwater sampling and analyses. All sampling activities and laboratory analytical methods were in accordance with the Installation-Wide Work Plan (Shaw, 2006). LHAAP-03 lies entirely within LHAAP-35A(58) and groundwater is being addressed as part of the planned remedial action for the larger Site, LHAAP-35A(58). Multiple soil sampling events were conducted at LHAAP-03 from 2006 through 2007. The soil sampling activities included collection of samples from more than 17 locations at depths ranging from surface (0 to 0.5 feet below ground surface [bgs]) to 15 feet bgs. The samples were analyzed in the laboratory for metals, and soil samples were found to contain lead, arsenic, VOCs, and SVOCs (Shaw, 2009).

3.0 SITE CHARACTERISTICS

LHAAP-03 lies above the Wilcox formation. This creates three groundwater zones at different

depths. The groundwater flow in these zones is generally east-northeast in the direction of Caddo Lake, but varies by location. It should be noted that groundwater generally occurs under semi-confined conditions at LHAAP-03. The depth to groundwater across LHAAP varies with typical depths ranging from 12 to approximately 25 feet bgs.

This Proposed Plan addresses soil at LHAAP-03. As previously stated, groundwater monitoring for arsenic within LHAAP-03 will be completed as part of the planned Remedial Action for LHAAP-35A(58). The concentrations of chemicals detected in soil samples at LHAAP-03 were compared to the screening levels protective of human health and the environment. These screening levels are either published by the TCEQ or were calculated based on the TCEQ guidance.

This comparison indicated that VOCs and SVOCs, along with soil metal exposure levels at the surface, did not exceed their respective screening levels for direct exposure pathways in any soil sample. The comparison of metal concentrations with groundwater protection screening levels indicated that two metals, arsenic and lead, may pose a threat to groundwater quality at LHAAP-03. Therefore, these two metals were selected as target chemicals for soil remediation at LHAAP-03. Figure 3 shows the extent of arsenic and lead in soil at LHAAP-03, which is anticipated to consist of between 50 and 150 cubic yards of soil.

4.0 SCOPE AND ROLE OF THE PROPOSED REMEDY

This is the final planned Remedial Action for the LHAAP-03 Site. The soil contaminants of concern (COCs) are lead and arsenic. The Preferred Alternative of excavation and off-Site disposal of contaminated soil will remove the COCs in the soil and based upon the small area of soil above the clean-up levels (50-150 cubic yards) represents the best alternative. Because the LHAAP-03 Site is small and entirely contained within the LHAAP-35A(58) boundary, all other monitoring and reporting requirements associated with groundwater and land use, including the five year reviews, will be

met under LHAAP-35A(58). The groundwater LUC restriction boundary that is presented in the LHAAP-35A(58) RD (Shaw, 2011a) as well as the nonresidential use boundary for LHAAP-35A(58) encompasses LHAAP-03. Further information on the restrictions can be found in the September 2010 LHAAP-35A(58) Record of Decision (ROD) and September 2011 Remedial Design. The monitoring of the LHAAP-03 groundwater is included in the LHAAP-58 Remedial Action Work Plan, as is the provision for all other LHAAP-03 monitoring and reporting requirements beyond the soil removal action. No separate ongoing administrative or response action will be required at LHAAP-03 after Alternative 2 is implemented.

5.0 SUMMARY OF LHAAP-03 SITE RISKS

Human Health Risk Assessment

A Human Health Risk Assessment (HHRA) for LHAAP-03 was conducted as part of risk assessment for the larger Site LHAAP-35A(58), which encompasses LHAAP-03. The HHRA included a calculation of cancer risks and non-cancer hazards for a hypothetical future maintenance worker under an industrial scenario for soil and groundwater. The cancer risk values were compared to the USEPA target risk range of 1×10^{-4} to 1×10^{-6} , and the non-cancer hazards were compared to the target hazard index of 1.

Soil

The major COCs found at the Site in soil are lead and arsenic. For the hypothetical future maintenance worker exposure to soil, the estimated hazard index is 0.47, below the benchmark of 1. The calculated carcinogenic risk is 2.1×10^{-5} , which is within the acceptable range (1×10^{-6} to 1×10^{-4}).

Groundwater

The VOC-impacted groundwater is unrelated to activities performed at LHAAP-03 and is being addressed as part of the planned remedial action for LHAAP-35A(58). The only groundwater COC above its respective TCEQ risk-based Medium Specific Concentration (groundwater – industrial level) and MCL of 0.01 milligrams per

liter (mg/L) was arsenic at 0.0414 mg/L in one well (03WW01) (See Figure 3). This exceedance of arsenic above its MCL is believed to be due to anaerobic conditions (i.e., low dissolved oxygen) in groundwater and not from site operations.

All other metals were either not detected or were detected at concentrations below their respective MCLs or GW-Ind values. The risks regarding LHAAP-03's groundwater are discussed in more detail in the LHAAP-35A(58) ROD (Shaw, 2010).

The excavation proposed in Alternative 2 will destroy monitoring well 03WW01. Monitoring well 03WW01 will be abandoned in accordance with Texas Administrative Code, Title 16, Section 76.1004. The existing monitoring well 35AWW08 and the proposed new monitoring well 35AWW09 will be used as replacement for 03WW01 (See Figure 3).

Although the risks to human health due to soil contamination are within the acceptable industrial screening criteria range at LHAAP-03, a comparison of arsenic and lead concentrations in the soil with regulatory threshold values indicate that these metals may pose a threat to groundwater quality. Therefore, the U.S. Army's current judgment is that the Preferred Alternative identified in this Proposed Plan is necessary to protect public health, welfare, or the environment from actual or threatened impacts to groundwater from lead and arsenic in the soil.

Ecological Risk Assessment

The ecological risk for Site LHAAP-03 was addressed in the installation-wide Baseline Ecological Risk Assessment (BERA) completed in 2007 by Shaw. The BERA concluded that no unacceptable risk was present in the Industrial Sub-Area, where LHAAP-03 is located. Therefore, no further action is needed at LHAAP-03 for the protection of ecological receptors.

Data gap sampling is currently being conducted for explosives, and the results of this sampling will be incorporated into an addendum to the BERA. However, based on the historical use of the Maintenance Shop Area (the larger area

within which LHAAP-03 is located), no change to the BERA conclusions are anticipated.

6.0 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are established to protect human health and the environment while also meeting applicable or relevant and appropriate requirements (ARARs). The identification of RAOs must consider the environmental issues at the Site and the receptors that are affected. The primary environmental issue or COC at LHAAP-03 is arsenic and lead concentrations in the soil that have the potential to leach into the groundwater. Ecological risk is not a concern at LHAAP-03. Based on these considerations, the RAO for LHAAP-03 is presented below:

- Protect human health and the environment by minimizing the potential for leaching of COCs from impacted soil into underlying groundwater.

The remediation goals for the COCs in soil are presented below:

- Arsenic levels at 5.9 milligrams per kilogram (mg/kg) or less.
- Lead levels at 180 mg/kg or less.

7.0 SUMMARY OF REMEDIAL ALTERNATIVES

Seven remedial technologies/process options were screened as part of the Feasibility Study based on their effectiveness, implementability, and cost per the USEPA RI/FFS guidance. Based on this screening, only two remedial alternatives were retained for detailed evaluation due to the small area of impacted soil rendering several technologies/process options ineffective, either technically or based on costs. The evaluation of the limited set of alternatives is consistent with NCP, which states that the scope of the RI/FFS analysis should be tailored to the Site circumstances and complexity of Site problems.

The remedial alternatives are summarized below.

Alternative 1 – No Action

The No Action Alternative is required by CERCLA and serves as a baseline for comparison to other alternatives. Alternative 1 provides no monitoring, treatment, or remediation for soil.

There are no costs associated with the No Action alternative.

Estimated Total Present Worth (PW) Cost: \$0

Alternative 2 – Excavation and Off-Site Disposal

This Alternative is the Preferred Alternative and involves the excavation and off-Site disposal of contaminated soil from LHAAP-03.

It is estimated that the total volume of contaminated soils to be excavated is 57 bank cubic yards, or 86 tons; however, soil sampling will be completed to confirm results meet applicable clean-up levels and excavation will continue until clean-up levels are achieved. All excavated material will be disposed at a permitted disposal facility. After excavation, confirmation samples will be collected and analyzed for metals. Once confirmation sampling results meet the proposed cleanup levels, the excavation areas will be backfilled with clean soil and reseeded.

All components of this action would use standard construction and operating procedures and routine sampling and analysis procedures. Details concerning operating procedures will be provided in a future design/work plan.

Implementation of this action may result in short-term impacts, such as minor fugitive dust emissions, storm-water runoff and precipitation/infiltration in the excavation areas. These potential problems would be eliminated using appropriate engineering controls, such as water spraying, erosion and sediment control, and phased excavation areas.

No LUCs beyond those in place for the larger LHAAP-35A(58) will be implemented to address LHAAP-03.

Estimated Total PW Cost: \$87,878

8.0 EVALUATION OF ALTERNATIVES

Nine criteria identified in the NCP, 300.430(f)(1)(i), are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. The evaluation includes threshold criteria (requirements that must be met) and balancing criteria (used to weigh trade-offs). The modifying criteria (anticipated agency and public acceptance) will be evaluated based on comments received on this Proposed Plan.

1. Overall Protection of Human Health and the Environment

No unacceptable risks to human health or the environment were determined to be associated with LHAAP-03 by the HHRA or BERA. However, metal concentrations in soil indicate the potential for contamination of groundwater in the future. Therefore, it was determined that addressing the metal contamination in soil was required to prevent potential impacts to groundwater resources at LHAAP.

The Excavation and Off-Site Disposal alternative is the most protective of groundwater. It involves the removal of impacted soil at LHAAP-03, and therefore is the alternative that includes active cleanup of the Site. This alternative meets the RAOs and is effective in preventing impacts to groundwater because contamination above the remedial goals is removed from the Site. The No Action alternative involves no actions to prevent impacts to groundwater resources.

2. Compliance with ARARs

ARARs are environmental laws that are identified on a Site-specific basis. The No Action alternative does not meet the chemical-specific ARARs because contaminant levels remain in the soil. The Excavation and Off-Site Disposal alternative involves actions to mitigate migration of contaminants from soil, and therefore is the alternative that meets chemical-specific ARARs.

3. Long-Term Effectiveness and Permanence

Over the long-term, the Excavation and Off-Site Disposal alternative would provide long-term effectiveness and permanence by preventing migration of contaminants from soil into groundwater. The No Action alternative is not effective in the long term.

4. Reduction in Toxicity, Mobility, or Volume Through Treatment

The No Action alternative does not provide reduction of toxicity, mobility, or volume of the contaminants. The Excavation and Off-Site Disposal alternative provides reduction of mobility because metals-contaminated soil is removed from the Site and placed in a permitted disposal facility. Toxicity and volume are not reduced by the Excavation and Off-Site Disposal alternative as the form and quantity of the contaminated soil is not altered.

5. Short-Term Effectiveness

Short-term effectiveness is not applicable to the No Action alternative. For the Excavation and Off-Site Disposal alternative, the use of proper dust suppressant measures would control windblown emissions of contaminated dust to protect the community and on-Site workers. Proper personal protective equipment would be required for Site workers. Measures to protect the environment are not expected for implementing the Excavation and Off-Site Disposal alternative.

The length of time required to implement and complete the remedial alternatives are as follows: Alternative 1 is a no action alternative, therefore, no time is required. The Excavation and Off-Site Disposal alternative, Alternative 2, has an estimated implementation duration of nine months.

6. Implementability

The alternatives are considered to be implementable.

7. Cost

The No Action alternative, which has no associated cost, is the least expensive alternative. The estimated net present-worth of

Alternative 2 is \$87,878, for the period of excavation of nine months.

Alternative 1 Total PW Cost: \$0

Alternative 2 (Preferred Alternative)

Total PW Cost: \$87,878

8. State/Support Agency Acceptance

The State of Texas and the USEPA support the Preferred Alternative.

9. Community Acceptance

Public comments will be solicited as part of the public comment period on the Proposed Plan and incorporated into the Responsiveness Summary in the final ROD.

9.0 SUMMARY OF THE PREFERRED ALTERNATIVE

Based on the evaluation of alternatives, Alternative 2 (Excavation and Off-Site Disposal) is the Preferred Alternative for the LHAAP-03 because it:

- is protective of human health and the environment;
- complies with ARARs;
- is expected to achieve RAOs;
- has been shown to be both efficient and effective at other sites with similar contamination; and,
- is easy to implement with minimal adverse short-term impacts.

It is estimated that the total volume of contaminated soils to be excavated is 57 bank cubic yards, or 86 tons. The excavation area and volume will be further defined as part of pre-excavation sampling during the remedial action implementation. All excavated material would be disposed at a permitted disposal facility. After excavation, confirmation samples would be collected and analyzed for metals. Once confirmation sampling results meet the proposed cleanup levels, the excavation areas would be backfilled with clean soil and reseeded.

All components of this action would use standard construction and operating procedures and routine sampling and analysis procedures. Details concerning operating procedures will be provided in a future design/work plan.

Implementation of this action may result in short-term impacts, such as fugitive dust emissions, storm-water runoff and precipitation/infiltration in the excavation areas. These potential problems would be eliminated using appropriate engineering controls, such as water spraying, erosion and sediment control, and phased excavation areas or temporary sheeting. Additional potential problems could be encountered during transportation of impacted soils from the Site to the designated disposal facility.

Because the LHAAP-03 Site is small and entirely contained within the LHAAP-35A(58) boundary, all other monitoring and reporting requirements associated with groundwater and land use, including the five year reviews, will be met under LHAAP-35A(58).

The Preferred Alternative can change in response to public comments or new information.

Based on information currently available, the U.S. Army believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the alternatives with respect to the balancing and modifying criteria. The U.S. Army expects the Preferred Alternative to satisfy the following requirements of CERCLA Section 121(b):

- be protective of human health and the environment;
- comply with ARARs; and,
- be cost effective.

10.0 COMMUNITY PARTICIPATION

The U.S. Army, the USEPA, and the TCEQ provide information regarding LHAAP-03 through public meetings and the Administrative Record file for the facility. The public is encouraged to gain a more comprehensive understanding of the Site.

The public comment period for this Proposed Plan offers the public an opportunity to provide input to the LHAAP-03 remedial action planning process. The Proposed Plan is available in the Administrative Record (see "Dates to Remember" on page 1 of this Proposed Plan for location). The public

comment period will begin on May 13, 2013 and end on June 12, 2013.

After the public has had an opportunity to review this Proposed Plan during the public comment period and the U.S. Army reviews the public comments received on it, the U.S. Army will publish the selected remedy for the LHAAP-03, the basis for its selection, the associated RAOs, and any contingency planning in a Decision Document (DD). The U.S. Army will also incorporate a Responsiveness Summary addressing public comments in the DD.

11.0 REFERENCES AND DOCUMENTS REVIEWED

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Ammunition Plant, Karnack, Texas, Houston, Texas. November.

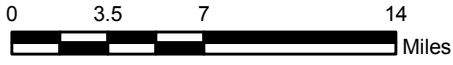
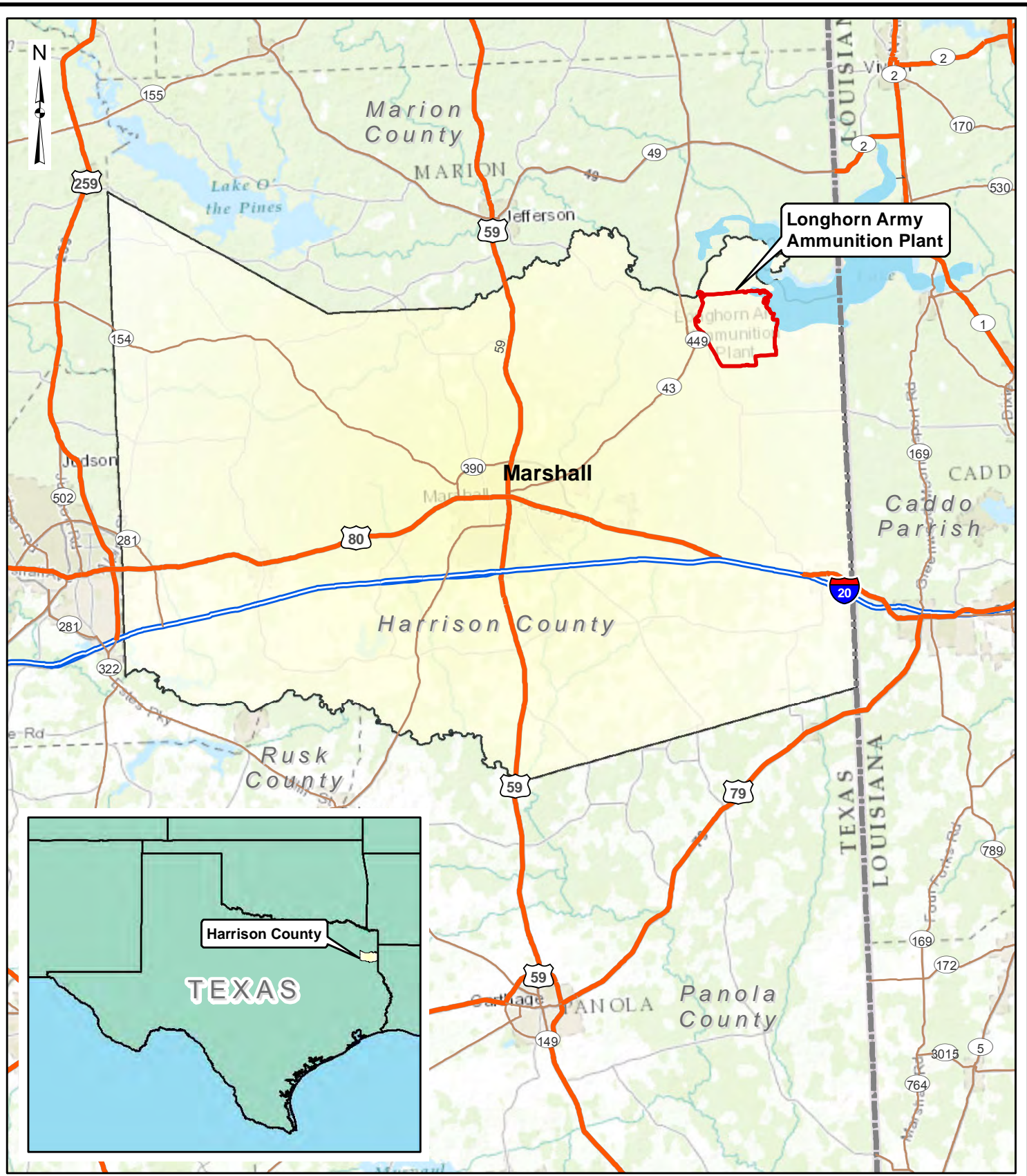
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U.S. Army Environmental Hygiene Agency, 1987. *Hazardous Waste Study No. 37-26-1665-87, Hazardous Waste Minimization.* May.



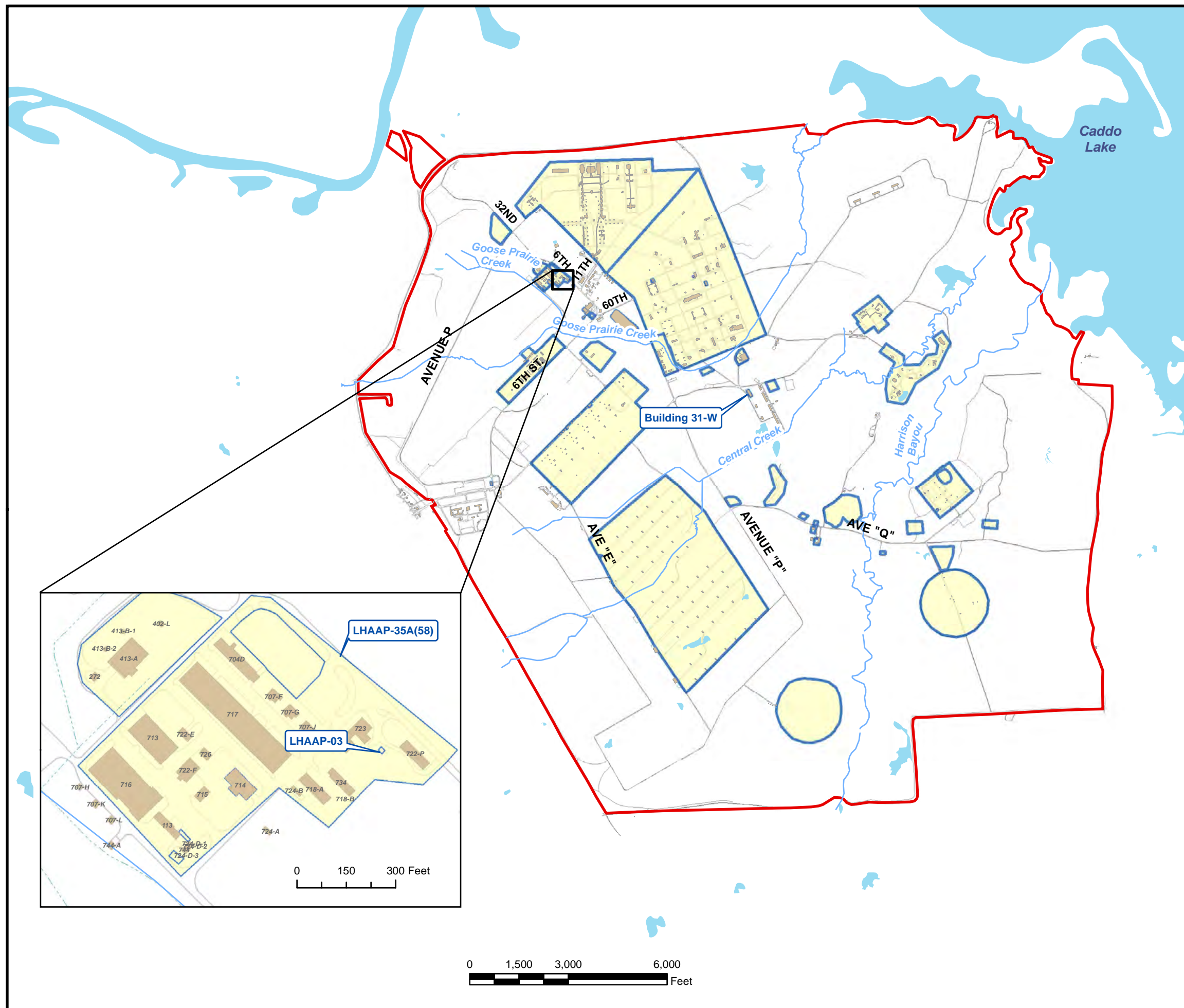
LHAAP -- Longhorn Army Ammunition Plant



Figure 1
LHAAP Location Map
LHAAP-03
Longhorn Army Ammunition Plant
Karnack, Texas

60256135

December 2012



Legend






-  Streams
-  Roads
-  LHAAP Boundary
-  LHAAP-03 Site Boundary
-  Lake/Pond



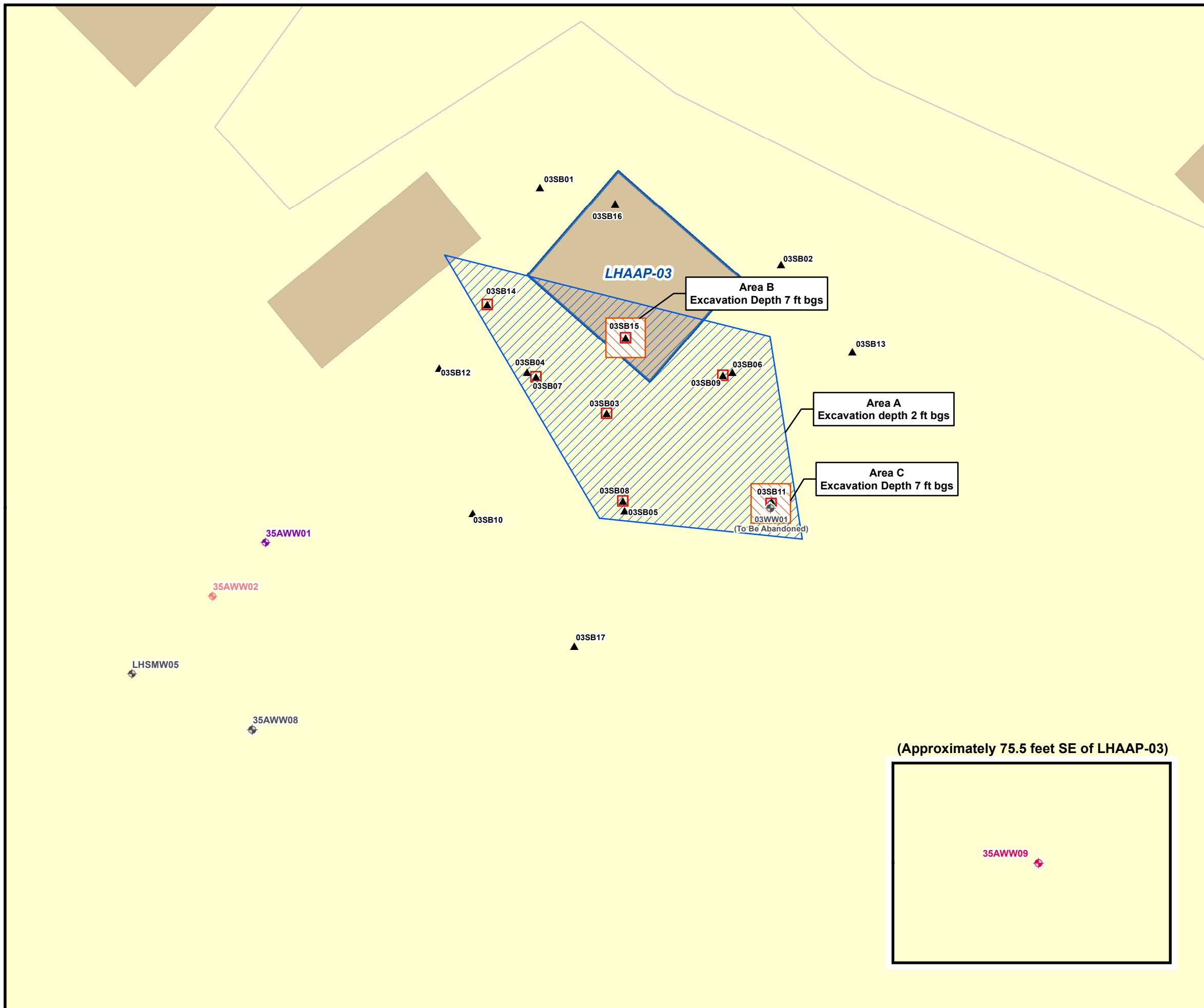
Figure 2
 Site Location Map
 LHAAP-03
 Longhorn Army Ammunition Plant
 Karnack, Texas

60256135

December 2012

0 150 300 Feet

0 1,500 3,000 6,000 Feet

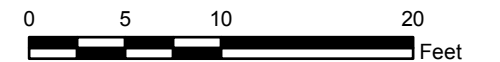


Legend

- ▲ Soil Boring
- Locations with Concentrations Exceeding Applicable RRS3 MSCs
- ◆ Proposed New Replacement Wells
- ⊕ Shallow Monitoring Well
- ⊖ Intermediate Monitoring Well
- ⊗ Deep Monitoring Well
- ▨ Target Remediation Area B and Area C
- ▧ Target Remediation Area A
- Roads
- Former Building Location
- Site

Notes:
ft bgs - feet below ground surface

Source:
Shaw, 2011, Draft Engineering Evaluation and Cost Analysis, LHAAP-03 (Former Waste Collection Pad Near Building 722-P, Paint Shop) Longhorn Army Ammunition Plant, Karnack, Texas.



Longhorn Army Ammunition Plant
Karnack, Texas

**Conceptual Target Remediation Area
LHAAP-03**

PROJECT NO. 60256135	PREPARED BY: TEG	DATE: 12-2012	Figure 3
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GLOSSARY OF TERMS

Specialized terms used in this Proposed Plan are defined below:

Administrative Record File: A file which is maintained and contains all information used to make a decision on the selection of a response action under CERCLA.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state environmental laws and regulations that must be complied with when undertaking a selected remedy. These requirements may vary among sites and alternatives.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A law that establishes a program to identify hazardous waste sites and procedures for cleaning up sites to be protective of human health and the environment, and evaluate damages to natural resources.

Decision Document (DD): A public document that identifies the selected remedy, the final RAOs, measures to achieve RAOs, the basis for the decision, remedial action performance expectations, and metrics to assess remedial progress. The DD is based on the information and technical analysis generated during the Remedial Investigation/Feasibility Study, consideration of ARARs, and consideration of public comments. All information used to make a final remedy decision must be documented in the Site Administrative Record.

Feasibility Study (FS): An investigation stage in the CERCLA clean-up process to identify the alternatives available to address contamination at a site, including an analysis of cost and how each alternative will protect human health and the environment

Five-year Review: A process that evaluates the protectiveness of the remedy and determines whether conditions remain protective of human health and the environment. CERCLA Section 121(c) and the National Contingency Plan at 40 CFR Section 300.430(f)(4)(ii) require that remedial actions that result in hazardous substances, pollutants, or contaminants remaining at a site above levels that allow for unlimited use and unrestricted exposure be reviewed every 5 years to ensure protection of human health and the environment.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): Also referred to as the National Contingency Plan, it is a plan required by CERCLA and codified at 40 CFR Section 300 that provides a framework for responding to releases or threats of release of hazardous substances and oil discharges.

Present Worth (PW) Analysis: A method to evaluate expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared. When calculating present worth costs for Superfund sites, capital as well as operation & maintenance costs are included.

Proposed Plan: A public participation requirement of CERCLA Section 117 in which the lead federal agency summarizes the preferred cleanup strategy, the rationale for the preference, the alternatives evaluated in the remedial investigation/feasibility study, and any ARAR waivers proposed for site cleanup. The Proposed Plan is issued to the public to solicit public review and comment on all alternatives under consideration.

Public Comment Period: A prescribed period during which the public may comment on the Proposed Plan.

Remedial Action: The means selected to achieve RAOs; also, the construction or implementation phase that follows the remedial design of the selected cleanup alternative at an NPL site.

Remedial Action Objective (RAO): The goals established for a remedy that ensure protection of human health and the environment.

Remedial Investigation (RI): An investigation stage in the CERCLA clean-up process in which the nature and extent of contamination (types of chemicals and how far they have travelled vertically and horizontally) is determined

Resource Conservation and Recovery Act (RCRA): RCRA, enacted in 1976, is the principal Federal law in the United States governing the disposal of solid waste and hazardous waste

Risk Assessment: An analysis of the potential adverse health effects (current and future) caused by hazardous substances. The assessment contributes to decisions regarding appropriate response alternatives.

ACRONYMS

ARARs	applicable or relevant and appropriate requirements
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DD	Decision Document
FFA	Federal Facilities Agreement
HHRA	Human Health Risk Assessment
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
PW	present worth
RAO	Remedial Action Objective
RI/FFS	Remedial Investigation/Focused Feasibility Study
ROD	Record of Decision
SVOC	semi-volatile organic compounds
TCEQ	Texas Commission on Environmental Quality
U.S.	United States
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound