DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

June 28, 2019

DAIM-ODB-LO

Mr. Rich Mayer
U.S. Environmental Protection Agency, Region 6
1201 Elm Street, Suite 500
Dallas, TX 75270-2102

Re: Draft Final Remedial Design/Remedial Action Work Plan, LHAAP-03, Former Waste Collection Pad, Building 722-P Paint Shop Longhorn Army Ammunition Plant, Karnack, Texas, June 2019

Dear Mr. Mayer,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your records. The document includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft version received on June 3, 2019, and Texas Commission on Environmental Quality's (TCEQ) comments received on June 6, 2019. In accordance with Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment. Response to comments on the Draft version of the document are included with this Draft Final.

The document was prepared by Bhate Environmental Associates, Inc., (Bhate) team, on behalf of the Army as part of Bhate's Performance Based Remediation contract for the facility. I ask that Kim Nemmers, Bhate's Project Manager, be copied on any communications related to the project.

The point of contact for this action is the undersigned. I may be contacted at 479-635-0110, or by email at rose.m.zeiler.civ@mail.mil.

Sincerely,

Rose M. Zeiler, Ph.D.
Longhorn AAP Site Manager

Copies furnished:
A. Palmie, TCEQ, Austin, TX (letter)
P. Bruckwicki, Caddo Lake NWR, TX (1 hard copy and 1 CD)
A. Williams, USACE, Tulsa District, OK (1 CD)
R. Smith, USACE, Tulsa District, OK (Electronic only)

A. Sherman, USAEC, San Antonio, TX (1 CD)
K. Nemmers, Bhate, Lakewood, CO (1 hard copy and 1 CD)
P. Srivastav, APTIM, Houston, TX (letter)

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BOX 220
RATCLIFF, AR 72951

June 28, 2019

DAIM-ODB-LO

Ms. April Palmie
Texas Commission on Environmental Quality
Superfund Section, MC-136
12100 Park 35 Circle, Bldg D
Austin, TX 78753

Re: Draft Final Remedial Design/Remedial Action Work Plan, LHAAP-03
Former Waste Collection Pad, Building 722-P Paint Shop
Longhorn Army Ammunition Plant, Karnack, Texas, June 2019

Dear Ms. Palmie,

One hard copy and one compact disc (CD) of the above-referenced document is being transmitted to you for your records. The document includes revisions based upon the Environmental Protection Agency's (EPA) comments on the Draft version received on June 3, 2019, and Texas Commission on Environmental Quality's (TCEQ) comments received on June 6, 2019. In accordance with Federal Facility Agreement, this Draft Final will be considered Final after 30 days without further comment. Response to comments on the Draft version of the document are included with this Draft Final.

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Response to Comments on
Draft Remedial Design / Remedial Action Work Plan
LHAAP-03 Former Waste Collection Pad, Building 722-P Paint Shop,
Longhorn Army Ammunition Plant, Karnack, Texas

Document Date: 17 May 2019
Comment Date: 3 June 2019

Reviewer: Mr. Richard Mayer, USEPA
Respondent: Dr. Rose Zeiler

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X)
2. Commenter Agrees (A) with response, or Does Not Agree (D) with response

Comment No.	Section, Page ref.	USEPA Comment	C, D, E, or X[1]	Response	A or D[2]
1.	Appendix C	Appendix C titled *Well Completion Log for Monitoring Well 03WW01* appears to be a Well Completion Report. Please correct the title or provide the well completion log information.	C	The Appendix C fly sheet and the list of Appendices have been revised to "State of Texas Well Completion Report for Monitoring Well 03WW01."	

Response to Comments on
Draft Remedial Design / Remedial Action Work Plan
LHAAP-03 Former Waste Collection Pad, Building 722-P Paint Shop,
Longhorn Army Ammunition Plant, Karnack, Texas

Document Date: 17 May 2019
Comment Date: 6 June 2019

Reviewer: Ms. April Palmie, TCEQ
Respondent: Dr. Rose Zeiler

1. Respondent Concurs (C), Does Not Concur (D), Takes Exception (E), or Delete (X)
2. Commenter Agrees (A) with response, or Does Not Agree (D) with response

Comment No.	Section, Page ref.	TCEQ Comment	C, D, E, or X[1]	Response	A or D[2]
1.	General	Please revise abbreviated dates. Example on page 1-1, Aug to August.	C	Dates have been revised as requested.	
2.	Pg. 1-2	First paragraph – add TCEQ before Risk Reduction Standard 3	C	Text has been revised as requested.	
3.	Table 1-1	Please make arsenic italic [or bold] and add note from ROD: Applicable RRS3 Industrial Soil MSC equals largest of calculated RRS3 MSC and background values. Italicized [or bold] text indicates value equals background.	C	Table 1-1 has been revised to show the arsenic value in italics and the note from the ROD has been added to the table as requested.	
4.	2.3, 2-2	Correct CLNWR acreage –7,100.	C	Text has been corrected to show the correct acreage.	

Comment No.	Section, Page ref.	TCEQ Comment	C, D, E, or X[1]	Response	A or D[2]
5.	4.3.2, 6.2 and other relevant sections	Consider P&A of 03WW01 before excavation. The well could be replaced, if deemed necessary. After looking at year 4 results for LHAAP-58, it would also be acceptable to P&A 03WW01 and not replace the well.	D	Well 03WW01 is still needed as a performance monitoring well for the LHAAP-58 remedy. We will take appropriate measures to avoid damaging the well but will plug and abandon and replace it if it is damaged during the excavation.	
6.	Figure 4-3	Please revise the blue circle symbol description to "Existing SB results used as sidewall confirmation samples" [or similar] For notes 1 and 2 add reference to Table 4-1.	C	The description of the blue circle symbols has been revised to read "Existing soil boring sample to be used as a sidewall confirmation sample". Reference to Table 4-1 has been added in parentheses in the 1st and 2nd notes.	
7.	Figure 4-4	See note regarding blue circle in previous comment, which also applies to yellow circles for floor samples. Add notes (like Figure 4-3) to describe confirmation sample process and reference to Table 4-1.	C	The descriptions for the blue and yellow symbols have been revised in accordance with the response to Comment #6. The callout to Table 4-1 and description of the new floor sample to be collected were added to the descriptions in parentheses.	

Draft Final
Remedial Design and Remedial Action Work Plan, 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, Tulsa District
Contracting Division
2488 East 81st Street
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Contract No. W9128F-13-D-0012
Task Order No. W9128BV17F0150
Project No. 501032
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Acronyms and Abbreviations

AECOM	AECOM Technology Corporation
APTIM	Aptim Federal Services, LLC
ARAR	applicable or relevant and appropriate requirements
BERA	baseline ecological risk assessment
Bhate	Bhate Environmental, Inc.
BRAC	base realignment and closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
CY	cubic yards
FFA	federal facility agreement
ft bgs	feet below ground surface
GPS	global positioning system
GWTP	groundwater treatment plant
IWWP	Installation-Wide Work Plan
Jacobs	Jacobs Engineering Group, Inc.
LHAAP	Longhorn Army Ammunition Plant
LUC	land use control
MATOC	Multiple Award Task Order Contract
MCLs	maximum contaminant levels
MEGA	Multiple Environmental Government Acquisition
mg/kg	milligrams per kilogram
MMRP	Military Munitions Response Program
MOA	memorandum of agreement
MSC	medium-specific concentration
NPL	National Priorities List
PPE	personal protective equipment
RAOs	remedial action objectives
RAWP	Remedial Action Work Plan
RD	remedial design
RI/FFS	Remedial Investigation/Focused Feasibility Study
ROD	record of decision
RRS2	Risk Reduction Standard 2

Acronyms and Abbreviations (continued)

RRS3	Risk Reduction Standard 3
SF	square feet
Shaw	Shaw Environmental, Inc.
SOP	standard operating procedure
SVOC	semivolatile organic compound
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
U.S. Army	U.S. Department of the Army
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Tulsa District, contracted Bhate Environmental, Inc. (Bhate), under the Omaha Multiple Environmental Government Acquisition (MEGA) National Small Business Multiple Award Task Order Contract (MATOC) Environmental Remediation Services with Military Munitions Response Program (MMRP), Task Order No. W9128BV17F0150 to conduct environmental restoration of LHAAP-03 at Longhorn Army Ammunition Plant (LHAAP). The Bhate Team is comprised of Bhate and Aptim Federal Services, LLC (APTIM). This Remedial Design (RD) and Remedial Action Work Plan (RAWP) was prepared to describe the design elements selected to implement the remedy for LHAAP-03 described in the Final Record of Decision (ROD) (Bhate 2018a) and the actions necessary to implement them.

1.1 Site Description

LHAAP is approximately 14 miles northeast of Marshall, Texas and approximately 40 miles west of Shreveport, Louisiana (**Figure 1-1**). The installation occupies approximately 1,300 of its former 8,416 acres between State Highway 43 at Karnack, Texas and the western shore of Caddo Lake. The facility can be accessed via 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. Department of the Army (U.S. Army), the U.S. Environmental Protection Agency (USEPA), and the Texas Water Commission (now the Texas Commission on Environmental Quality [TCEQ]) entered into a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §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. LHAAP has been under the administrative control of the Base Realignment and Closure (BRAC) Division of the Army since 2003 and is Defense Environmental Restoration Account funded. The majority of LHAAP has been transferred by the U.S. Army to the U.S. Fish and Wildlife Service (USFWS) for management as the Caddo Lake National Wildlife Refuge (Bhate 2018a).

LHAAP-03 is located approximately 50 feet to the west of former Building 722-P (**Figure 1-2**). Building 722-P was used for paint spraying and polyurethane spray coating of various items. LHAAP-03 was a waste collection site (originally identified as a 16-foot by 15-foot-area) outside of the paint shop at Building 722-P, which was at the Maintenance Shop Area located within the boundary of LHAAP-35A (58) (see **Figures 1-2**).

The ROD identified two chemicals of concern (COCs) for human health in soil, as shown in **Table 1-1**. No chemicals of potential ecological concern were identified. The remedy selected in the ROD included excavation and off-site disposal of soil. The human health cleanup levels were set at concentrations equal to the largest of the calculated TCEQ Risk Reduction Standard 3 (RRS3) industrial soil medium-specific concentrations (MSCs) based on the site-specific soil standard for groundwater protection, and background soil concentration (AECOM 2013a). These cleanup levels are shown in **Table 1-1**.

Table 1-1
Chemicals of Concern and Cleanup Levels for LHAAP-03

Media	Chemicals of Concern (Human Health)	Cleanup Levels [a]
Soil	Arsenic	*5.9 mg/kg*
	Lead	180 mg/kg

Notes:

[a] *Applicable RRS3 Industrial Soil MSC equals largest of the calculated RRS3 MSC and background values. Italicized text indicates the cleanup level equals background*

mg/kg – milligrams per kilogram

1.2 Selected Remedy

The final remedy is identified in the Proposed Plan (AECOM 2013b) that has been reviewed and approved by the regulatory agencies and placed in the Administrative Record file for LHAAP. The Final LHAAP-03 ROD (Bhate 2018a) signed by the Army and USEPA selected excavation and offsite disposal as the remedy for arsenic and lead contaminated soil at LHAAP-03 as summarized in Section 1.4 of the Final ROD. Following remedial action, COC concentrations will be reduced to achieve chemical-specific applicable or relevant and appropriate requirements (ARARs) (based on the commercial/industrial land use scenario). The remaining arsenic and lead concentrations in soil will not pose an unacceptable direct contact risk to humans or ecological receptors at this site. The selected remedy for LHAAP-03 protects groundwater by preventing migration of COCs into groundwater at concentrations that could possibly result in local exceedances of the maximum contaminant levels (MCLs) for arsenic and lead.

The target soil remediation area for LHAAP-03 is contained entirely within the boundaries of a larger site, LHAAP-35A (58). Because LHAAP-03 is small and entirely contained within LHAAP-35A (58) and its land use control (LUC) boundary, the management strategy is to address the LHAAP-03 groundwater remedy and LUCs as being indistinguishable from and included with the LHAAP-35A (58) remedy. This was approved in the Explanation of Significant Differences for the LHAAP-35A (58) ROD (Bhate 2018b).

The final remedy addresses arsenic- and lead-contaminated soil that, based upon testing and modeling, have the potential to result in local groundwater arsenic and lead concentrations exceeding their respective MCLs. The soil cleanup levels selected are protective of the groundwater for arsenic and lead. Surface water runoff to surface water streams is not shown as a pathway for the site, and there is no indication of concentrations at the surface that present an unacceptable risk to human or ecological receptors that could create a risk via that pathway (Bhate 2018a). To address ecological risk, LHAAP-03 was grouped with several other sites as part of the Industrial Sub-Area. The Baseline Ecological Risk Assessment (BERA) (Shaw 2007b) concluded that no unacceptable risk was present in the Industrial Sub-Area; therefore, no further action is needed at LHAAP-03 for the protection of ecological receptors (Bhate 2018a).

Because LHAAP-03 lies wholly within the LUC boundary of LHAAP-35A (58), all LUCs, as well as the non-residential land use notification, applicable to LHAAP-35A (58) will be applicable to LHAAP-03 in the same way and to the same extent (Shaw 2010 & Bhate 2018b). Therefore, the remedy selected for LHAAP-03 does not include any specific provisions for LUCs (Bhate 2018a).

CERCLA Five-Year Reviews specific to LHAAP-03 will be implemented following completion of the soil remedy to evaluate whether the remedy remains protective of human health and the environment. CERCLA Five-Year Reviews for LHAAP-03 will be addressed as part of the remedial action for LHAAP-35A (58). All monitoring and reporting requirements associated with CERCLA five year reviews, will be met under LHAAP-35A (58) (Bhate 2018b).

The ROD identified three areas to be excavated based on previous soil sample exceedances from 2006 through 2008 as the conceptual target remediation areas. The ROD also notes that the excavation extents would be refined as part of the pre-excavation sampling. These areas are described below:

- **Area A.** Approximately 25-feet-wide by 25- to 35-feet-long (approximately 560 square feet [SF]) by 2-feet-deep
- **Area B.** Approximately 5-feet by 5-feet-around 03SB15 (within Area A footprint) by at least 7-feet-deep (bottom excavation depth is not defined)
- **Area C.** Approximately 5-feet by 5-feet-around 03SB11 (within Area A footprint) by 7-feet-deep

1.3 Remedial Action Objectives

The remedial action objective (RAO) developed for LHAAP-03 and outlined in the Final ROD (Bhate 2018a) is to protect human health and the environment by preventing lead and arsenic contaminated soils from potentially leaching into the underlying groundwater. Per the ROD's RAOs, and consistent with the National Contingency Plan, COCs and cleanup levels must be set. These are shown in **Table 1-1**.

1.4 Document Organization

This document is composed of the following sections:

- **Section 1.0:** "Introduction" summarizes the site background, proposed remedy, and RAOs.
- **Section 2.0:** "Site Characteristics" summarizes the geology and hydrogeology of the site, as well as a summary of the nature and extent of contamination.
- **Section 3.0:** "Soil Sampling through November 2018" summarizes the results of the prior samples as well as the samples collected in November 2018 as part of the pre-excavation sampling as described in the ROD that form the basis for the design elements described in subsequent sections.
- **Section 4.0:** "Soil Excavation Remedial Design" describes the design basis for the planned excavation of contaminated soil.
- **Section 5.0:** "Remedial Action Work Plan" describes the tasks to implement the design for soil excavation.
- **Section 6.0:** "Schedule" provides a list of activities and anticipated durations for the work plan tasks.
- **Section 7.0:** "References" provides citations for the documents used as references.

This work plan also includes the following appendices supporting the main text:

- **Appendix A** includes the Analytical Data Reports for the November 2018 soil samples collected.
- **Appendix B** includes the Sample Collection Logs from the November 2018 soil sample collection event.
- **Appendix C** includes the State of Texas Well Completion Report for monitoring well 03WW01.

1.5 Deviations from the Installation-Wide Work Plan

There is a planned deviation from the Final Installation-Wide Work Plan (IWWP) (Bhate 2018c), Section 3.8.3, Verification of Excavation Limits. The IWWP indicates that verifications samples shall be collected from every 1,000 SF of excavation floor and from each wall. The largest planned excavation for LHAAP-03 is 300 SF, and the smallest is 36 SF. Because of the small excavation areas and shallow depths, the resulting exposed surface area is expected to be less than 400 SF. Therefore, it is proposed to verify the excavation limits both laterally and vertically with one composite confirmation sample. Each wall and floor will not be individually tested. See **Section 4.4** of this document for more details of the planned confirmation sampling.

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2.0 SITE CHARACTERISTICS

2.1 Geology and Hydrogeology

The subsurface geology at LHAAP consists primarily of a thin veneer of Quaternary alluvium overlying Tertiary age formations of the Wilcox and Midway Groups. The Wilcox Group underlies most of the LHAAP installation (Jacobs 2001). The thickness of the Wilcox Group varies from 350 feet in the northwest corner of the installation to 130 feet along the eastern side near Caddo Lake. This formation consists of interbedded fine-to medium-grained sand, silt, and clay. The shallow soils at LHAAP-03 include interbedded layers of silty clays and sands (Shaw 2007a).

2.2 Nature and Extent of Contamination

From 2006 through 2008, soil samples were collected at LHAAP-03 soil operable unit at depths ranging from surface (0 to 0.5 feet below ground surface [ft bgs]) to 15 ft bgs. The collected samples were analyzed for metals, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). The analytical results were compared to TCEQ Risk Reduction Standard 2 (RRS2) and RRS3 MSCs (Title 30 Texas Administrative Code [TAC] Chapter 335) corresponding to commercial/industrial land-use. The RRS2 and RRS3 MSCs are risk-based values developed to protect human health and groundwater resources that are protective at a target risk level of 1×10^{-6} for carcinogens and a target hazard quotient of 1 for non-carcinogens, as described in the *Final Remedial Investigation – Focused Feasibility Study* (AECOM 2013a).

Arsenic and lead were detected in one or more samples from borings 03SB01 through 03SB15, and 03SB17 at concentrations exceeding their respective RRS2 MSCs. These data indicated that there is a potential for the metals-contaminated soil to contaminate the groundwater (Shaw 2009). RRS3 MSCs were developed using the soil attenuation model, according to the TCEQ Risk Reduction Rules (30 TAC §335 and updates), included in the Remedial Investigation/Focused Feasibility Study (RI/FFS), Appendix B (AECOM 2013a).

The calculated 95 percent upper confidence limits (UCLs) of the mean concentrations in soil for arsenic and lead were compared to their respective calculated RRS3 MSCs. This comparison indicated that arsenic and lead exceeded their respective applicable RRS3 industrial soil MSCs and they were identified as COCs in soil. **Section 3.0** discusses the sample results and location in more detail.

2.3 Current and Future Land Use

LHAAP is located near the unincorporated community of Karnack, Texas. Karnack is a rural community with a population of approximately 775 people. The incorporated community of Uncertain, Texas, approximate 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 U.S. Army's needs in 1997. The plant area has been relatively dormant since that time. LHAAP is surrounded by a fence (except on the border with Caddo Lake) with an access gate that is locked after daylight hours, which restricts public access. The fence now represents the National Wildlife Refuge boundary. The public can access most of the facility during the day, with additional fencing and signage restricting access from some environmental sites.

The reasonably anticipated future use of LHAAP-03 is part of 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 and will be used to facilitate a future transfer of LHAAP-03. Presently the Caddo Lake National Wildlife Refuge occupies approximately 7,100 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. Neither of these events terminating LHAAP-03's use as a wildlife refuge are reasonably foreseeable (Bhate 2018a).

2.4 Current and Future Surface Water Use

There is no surface water body present within LHAAP-03. Land at LHAAP-03 is relatively flat; water from heavy rains would eventually drain to the southern branch of Goose Prairie Creek, approximately 800 feet to the southwest. Goose Prairie Creek flows 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 and provides drinking water supply for multiple cities/towns. The anticipated future uses of surface water are the same as current uses.

2.5 Current and Future Groundwater Use

Groundwater in the drinking water aquifer (250 to 430 ft bgs) near LHAAP is currently used as a drinking water source. The drinking water aquifer should not be confused with the "deep zone" groundwater, which extends only to a depth of approximately 151 ft bgs. The deep zone groundwater and the drinking water aquifer are distinct from each other, and there is no connectivity between the contaminated zone and the drinking water aquifer. There are six active water supply wells near LHAAP that are completed in the drinking water aquifer (**Figure 1-2**).

Groundwater under LHAAP-03 is indistinguishable from and is included with the site wide LHAAP-35A (58) groundwater (Bhate 2018a).

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3.0 PRE-EXCAVATION SOIL SAMPLING

Pre-excavation sampling was conducted prior to preparation of the RD/RAWP to better define the excavation limits and to pre-characterize the waste for offsite disposal of the soil. The intent was to define the limits of the excavation based on the samples with concentrations below the cleanup levels and to use the results as confirmation samples. The sampling approach was outlined in the *Technical Memorandum – Pre-Excavation Sampling at LHAAP-03 Former Waste Collection Pad Building, 722-P Paint Shop, Longhorn Army Ammunition Plant, Karnack, Texas* (Bhate 2018d) and was approved by the regulators in October 2018. Soil samples were collected on November 29, 2018 at pre-determined locations and intervals as described in the Pre-Excavation Sampling Technical Memorandum (Bhate 2018d). Analytical results from the November 2018 pre-excavation sampling were all below the RRS3 MSCs. Because of the low concentrations, a pre-excavation waste characterization sample analysis was not performed. The analytical data from the November 2018 sampling event is provided in **Table 3-1** and shown on **Figure 3-1**. Analytical data reports are included as **Appendix A**, and Sample Collection Logs are provided as **Appendix B**.

The data from November 2018 was used along with the prior data from 2006 through 2008 to re-evaluate the excavation areas shown in the ROD. The 2006 through 2008 and the ROD excavation areas are shown on **Figure 3-1**. Results that exceeded the RRS3 MSC are yellow highlighted on **Figure 3-1**. The 2006 through 2008 sampling had been conducted at seventeen locations. The area sampled from 2006 through 2008 covered approximately 2,100 SF (or less than 1/10th of an acre) and identified an area of approximately 560 SF for remediation (Bhate 2018a). Samples were collected from 0 to 0.5 ft bgs, 3 to 4 ft bgs, and 5 to 7 ft bgs at each location except at 03SB11, which also had deeper intervals collected at 9 to 10 ft bgs and 14 to 15 ft bgs. At several of the locations, arsenic and lead concentrations were below the RRS3 MSCs in all sampled intervals. The maximum detected concentrations of arsenic and lead in soil were 32.7 and 6,760 milligrams per kilogram (mg/kg), respectively, in boring 03SB11 at the 6 to 7 ft bgs interval during the 2006 sampling event. The deeper interval samples were below the RRS3 MSC.

A groundwater monitoring well (03WW01) was installed at location 03SB11, where deeper intervals were sampled. Concentrations at depths below the 0 to 0.5 ft bgs interval exceeded the RRS3 MSC at only one other location, 03SB15, where just arsenic was detected above the RRS3 MSC. At 03SB15, the arsenic concentration at 6 to 7 ft bgs was 7.62 mg/kg, just above the RRS3 MSC of 5.9 mg/kg. Data from the November 2018 sampling did not indicate any other locations with deeper contamination. **Figure 3-1** shows the November 2018 and the prior 2006 through 2008 sample results.

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4.0 SOIL EXCAVATION REMEDIAL DESIGN

The design elements of the excavation are provided in the following sections. The details of the implementation of the design are included in **Section 7.0**.

4.1 Design Criteria

The soil design criteria define the goals to be achieved and are based on the RAOs of protection of human and ecological receptors from contaminated soil and the protection of human health by preventing further potential degradation of groundwater. The ROD identified COCs for the soil to groundwater pathway as shown in **Table 1-1**. The design for soil includes excavation of the contaminated soil until the cleanup levels are attained or groundwater is encountered. If the contamination is present at or below groundwater level, excavation will be terminated at the depth where saturated conditions are encountered.

4.2 Performance Objective

The performance objective is to remove the contaminated soil above the RRS3 MSCs. For areas that are not already defined by existing samples, confirmation samples will be collected and analyzed for the COCs after excavation to verify the contaminated soils were removed and cleanup levels were attained. Soil concentrations in few surface soil samples and a couple of subsurface samples exceeded the RRS3 MSC. The surface area locations (0 to 2 ft bgs) are shown on **Figure 4-1** and the subsurface locations (6 to 7 ft bgs) are shown on **Figure 4-2**.

4.3 Excavation Areas

The proposed excavation areas to address the soil to groundwater pathway are shown on **Figures 4-1** and **4-2**. The excavation depths anticipated to remove the contaminated soil at various locations within the footprint of LHAAP-03 are 1 or 8 ft bgs. The groundwater elevation typically is approximately 25 ft bgs and is not expected to be encountered during excavation.

4.3.1 Excavation Area Sample Summary

Excavation Area A (Areas A1 and A2)

Review of all results indicate that the majority of the contamination is in the 0 to 0.5 foot bgs interval with concentrations of lead and arsenic above the RRS3. The individual sample locations with lead and arsenic concentrations exceeding their respective RRS3 MSC values are shown with yellow highlighting on **Figure 3-1**. Additional samples were collected in November 2018 along the perimeter and within the target remedial Area A described in the ROD (**Figure 4-1**). The results from the 2018 and historic samples were used to define the lateral extent of the excavations.

For Area A1, there were 9 sample locations within 4 feet of the Area A1 excavation perimeter that were below the RRS3 MSC and are proposed to be used to indicate that the 0 to 1 foot bgs excavation side walls are clean. The excavation floor of Area A1 will have a confirmation sample collected.

For Area A2, the excavation is small in both width and depth (~140 cubic feet). Because the excavation area is so small, only one composite will be collected for the entire excavation. A composite sample consisting of a grab from each sidewall and the floor will used for the confirmation sample for this 1-foot excavation area. This is a deviation from the IWWP sampling protocol as described in **Section 1.5**.

Excavation Areas B and C

Two soil borings, 03SB15 and 03SB11, with samples collected at deeper intervals from 2006 through 2008 had prior results above the RRS3 MSC. The ROD identified remediation to be conducted around these two areas with refinements based on the pre-excavation sampling (Bhate 2018a). The November 2018 samples collected from 0 through 9 ft bgs around these two areas confirms that these were isolated occurrences.

For Area B, a sample collected from 03SB15 in 2007 had arsenic slightly above the RRS3 MSC at only the 6 to 7 ft bgs interval. Three samples were collected in November 2018 at distances from 4 to 7 feet away from the 03SB15 location at intervals from 0 to 2 ft bgs, 3 to 4 ft bgs, 6 to 7 ft bgs, and one from 8 to 9 ft bgs. **Figure 4-2** shows the proximity of the results that make the reconfigured triangular Area B. None of the arsenic or lead results from the November 2018 samples had results above the RRS3 MSC. The triangular area shown on **Figure 4-2** will be excavated to a depth of 8 feet, and the three sample results defining the corners of the triangle will be used to define the horizontal limits of the excavation and a confirmation sample will be collected from the floor of the excavation.

For Area C, 03SB11 collected in 2007 had the highest concentrations of arsenic and lead detected at LHAAP-03 at the 6- to7-foot-interval. In 2008, during the installation of 03WW01 adjacent to 03SB11, additional soil samples were collected at 8 to 9 ft bgs and 14 to 15 ft bgs and did not have any RRS3 MSC exceedances. In November 2018, samples were collected approximately 4 feet to the northwest and southeast of 03SB11 at 0 to 2, 3 to 4, and 6 to7 ft bgs intervals (**Figure 4-2**). None of the 2018 sample results were above the RRS3 MSCs. Because the two samples were so close to 03SB11, the excavation at Area C will be approximately 8-feet by 8-feet-horizontally. The results from the 2008 sample from 8 to 9 ft bgs are being used to define the vertical limit of the excavation to 8 ft bgs and will be used as the floor confirmation sample. The two 2018 sample results from 6 to 7 ft bgs will also be used as the confirmation samples for the side walls.

Because the excavation is so small, an effort will be made to keep the monitoring well, 03WW01, in place. The screened interval of the well is below 18 ft bgs and the annular space was sealed with cement from 0 to 16 ft bgs. The 03WW01 State of Texas Well Completion Report is included in **Appendix C**.

4.3.2 Excavation Depth and Extent

Approximately 40 in-place cubic yards (CY) of soil will be excavated from Areas A, B, and C. The excavation areas proposed after the pre-excavation sampling are as follows:

- **Area A.** This area was split into two subareas from the ROD Area A—Area A1 and Area A2 as shown on **Figure 4-1**.
  - For Area A1, the excavation area was developed by surrounding the locations that were above the RRS3 MSC at 0 to 0.5 ft bgs and extending the horizontal limit to within 5 feet of sample locations that had results below the RRS3 MSCs at 0 to 0.5 ft bgs or 0 to 2 ft bgs. An initial excavation depth of 1 foot is planned since none of the 0 to 2 ft bgs November 2018 samples were above the RRS3 MSC.
  - For Area A2, the contamination appears to be isolated at 0 to 0.5 ft bgs, and a small excavation is planned around it. The estimated horizontal area is depicted on **Figure 4-1**, and the initial vertical excavation depth is 1 foot bgs.
- **Area B.** This area was defined in the ROD as a 5-feet-wide by 5-feet-deep by 7-feet-deep excavation. The area has been redefined by the sample results to a triangular area, as shown on **Figure 4-2**. The area will be excavated to a depth of 8 feet.
- **Area C.** This area has remained unchanged from the ROD and will be excavated as an 8-foot by 8-foot-square excavation approximately 8-feet-deep centered around monitoring well 03WW01. Because the excavation is small, and the vertical limit is known, an effort will be made to save monitoring well 03WW01 and not abandon it initially. The grout seal around the well extends down to 16 feet bgs and should remain intact and protected with careful excavation around the well. However, if it is damaged during excavation, the well will be plugged and abandoned and reinstalled by a Texas licensed well driller.

4.4 Confirmation Sampling

Confirmation samples will be collected to define the final excavation limits. If contamination is present in a confirmation sample, the excavation limits will be extended in increments of 1 foot vertically and horizontally until confirmation samples are below the RRS3 MSC.

The IWWP (Bhate 2018c) indicates that each confirmation sample will be a 5-point composite soil sample collected from every 1,000 SF of the excavation floor area and of each sidewall. However, a deviation from the 5-point composite methodology is proposed to allow the use of existing soil samples to define the excavation limits. Because of the small excavation areas and the abundance of samples with results below the RRS3 MSC in the small area at LHAAP-03, the use of existing samples and a deviation to the IWWP has been proposed for confirmation sampling. For excavations where the limits were set by existing samples below the RRS3 MSC, no additional confirmation samples will be collected. For small excavations, a single composite sample representing the walls and floor will be collected. **Figure 4-3** shows the existing sample locations and intervals to be used for confirmation samples for the 1-foot excavation areas, and **Figure 4-4** shows the existing 1ocations to be used for the Areas B and C excavations. **Table 4-1** summarizes the samples (existing and proposed) to be used for excavation confirmation.

The following proposed sampling procedure for small excavation areas (less than 200 SF of floor area and sidewall height of less than 10 feet) is a deviation from the IWWP. It is proposed to collect a single 5-point composite sample from such excavations by collecting a grab sample from each of the four sidewalls and the floor. This alternate sampling will be conducted at Area A2. If the composite sample result is above the cleanup levels, then additional grab samples may be collected from each wall to determine which direction to overexcavate. If no additional sampling is conducted prior to over excavation, each wall and the floor will be overexcavated by 1 foot. The Area A1 excavation floor sampling will be performed in accordance with the IWWP.

4.5 Waste Characterization and Disposal

The excavated soil will be disposed at an off-site landfill. Waste characterization samples will be collected at a rate of one sample for every 1,000 CY of excavated soil to characterize the waste. It is anticipated that soil will be classified as non-hazardous. Samples will be analyzed for the analytes required by the selected waste disposal facility.

4.6 Backfill and Site Restoration

Following the receipt of clean confirmation samples for a given excavation area, clean fill dirt will be placed in the excavation and compacted with the backhoe/excavator bucket to prevent settling. The fill dirt will be suitable for future vegetation growth. Borrow source material will be considered clean if VOCs and metals are below the TCEQ RRS2 MSCs for industrial use. It is estimated that less than 100 CY of fill dirt will be brought on site. Borrow source samples will be collected at a rate of one per 1,000 CY of borrow soil. The site will be reseeded with a native grass and wildflower mix with guidance from USFWS.

4.7 Other Design Considerations

Several of the bridges at LHAAP have weight limits. Routes for trucks filled with waste soil as well as for trucks bringing clean soil from borrow sources will be selected with coordination from USFWS to avoid the bridges if possible. Additional gates may need to be unlocked to allow access to and from LHAAP from another gate besides the main gate in Karnack to avoid bridges where weight limits may be exceeded with loaded trucks.

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5.0 LAND USE CONTROL PLAN

LHAAP-03 lies wholly within the LUC boundary of LHAAP-35A (58) (see **Figure 1-2**). All LUCs, as well as the non-residential notification, applicable to LHAAP-35A (58) will be applicable to LHAAP-03 in the same way and to the same extent. Therefore, the remedy selected in the ROD does not include specific provisions for LUCs (Bhate 2018a).

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6.0 REMEDIAL ACTION WORK PLAN

6.1 Field Activities

This section describes the remedial action field activities planned at the LHAAP-03. Prior to initiation of the field activities performed as part of this RD/RAWP, the regulators will be notified at least 10 days in advance. Site-specific activities are described in associated subsections. The field activities to be conducted under this Work Plan are outlined below:

- Mobilization and Site Setup
- Surveying
- Soil Excavation and Disposal
- Confirmation Soil Sampling
- Backfilling and Site Restoration
- Waste Management
- Decontamination
- Site Restoration

In general, the field activities will be conducted in accordance with the IWWP for LHAAP (Bhate 2018c).

6.1.1 Mobilization and Site Setup

Prior to the mobilization of subcontractors to LHAAP sites, work locations for overhead and ground level accessibility will be evaluated. In areas that have excessive vegetation and/or tree growth, a backhoe or other appropriate earthmoving equipment will be used to clear the areas to allow equipment access. After coordinating with underground utility locators for utility clearances, excavation locations and areas that require surface soil removal will be located and staked. Utility location and clearance for intrusive activities will be conducted in accordance with Section 3.1 of the IWWP (Bhate 2018c).

Appropriate personnel, subcontractors, and equipment necessary to perform specific task(s) will be mobilized to the site. A permanent decontamination station is located at the on-site LHAAP-18/24 groundwater treatment plant (GWTP) and can accommodate large equipment. Temporary decontamination pads will be constructed as needed at approved on-site locations to decontaminate equipment and prevent cross-contamination between sites. Wash water will be contained and transported to the GWTP for disposal when necessary.

Improvement of the site access road using gravel or other materials to reduce the slopes may be performed to allow trucks and heavy equipment to enter and exit the site safely. USFWS will be consulted regarding any improvements to minimize impact to the surrounding terrain to the degree possible.

6.1.2 Surveying

During the excavation, the locations of soil confirmation samples and limits of excavation will be surveyed using global positioning system (GPS) equipment. Use of GPS equipment will be coordinated with USACE in accordance with Section 3.3 of the IWWP (Bhate 2018c). A professional land surveyor licensed in the State of Texas will survey the final horizontal excavation limits. After backfilling is complete, the new vertical elevation of the top of casing for 03WW01 (or 03WW01R if replaced) will be surveyed based on the North American Vertical Datum of 1988 to the nearest 0.01 foot.

6.1.3 Soil Excavation and Disposal

The limits and plans for excavation are described in **Section 4.0** of this Plan. Excavation of the soil generally consists of preparing the site, excavating the soil, transporting and disposing the soil, collecting confirmation samples, surveying the excavation limits, backfilling, and restoring the site. Excavations performed under this remedial action are expected to be less than one acre in size and are not subject to the storm water pollution prevention requirements of Chapter 26 of the Texas Water Code and TCEQ General Permit TXR15000. However, best practices (silt fencing, berms, etc.) will be used where appropriate to prevent excess runoff of sediment from the excavation and stockpile areas.

6.1.3.1 Site Preparation

The areas to initially be excavated will be established prior to mobilization of the excavation personnel. A GPS will be used to delineate and mark the excavation areas shown on **Figures 4-1** and **4-2**. The potential limits of excavation will then be physically marked with survey stakes, pin flags, paint, or other appropriate marking. Clearing of the vegetation in the excavation area will largely be conducted using conventional equipment. A temporary decontamination station may be constructed on site as needed.

An area between the site and the existing roads to the north and east will be cleared for construction of a temporary soil staging/stock pile area. This will allow the transport vehicles to stay on the road during loading activities. A temporary staging area consisting of berm with polyethylene sheeting will be constructed for stockpiling soil prior to collecting waste characterization samples and off-site transport and disposal.

6.1.3.2 Excavation and Soil Handling

After the initial excavation limits are established, excavation will begin. Vertical excavation will stop if groundwater is encountered. Areas B and C with an excavation depth of more than 4 feet will not be benched and no personnel will enter these excavations. All activities will be conducted from the surface. See **Section 6.2** below for monitoring well excavation or abandonment and reinstallation for the well located within excavation Area C.

The excavated soil will be stockpiled in the designated area. Composite samples will be collected from the stockpiled material at a rate of 1 sample per 1,000 CY and analyzed for the necessary analytes to obtain acceptance at the selected disposal facility. Each composite sample will consist of equal parts of five samples collected at evenly spaced locations within the stockpile.

The fully-characterized excavation stockpile soil will be placed into transport trailers or dump trucks for immediate transport from the site to the disposal facility. Licensed transporters will be used to haul the excavated soil to the pre-approved landfill for non-hazardous disposal. The excavated soil may be staged on plastic sheeting adjacent to the excavation while awaiting loading. The excavated soil stockpile will be protected from rainfall runoff and erosion by covering it with plastic sheeting. As an alternative to stockpiles, roll-off boxes may be supplied by the landfill and used in place of the stockpiles.

Loading of trucks will be coordinated with USFWS to ensure that load ratings for bridges along the haul route out of the refuge (if any) are not exceeded.

6.1.3.3 Confirmation Soil Sampling

After the initial excavation, confirmation samples will be collected from the sidewalls and floor of the excavation in the areas where existing samples are not available for use as confirmation samples. The confirmation samples will be tested for the contaminants. Excavation will continue until concentrations in the soil are less than the site-specific cleanup levels.

As described in **Section 4.4**, in small areas a composite wall/floor sample may deviate from the IWWP and will be collected by combining discrete samples collected from each of the four walls and the floor. GPS coordinates of each discrete sample location that comprises the composite confirmation sample will be collected. Vertical wall height will be manually measured and recorded. Each sample location will be numbered sequentially in order of collection, labelled on a map, and identified using the following nomenclature:

03WFXXX-ZZ-MMDDYY or 03FLXXX-ZZ-MMDDYY

The number 03 represents the site (LHAAP-03); WF indicates that it is small excavation with composite of both the wall and floor, WL indicates a sidewall sample, while FL indicates a floor sample; XXX represents the unique sample number; ZZ indicates excavation sidewall height or the average depth below ground surface of the excavation floor; and MMDDYY is the date of sample collection.

If contaminants are detected above their cleanup levels during the confirmation sampling, the area will be over-excavated. In the case of the small excavation where a wall and floor composite sample is collected, the excavation will be overexcavated approximately one foot deeper and sideways on all walls. This will continue until confirmation samples demonstrate the contaminants remaining in the soil are below their cleanup level or until groundwater is encountered.

Even though not expected, in the event that groundwater is encountered, and a floor sample cannot be collected, a linear 5-point composite sample will be collected from each excavation sidewall just above the groundwater interface to represent the floor area above the groundwater. If the linear 5-point composite sidewall sample is above the cleanup level, then additional excavation of the sidewall will be conducted to the groundwater interface depth, and over-excavation step outs and confirmation sampling would continue until the confirmation sample results are below the cleanup levels. The confirmation samples will confirm that the vadose zone soil identified as exceeding the cleanup levels would be removed.

6.1.3.4 Backfilling and Site Restoration

The backfill operations will proceed after excavation confirmation samples are clean for a definable area. For Area C, the excavations will be immediately backfilled to maintain the structural integrity of monitoring well 03WW01. The excavation areas will be backfilled with fill material that is certified to meet the site-specific cleanup levels. The backfill will be placed in 1-foot lifts to allow proper compaction with a backhoe/excavator bucket. After backfilling is complete, the area will be graded, with a mound approximately one foot above finished grade to promote positive drainage and allow for some soil settling without creating a depression. The top six inches will have a soil that will be suitable for vegetative growth. The well pad for 03WW01 (or 03WW01R if replaced), the protective casing with lock, and pipe bollards will be installed. The well identification will be clearly marked. The surface will be reseeded with a native grass and wildflower seed mixture selected in coordination with USFWS.

6.2 Monitoring Well Excavation or Abandonment and Installation

Monitoring well 03WW01 is in the 8-foot depth excavation area. The well pad will be broken up and removed along with the pipe bollards prior to initiating excavation. The protective well

casing will also be removed. The grout plug above the bentonite seal will remain in place. The excavation will extend down to 8 feet taking care to not impact the cement around the pipe. Supports may be placed around the well stickup during excavation if needed for support. A portion of the area will be excavated to 8 feet and will be immediately backfilled. Hand tools may be used to scrape any dirt from the cement near the 6 to 7 ft bgs area. A physical barrier (such as polyethylene sheeting) will be placed against the cut wall of the excavation prior to backfilling. The next portion of the excavation will remove the soil up to the barrier and will remove the physical barrier ensuring that contaminated soil was removed from Area C. Hand compaction may be conducted around the well taking care to not damage the well.

If the structural integrity of the well is damaged, the well will be abandoned by pulling out the well casing (or overdrilling if the casing cannot be removed) prior to grouting the borehole. If this fails, the well casing will be grouted in place and the portion extending into the excavation will be cut at least 2 ft bgs. Once the excavation is backfilled, a new well, 03WW01R, will be installed adjacent to the location and screened with the same interval to replace 03WW01. If needed, the well abandonment will be conducted in accordance with Section 3.9 of the IWWP, and the shallow well installation with stick up completion and its development will be completed in accordance with Section 3.2 of the IWWP (Bhate 2018c). The State of Texas Well Completion Report for 03WW01 is included in **Appendix C**.

6.3 Waste Management

Wastes generated during the project are anticipated to include waste water, soil, personal protective equipment (PPE), sampling equipment, and miscellaneous trash. These wastes will be managed in accordance with Section 3.7 of the IWWP (Bhate 2018c).

6.4 Decontamination

Decontamination of equipment will be performed in accordance with Standard Operating Procedure (SOP) A1 in Appendix A of the IWWP (Bhate 2018c).

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7.0 POST-REMEDIAL MONITORING AND REPORTING

7.1 Remedial Action Completion Report

A Remedial Action Completion Report will be submitted upon completion of the excavation, confirmation sampling, backfilling, and waste disposal to document the activities performed to complete the remedial action.

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8.0 SCHEDULE

Table 8-1 shows the estimated duration for each major site activity and timeline. Weather and unknown site conditions could affect this schedule.

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Tables

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

		Location Code	03SB18		03SB19						03SB20					
		Sample ID	03SB18-0.0-2.0		03SB19-0.0-2.0		03SB19-3.0-4.0		03SB19-6.0-7.0		03SB20-0.0-2.0		03SB20-0.0-2.0-FD		03SB20-3.0-4.0	
		Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
		Sample Interval Depth (ft bgs)	0 - 2		0 - 2		3 - 4		6 - 7		0 - 2		0 - 2		3 - 4	
		Sample Purpose	REG		REG		REG		REG		REG		FD		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																
Arsenic	mg/kg	5.9	1.56		2.63		1.14		2.99		1.54		4.05		3.9	
Lead	mg/kg	180	6.15		9.52		7.89		5.71		8.26		11.3		16.3	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

		Location Code	03SB21				03SB22								03SB23			
		Sample ID	03SB21-0.0-2.0		03SB21-3.0-4.0		03SB22-0.0-2.0		03SB22-3.0-4.0		03SB22-3.0-4.0-FD		03SB22-6.0-7.0		03SB23-0.0-2.0		03SB23-3.0-4.0	
		Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
		Sample Interval Depth (ft bgs)	0 - 2		3 - 4		0 - 2		3 - 4		3 - 4		6 - 7		0 - 2		3 - 4	
		Sample Purpose	REG		REG		REG		REG		FD		REG		REG		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																		
Arsenic	mg/kg	5.9	1.74	J	0.974		1.79		4.61		0.709		2.63		1.93		4.16	
Lead	mg/kg	180	10.2		4.97		9.07		8.66		6.26		7.62		12.3		7.12	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

		Location Code	03SB24		03SB25		03SB26							
		Sample ID	03SB24-0.0-2.0		03SB25-0.0-2.0		03SB26-0.0-2.0		03SB26-0.0-2.0-FD		03SB26-3.0-4.0		03SB26-6.0-7.0	
		Sample Date	11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
		Sample Interval Depth (ft bgs)	0 - 2		0 - 2		0 - 2		0 - 2		3 - 4		6 - 7	
		Sample Purpose	REG		REG		REG		FD		REG		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS														
Arsenic	mg/kg	5.9	1.66		1.42		5.83		1.92		0.74		2.94	
Lead	mg/kg	180	14.3		8.02		8.6		8.38		4.14		6.96	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 3-1

November 2018 Soil Sample Analytical Results, LHAAP-03

Location Code			03SB27								03SB28					
Sample ID			03SB27-0.0-2.0		03SB27-3.0-4.0		03SB27-6.0-7.0		03SB27-8.0-9.0		03SB28-0.0-2.0		03SB28-3.0-4.0		03SB28-6.0-7.0	
Sample Date			11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018		11/29/2018	
Sample Interval Depth (ft bgs)			0 - 2		3 - 4		6 - 7		8 - 9		0 - 2		3 - 4		6 - 7	
Sample Purpose			REG		REG		REG		REG		REG		REG		REG	
Parameter	Units	RRS3 MSCs	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
METALS																
Arsenic	mg/kg	5.9	1.41		2.84		5.02		2.33		1.59		0.565		1.6	
Lead	mg/kg	180	8.66		7.36		7.29		4.67		8.27		5.29		5.96	

Notes:

FD - field duplicate

ft bgs - feet below ground surface

ID - identification

J - estimated value

mg/kg - milligrams per kilogram

RRS3 MSCs - Risk Reduction Standard 3 Medium-Specific Concentrations

REG - regular sample

Val Qual - validation qualifier

Table 4-1
Proposed Excavation Sampling Summary

Excavation Area	Excavation Depth (feet)	Estimated Total Volume (CY)	Estimated Floor Area (square feet)	Existing Sidewall Samples	Existing Floor Samples	Estimated Additional Samples Required
A1	1	12	300	03SB18, 03SB12, 03SB25, 03SB24, 03SB23, 03SB28, 03SB27, 03SB15, 03SB26	None	1 floor
A2	1	1	25	None	None	1 composite of four sidewalls and floor
B	8	8	25	03SB15, 03SB19, 03SB26	None	1 floor
C	8	19	64	03SB22 and 03SB28	03SB11 sample intervals 9-10 ft bgs and 14-15 feet bgs	None
	Estimated Total Volume (CY)	40			Total # Samples to be Collected	2 floor and 1 composite for small excavation

Notes:

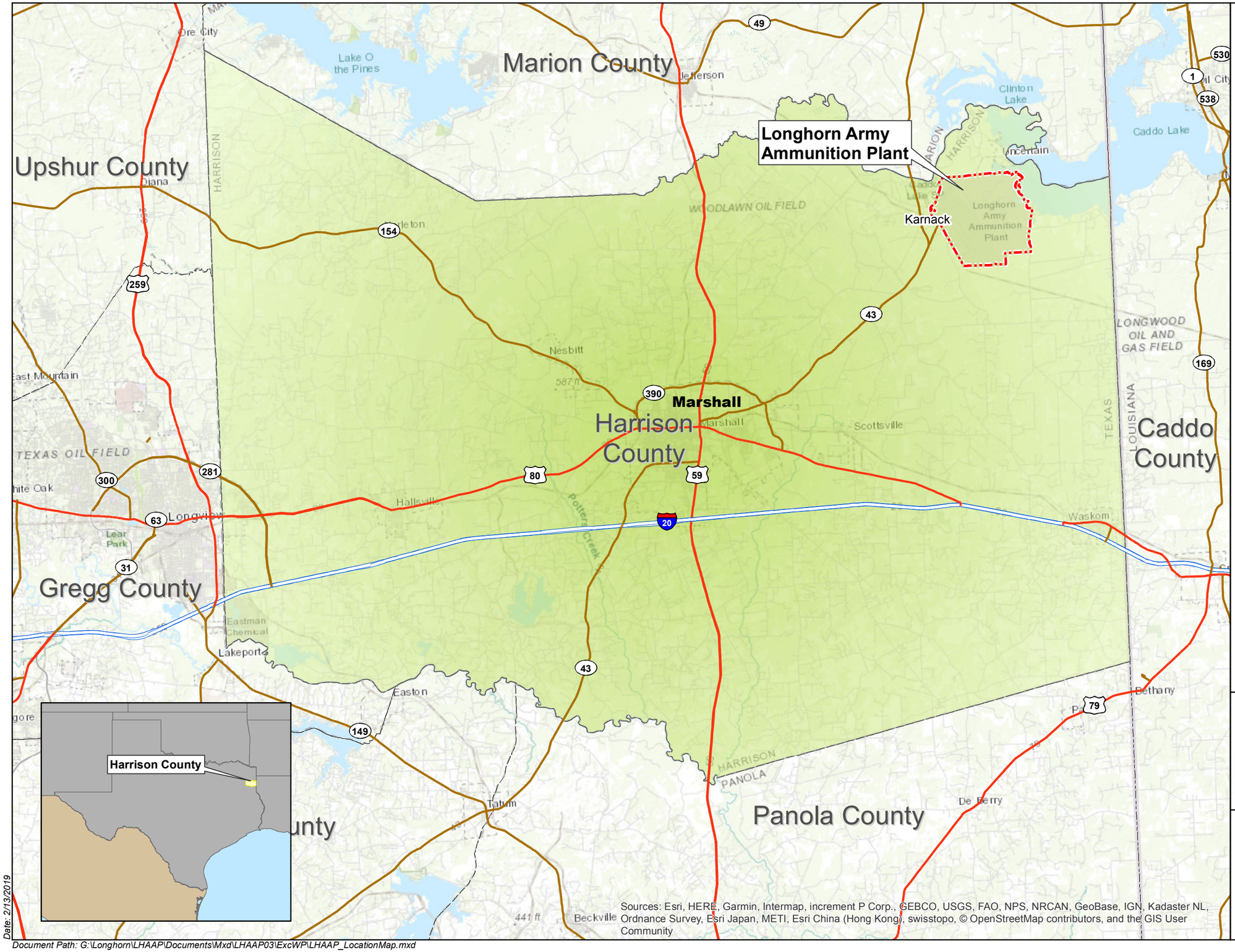
bgs - below ground surface

CY - cubic yards

Table 8-1
Schedule for Major Site Activities

Activities	Duration
Site Preparation and Mobilization	5
Utility Clearance	1
Excavation	3
Waste Characterization and Confirmation Sampling (includes analysis)	5
Loading Stockpiled Soil, T&D, Over-excavation, Confirmation Sampling	5
Site Backfill and Restoration	2
If needed, well replacement	1
Well pad construction and bollard replacement	1
Surveying (Excavation limits and well pad/top of casing)	1
Demobilization	2
Total number of days:	26

Figures



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

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Figure 1-1

LHAAP Location Map
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/13/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP_LocationMap.mxd

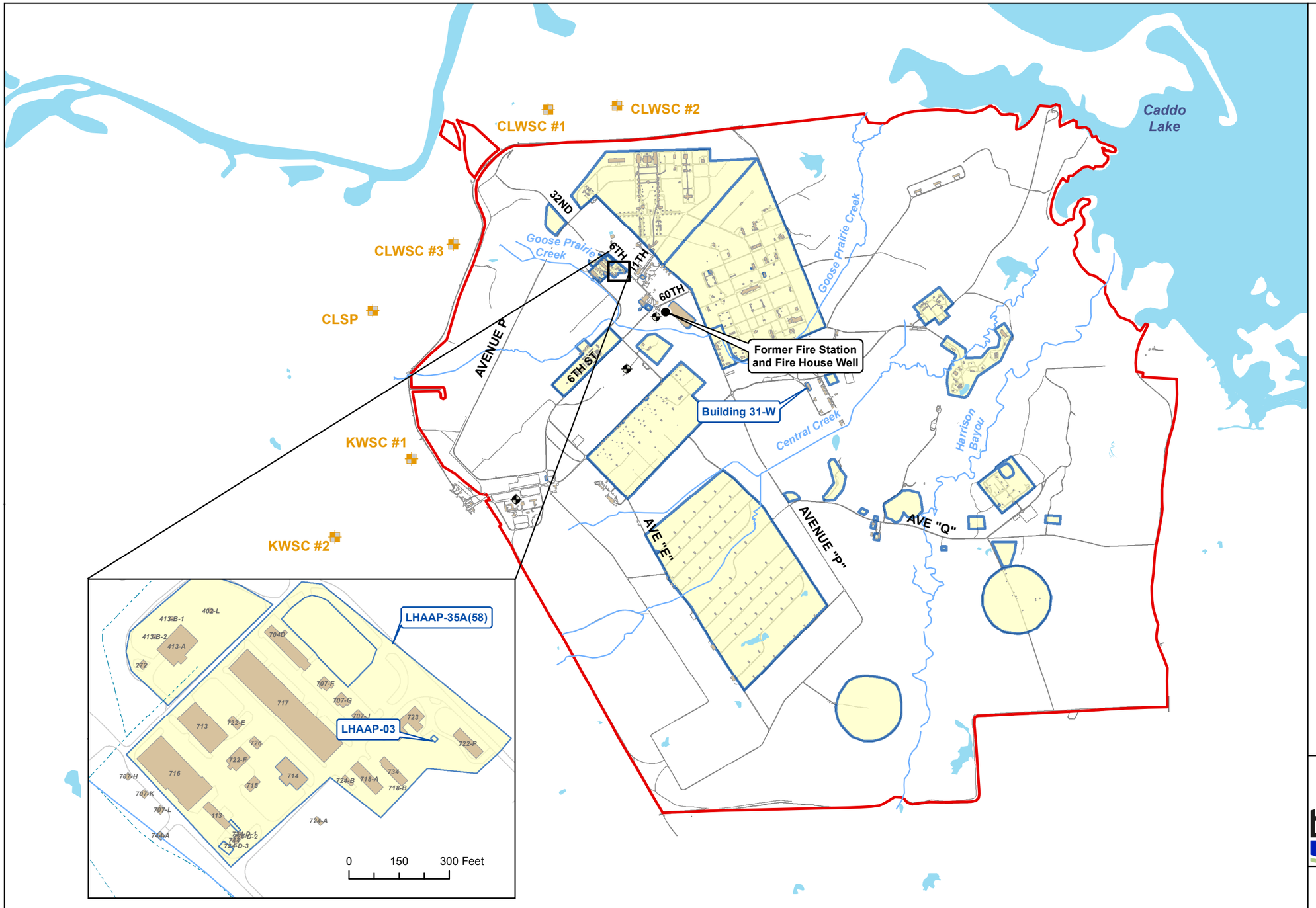

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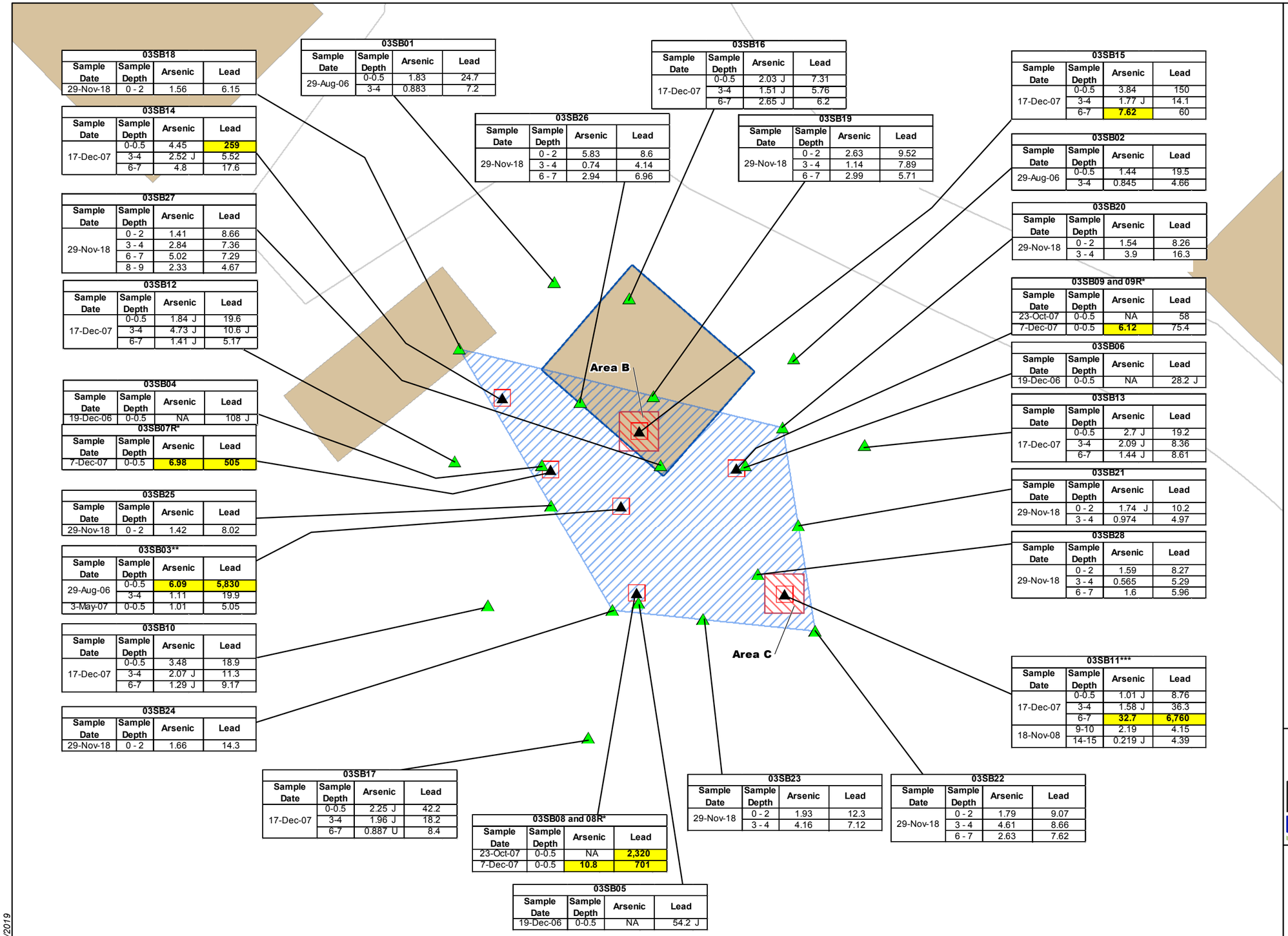
Figure 1-2

Site Location Map
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

\\usgrn1vfp001\data\group\G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP-03 Site Location Map.mxd



03SB18

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.56	6.15

03SB14

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	4.45	259
	3-4	2.52 J	5.52
	6-7	4.8	17.6

03SB27

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.41	8.66
	3 - 4	2.84	7.36
	6 - 7	5.02	7.29
	8 - 9	2.33	4.67

03SB12

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	1.84 J	19.6
	3-4	4.73 J	10.6 J
	6-7	1.41 J	5.17

03SB04

Sample Date	Sample Depth	Arsenic	Lead
19-Dec-06	0-0.5	NA	108 J

03SB07R*

Sample Date	Sample Depth	Arsenic	Lead
7-Dec-07	0-0.5	6.98	505

03SB25

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.42	8.02

03SB03**

Sample Date	Sample Depth	Arsenic	Lead
29-Aug-06	0-0.5	6.09	5,830
	3-4	1.11	19.9
3-May-07	0-0.5	1.01	5.05

03SB10

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	3.48	18.9
	3-4	2.07 J	11.3
	6-7	1.29 J	9.17

03SB24

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.66	14.3

03SB01

Sample Date	Sample Depth	Arsenic	Lead
29-Aug-06	0-0.5	1.83	24.7
	3-4	0.883	7.2

03SB26

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	5.83	8.6
	3 - 4	0.74	4.14
	6 - 7	2.94	6.96

03SB16

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	2.03 J	7.31
	3-4	1.51 J	5.76
	6-7	2.65 J	6.2

03SB19

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	2.63	9.52
	3 - 4	1.14	7.89
	6 - 7	2.99	5.71

03SB15

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	3.84	150
	3-4	1.77 J	14.1
	6-7	7.62	60

03SB02

Sample Date	Sample Depth	Arsenic	Lead
29-Aug-06	0-0.5	1.44	19.5
	3-4	0.845	4.66

03SB20

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.54	8.26
	3 - 4	3.9	16.3

03SB09 and 09R*

Sample Date	Sample Depth	Arsenic	Lead
23-Oct-07	0-0.5	NA	58
7-Dec-07	0-0.5	6.12	75.4

03SB06

Sample Date	Sample Depth	Arsenic	Lead
19-Dec-06	0-0.5	NA	28.2 J

03SB13

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	2.7 J	19.2
	3-4	2.09 J	8.36
	6-7	1.44 J	8.61

03SB21

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.74 J	10.2
	3 - 4	0.974	4.97

03SB28

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.59	8.27
	3 - 4	0.565	5.29
	6 - 7	1.6	5.96

03SB11***

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	1.01 J	8.76
	3-4	1.58 J	36.3
	6-7	32.7	6,760
18-Nov-08	9-10	2.19	4.15
	14-15	0.219 J	4.39

03SB17

Sample Date	Sample Depth	Arsenic	Lead
17-Dec-07	0-0.5	2.25 J	42.2
	3-4	1.96 J	18.2
	6-7	0.887 U	8.4

03SB08 and 08R*

Sample Date	Sample Depth	Arsenic	Lead
23-Oct-07	0-0.5	NA	2,320
7-Dec-07	0-0.5	10.8	701

03SB05

Sample Date	Sample Depth	Arsenic	Lead
19-Dec-06	0-0.5	NA	54.2 J

03SB23

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.93	12.3
	3 - 4	4.16	7.12

03SB22

Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.79	9.07
	3 - 4	4.61	8.66
	6 - 7	2.63	7.62

Soil Boring

Above Cleanup Level

Soil Boring All Sampled Intervals below Cleanup Level

Target Remediation Area B and Area C from ROD (Excavation Depth to 7 feet bgs)

Target Remediation Area A from ROD (Excavation Depth to 2 feet bgs)

Roads

Fomer Buildings/Structures

Site Boundary

Note:
1. Excavation depths and areas indicated are from the ROD Record of Decision.
2. All units in milligrams per kilogram (mg/kg)
3. J - Estimated concentration
U - Below detection limit
NA - Parameter not analyzed
4. bgs - below ground surface
5. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations
6. Yellow highlighting indicates results exceeding RRS3 MSCs
7. * Resample of the same location at a later date. Note that the original result from 03SB07 was rejected.
8. ** An additional sample called 03SB03-01-Total was collected in May 2007 from the original sample 03SB03-01 location and subjected to both total and the Synthetic Precipitation Leaching Procedure analyses
9. *** In Nov 2008, a soil boring was offset from the original boring location, additional samples were collected at deeper intervals, and well 03WW01 was installed in Nov 2008.

Parameter	Units	RRS3 MSCs
Arsenic	mg/kg	5.9
Lead	mg/kg	180

N

0 5 10 Feet

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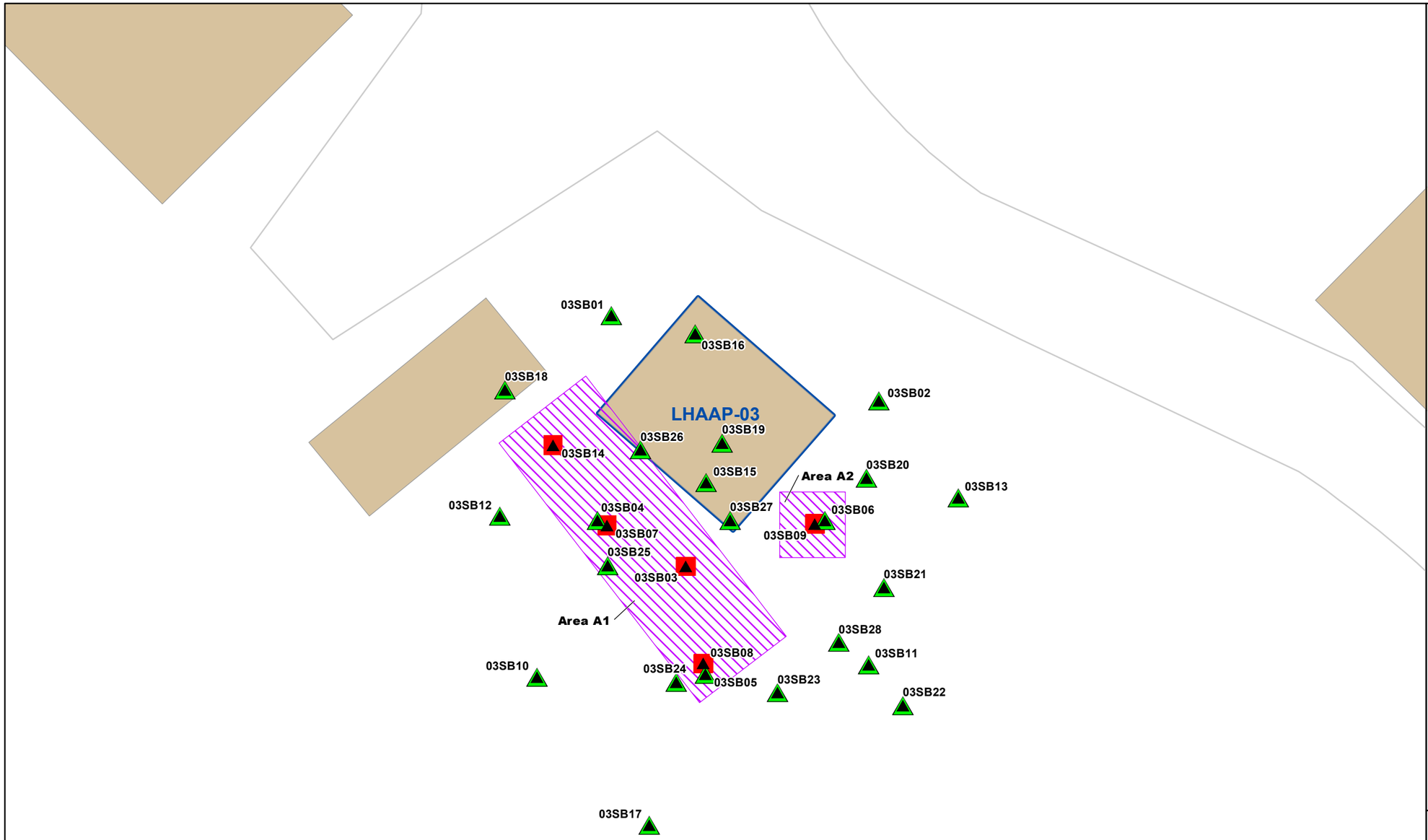
Figure 3-1

Soil Boring Locations and Results
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_SoilBoring_Result.mxd



Soil Boring

0-0.5 or 0-2 foot bgs
Sample below RRS3 MSC

0-0.5 foot deep soil contamination
above RRS3 MSC to be removed

1 ft Excavation Depth

Roads

Buildings

Site Boundary

Note:
1. bgs - below ground surface
2. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations

N

0 5 10 Feet

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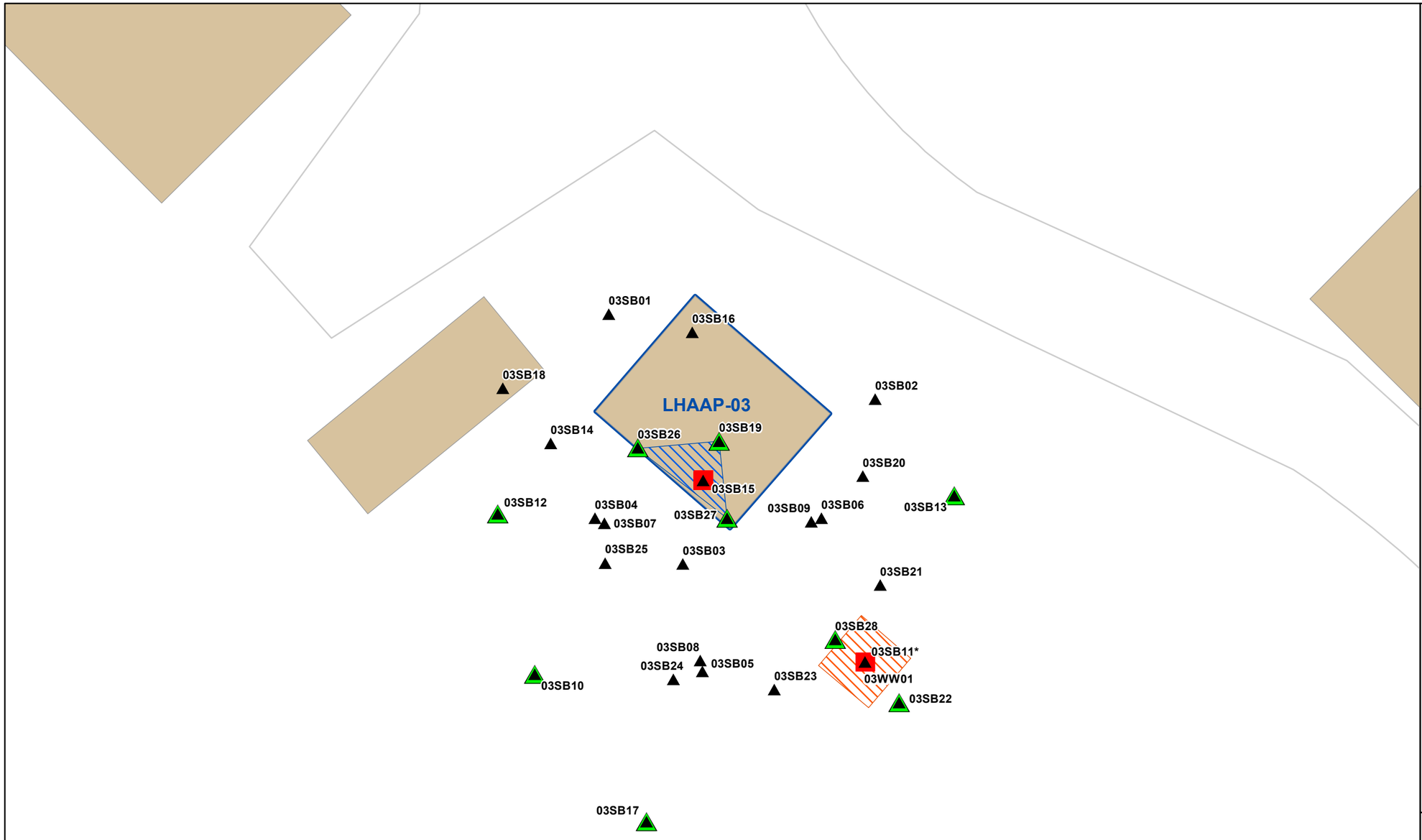
Figure 4-1

Proposed 1-Foot Excavation Areas
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_Prop_TwoFeet_ExcavationArea.mxd



6-7 foot deep soil contamination above RRS3 MSC to be removed

Below Cleanup Level at 6-7 ft bgs

Soil Boring not Sampled at 6-7 ft bgs

Area B (Excavation 8 feet bgs)

Area C (Excavation 8 feet bgs)

Shallow Monitoring Well

Roads

Former Buildings/Structures

Site Boundary

Note:
1. bgs - below ground surface
2. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations

* 03SB11 sample intervals from 9-10 feet bgs and 14-15 feet bgs were below RRS3 MSC

N

0 5 10 Feet

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Figure 4-2

Proposed 8-Foot Excavation Area
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_Prop_EightFeet_ExcavationArea.mxd

03SB18			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.56	6.15

03SB26			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	5.83	8.6

03SB15			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2.5	3.84	150

03SB27			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.41	8.66

03SB12			
Sample Date	Sample Depth	Arsenic	Lead
17-Nov-07	0 - 0.5	1.84 J	19.6
	3 - 4	4.73 J	10.6 J

03SB25			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.42	8.02

03SB28			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.59	8.27

03SB24			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.66	14.3

03SB23			
Sample Date	Sample Depth	Arsenic	Lead
29-Nov-18	0 - 2	1.93	12.3
	3 - 4	4.16	7.12

03SB01 03SB16 03SB02 03SB14 03SB20 Area A2 03SB13 03SB06 03SB04 03SB07 03SB09 03SB03 03SB21 Area A1 03SB08 03SB10 03SB11 03SB05 03SB22 03SB17

- Soil Boring
- Existing Soil Boring Sample to be Used as a Sidewall Confirmation Sample
- Above Cleanup Level
- Initial Excavation Depth 1-Foot
- Roads
- Former Buildings/Structures
- Site Boundary

Note:
1. A composite floor confirmation sample will be collected for Area A1 (See **Table 4-1**).
2. A single composite confirmation sample will be collected for Area A2 with a grab from each sidewall and floor (See **Table 4-1)**.
3. All units in milligrams per kilogram (mg/kg)
4. J - Estimated concentration
   U - Below detection limit
   NA - Parameter not analyzed
5. bgs - below ground surface

Parameter	Units	RRS3 MSCs
Arsenic	mg/kg	5.9
Lead	mg/kg	180

N

0 5 10 Feet

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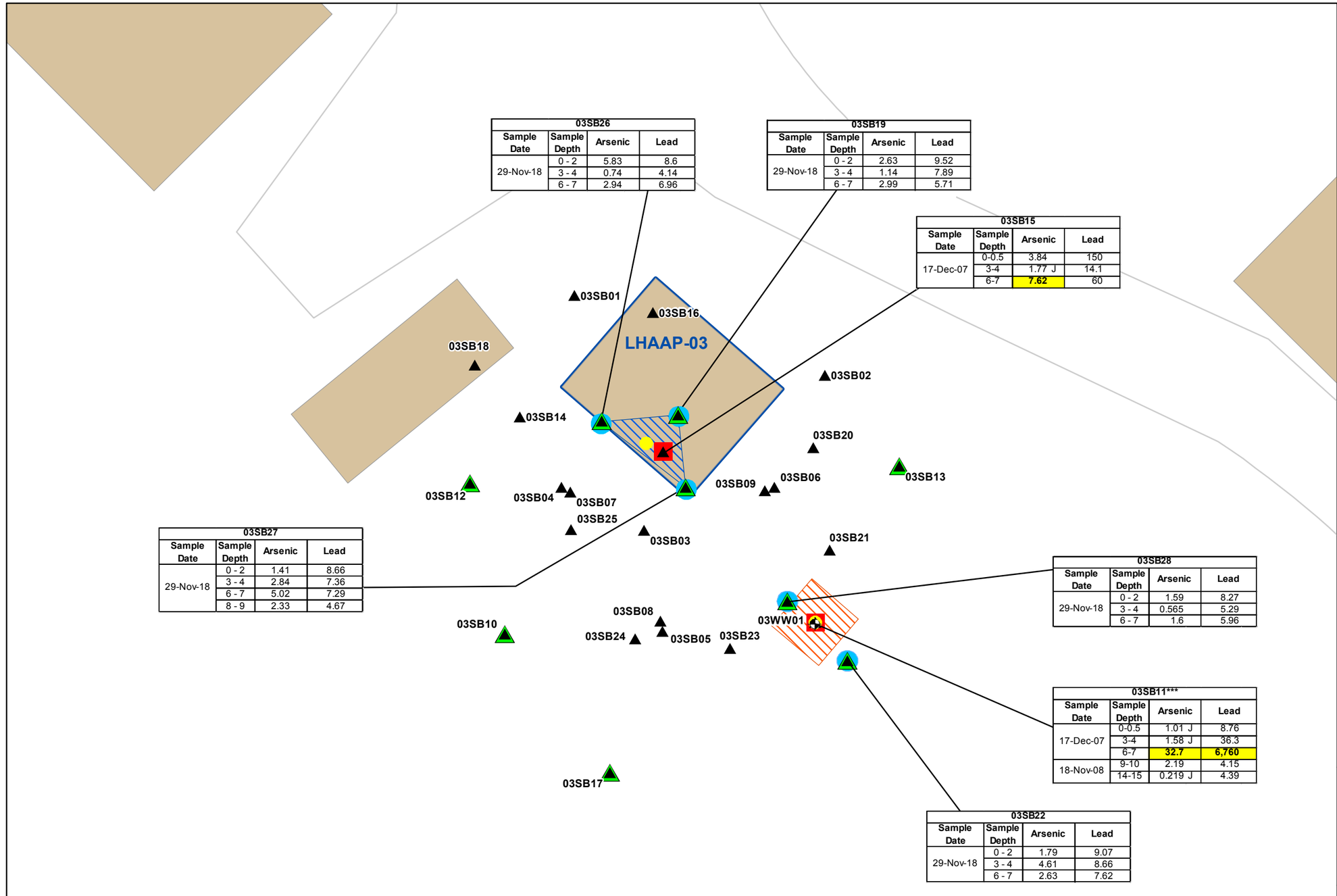
Figure 4-3

Proposed Confirmation Samples
1-Foot Excavation Areas
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 4/9/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_ProposedConfirmationSamples_2ftexc.mxd



Shallow Monitoring Well

Soil Boring

Below Cleanup Level at 6-7 ft bgs

6-7 foot deep soil contamination above RRS3 MSC

Existing Soil Boring Sample to be Used as a Sidewall Confirmation Sample (See **Table 4-1**)

Floor Confirmation Sample (Existing soil boring sample for Area C and new location to be collected for Area B) (See **Table 4-1**)

8 ft Excavation Limit

Area B (8-foot excavation)

Area C (8-foot excavation)

Roads

Buildings

Site Boundary

Note:
1. Excavation depths indicated are from the Record of Decision.
2. All units in milligrams per kilogram (mg/kg)
3. J - Estimated concentration
U - Below detection limit
NA - Parameter not analyzed
4. bgs - below ground surface
5. RRS3 MSCs - Risk Reduction Standard 3 Medium-specific Concentrations
6. Yellow highlighting indicates results exceeding RRS3 MSCs
7. *** In Nov 2008, a soil boring was offset from the original boring location, additional samples were collected at deeper intervals, and well 03WW01 was installed in Nov 2008.

Parameter	Units	RRS3 MSCs
Arsenic	mg/kg	5.9
Lead	mg/kg	180

N

0 5 10 Feet

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Figure 4-4

Proposed Confirmation Samples
8-Foot Excavation Areas B and C
LHAAP-03

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 2/28/2019

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP03\ExcWP\LHAAP03_ProposedConfirmationSamples_8ftExc.mxd

Appendix A

Analytical Data Reports from November 2018 Soil Samples

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Houston, TX 77099
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December 18, 2018

Susan Huang
Aptim Environmental & Infrastucture, Inc.
2500 City West Blvd., Suite 1700
Houston, TX 77042

Work Order: **HS18120004**

Laboratory Results for: **Longhorn Army Ammunition Plant LHAAP-03**

Dear Susan,

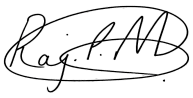
ALS Environmental received 36 sample(s) on Nov 30, 2018 for the analysis presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested. Results are expressed as "as received" unless otherwise noted.

QC sample results for this data met EPA or laboratory specifications except as noted in the Case Narrative or as noted with qualifiers in the QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained by ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to call me.

Sincerely,



Generated By: JUMOKE.LAWAL
RJ Modashia
Project Manager

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Work Order: HS18120004

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120004-01	03SB18-0.0-2.0	Soil		29-Nov-2018 10:00	30-Nov-2018 09:40	☐
HS18120004-02	03SB19-0.0-2.0	Soil		29-Nov-2018 10:18	30-Nov-2018 09:40	☐
HS18120004-03	03SB19-3.0-4.0	Soil		29-Nov-2018 10:20	30-Nov-2018 09:40	☐
HS18120004-04	03SB19-6.0-7.0	Soil		29-Nov-2018 10:24	30-Nov-2018 09:40	☐
HS18120004-05	03SB19-8.0-9.0	Soil		29-Nov-2018 10:26	30-Nov-2018 09:40	☑
HS18120004-06	03SB20-0.0-2.0	Soil		29-Nov-2018 10:30	30-Nov-2018 09:40	☐
HS18120004-07	03SB20-0.0-2.0-FD	Soil		29-Nov-2018 10:30	30-Nov-2018 09:40	☐
HS18120004-08	03SB20-3.0-4.0	Soil		29-Nov-2018 10:35	30-Nov-2018 09:40	☐
HS18120004-09	03SB20-6.0-7.0	Soil		29-Nov-2018 10:38	30-Nov-2018 09:40	☑
HS18120004-10	03SB21-0.0-2.0	Soil		29-Nov-2018 10:45	30-Nov-2018 09:40	☐
HS18120004-11	03SB21-3.0-4.0	Soil		29-Nov-2018 10:50	30-Nov-2018 09:40	☐
HS18120004-12	03SB21-6.0-7.0	Soil		29-Nov-2018 10:55	30-Nov-2018 09:40	☑
HS18120004-13	03SB22-0.0-2.0	Soil		29-Nov-2018 11:05	30-Nov-2018 09:40	☐
HS18120004-14	03SB22-3.0-4.0	Soil		29-Nov-2018 11:10	30-Nov-2018 09:40	☐
HS18120004-15	03SB22-3.0-4.0-FD	Soil		29-Nov-2018 11:10	30-Nov-2018 09:40	☐
HS18120004-16	03SB22-6.0-7.0	Soil		29-Nov-2018 11:13	30-Nov-2018 09:40	☐
HS18120004-17	03SB22-8.0-9.0	Soil		29-Nov-2018 11:15	30-Nov-2018 09:40	☑
HS18120004-18	03SB23-0.0-2.0	Soil		29-Nov-2018 11:30	30-Nov-2018 09:40	☐
HS18120004-19	03SB23-3.0-4.0	Soil		29-Nov-2018 11:33	30-Nov-2018 09:40	☐
HS18120004-20	03SB23-6.0-7.0	Soil		29-Nov-2018 11:35	30-Nov-2018 09:40	☑
HS18120004-21	03SB24-0.0-2.0	Soil		29-Nov-2018 11:45	30-Nov-2018 09:40	☐
HS18120004-22	03SB25-0.0-2.0	Soil		29-Nov-2018 11:40	30-Nov-2018 09:40	☐
HS18120004-23	03SB26-0.0-2.0	Soil		29-Nov-2018 10:05	30-Nov-2018 09:40	☐
HS18120004-24	03SB26-0.0-2.0-FD	Soil		29-Nov-2018 10:05	30-Nov-2018 09:40	☐
HS18120004-25	03SB26-3.0-4.0	Soil		29-Nov-2018 10:10	30-Nov-2018 09:40	☐
HS18120004-26	03SB26-6.0-7.0	Soil		29-Nov-2018 10:13	30-Nov-2018 09:40	☐

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Work Order: HS18120004

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS18120004-27	03SB26-8.0-9.0	Soil		29-Nov-2018 10:15	30-Nov-2018 09:40	☑
HS18120004-28	03SB27-0.0-2.0	Soil		29-Nov-2018 11:55	30-Nov-2018 09:40	☐
HS18120004-29	03SB27-3.0-4.0	Soil		29-Nov-2018 12:00	30-Nov-2018 09:40	☐
HS18120004-30	03SB27-6.0-7.0	Soil		29-Nov-2018 12:05	30-Nov-2018 09:40	☐
HS18120004-31	03SB27-8.0-9.0	Soil		29-Nov-2018 12:08	30-Nov-2018 09:40	☐
HS18120004-32	03SB28-0.0-2.0	Soil		29-Nov-2018 12:15	30-Nov-2018 09:40	☐
HS18120004-33	03SB28-3.0-4.0	Soil		29-Nov-2018 12:18	30-Nov-2018 09:40	☐
HS18120004-34	03SB28-6.0-7.0	Soil		29-Nov-2018 12:20	30-Nov-2018 09:40	☐
HS18120004-35	03SB28-8.0-9.0	Soil		29-Nov-2018 12:24	30-Nov-2018 09:40	☑
HS18120004-36	Trip Blank	Water	ALS-111418-61	29-Nov-2018 00:00	30-Nov-2018 09:40	☑

Client: Aptim Environmental & Infrastucture, Inc. **CASE NARRATIVE**
Project: Longhorn Army Ammunition Plant LHAAP-03
Work Order: HS18120004

Metals by Method SW6020

Batch ID: 135452

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Batch ID: 135451

Sample ID: 03SB27-3.0-4.0 (HS18120004-29MS)

- The test results meet requirements of the current NELAP standards, state requirements or programs where applicable.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB18-0.0-2.0
Collection Date: 29-Nov-2018 10:00

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-01
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.56**		**0.0661**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 19:53
Lead	**6.15**		**0.0123**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 19:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB19-0.0-2.0
Collection Date: 29-Nov-2018 10:18

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-02
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.63**		**0.0645**	**0.0921**	**0.460**	**mg/Kg**	1	14-Dec-2018 19:55
Lead	**9.52**		**0.0120**	**0.0921**	**0.460**	**mg/Kg**	1	14-Dec-2018 19:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB19-3.0-4.0
Collection Date: 29-Nov-2018 10:20

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-03
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.14**		**0.0639**	**0.0913**	**0.456**	**mg/Kg**	1	14-Dec-2018 19:58
Lead	**7.89**		**0.0119**	**0.0913**	**0.456**	**mg/Kg**	1	14-Dec-2018 19:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB19-6.0-7.0
Collection Date: 29-Nov-2018 10:24

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-04
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.99**		**0.0682**	**0.0975**	**0.487**	**mg/Kg**	1	14-Dec-2018 20:00
Lead	**5.71**		**0.0127**	**0.0975**	**0.487**	**mg/Kg**	1	14-Dec-2018 20:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB20-0.0-2.0
Collection Date: 29-Nov-2018 10:30

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-06
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.54**		**0.0684**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 20:02
Lead	**8.26**		**0.0127**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 20:02

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB20-0.0-2.0-FD
Collection Date: 29-Nov-2018 10:30

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-07
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**4.05**		**0.0669**	**0.0955**	**0.478**	**mg/Kg**	1	14-Dec-2018 20:04
Lead	**11.3**		**0.0124**	**0.0955**	**0.478**	**mg/Kg**	1	14-Dec-2018 20:04

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB20-3.0-4.0
Collection Date: 29-Nov-2018 10:35

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-08
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**3.90**		**0.0681**	**0.0973**	**0.486**	**mg/Kg**	1	14-Dec-2018 20:07
Lead	**16.3**		**0.0126**	**0.0973**	**0.486**	**mg/Kg**	1	14-Dec-2018 20:07

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB21-0.0-2.0
Collection Date: 29-Nov-2018 10:45

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-10
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.74**		**0.0642**	**0.0917**	**0.458**	**mg/Kg**	1	14-Dec-2018 20:16
Lead	**10.2**		**0.0119**	**0.0917**	**0.458**	**mg/Kg**	1	14-Dec-2018 20:16

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB21-3.0-4.0
Collection Date: 29-Nov-2018 10:50

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-11
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.974**		**0.0640**	**0.0915**	**0.457**	**mg/Kg**	1	14-Dec-2018 20:27
Lead	**4.97**		**0.0119**	**0.0915**	**0.457**	**mg/Kg**	1	14-Dec-2018 20:27

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-0.0-2.0
Collection Date: 29-Nov-2018 11:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-13
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.79**		**0.0660**	**0.0943**	**0.472**	**mg/Kg**	1	14-Dec-2018 20:29
Lead	**9.07**		**0.0123**	**0.0943**	**0.472**	**mg/Kg**	1	14-Dec-2018 20:29

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-3.0-4.0
Collection Date: 29-Nov-2018 11:10

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-14
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**4.61**		**0.0665**	**0.0950**	**0.475**	**mg/Kg**	1	14-Dec-2018 20:31
Lead	**8.66**		**0.0124**	**0.0950**	**0.475**	**mg/Kg**	1	14-Dec-2018 20:31

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client:	Aptim Environmental & Infrastucture, Inc.	**ANALYTICAL REPORT**
Project:	Longhorn Army Ammunition Plant LHAAP-03	WorkOrder:HS18120004
Sample ID:	03SB22-3.0-4.0-FD	Lab ID:HS18120004-15
Collection Date:	29-Nov-2018 11:10	Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.709**		**0.0660**	**0.0943**	**0.471**	**mg/Kg**	1	14-Dec-2018 20:33
Lead	**6.26**		**0.0123**	**0.0943**	**0.471**	**mg/Kg**	1	14-Dec-2018 20:33

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB22-6.0-7.0
Collection Date: 29-Nov-2018 11:13

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-16
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.63**		**0.0672**	**0.0959**	**0.480**	**mg/Kg**	1	14-Dec-2018 22:30
Lead	**7.62**		**0.0125**	**0.0959**	**0.480**	**mg/Kg**	1	14-Dec-2018 22:30

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB23-0.0-2.0
Collection Date: 29-Nov-2018 11:30

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-18
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.93**		**0.0648**	**0.0926**	**0.463**	**mg/Kg**	1	14-Dec-2018 22:32
Lead	**12.3**		**0.0120**	**0.0926**	**0.463**	**mg/Kg**	1	14-Dec-2018 22:32

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB23-3.0-4.0
Collection Date: 29-Nov-2018 11:33

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-19
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**4.16**		**0.0645**	**0.0922**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:35
Lead	**7.12**		**0.0120**	**0.0922**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:35

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB24-0.0-2.0
Collection Date: 29-Nov-2018 11:45

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-21
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.66**		**0.0661**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 22:37
Lead	**14.3**		**0.0123**	**0.0944**	**0.472**	**mg/Kg**	1	14-Dec-2018 22:37

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB25-0.0-2.0
Collection Date: 29-Nov-2018 11:40

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-22
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.42**		**0.0681**	**0.0972**	**0.486**	**mg/Kg**	1	14-Dec-2018 22:39
Lead	**8.02**		**0.0126**	**0.0972**	**0.486**	**mg/Kg**	1	14-Dec-2018 22:39

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-0.0-2.0
Collection Date: 29-Nov-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-23
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**5.83**		**0.0684**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 22:41
Lead	**8.60**		**0.0127**	**0.0977**	**0.489**	**mg/Kg**	1	14-Dec-2018 22:41

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-0.0-2.0-FD
Collection Date: 29-Nov-2018 10:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-24
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.92**		**0.0674**	**0.0963**	**0.481**	**mg/Kg**	1	14-Dec-2018 22:44
Lead	**8.38**		**0.0125**	**0.0963**	**0.481**	**mg/Kg**	1	14-Dec-2018 22:44

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-3.0-4.0
Collection Date: 29-Nov-2018 10:10

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-25
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.740**		**0.0646**	**0.0923**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:46
Lead	**4.14**		**0.0120**	**0.0923**	**0.461**	**mg/Kg**	1	14-Dec-2018 22:46

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB26-6.0-7.0
Collection Date: 29-Nov-2018 10:13

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-26
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.94**		**0.0680**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:26
Lead	**6.96**		**0.0126**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:26

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-0.0-2.0
Collection Date: 29-Nov-2018 11:55

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-28
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.41**		**0.0680**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:29
Lead	**8.66**		**0.0126**	**0.0971**	**0.486**	**mg/Kg**	1	12-Dec-2018 20:29

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-3.0-4.0
Collection Date: 29-Nov-2018 12:00

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-29
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.84**		**0.0642**	**0.0917**	**0.459**	**mg/Kg**	1	12-Dec-2018 20:31
Lead	**7.36**		**0.0119**	**0.0917**	**0.459**	**mg/Kg**	1	12-Dec-2018 20:31

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-6.0-7.0
Collection Date: 29-Nov-2018 12:05

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-30
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**5.02**		**0.0640**	**0.0915**	**0.457**	**mg/Kg**	1	12-Dec-2018 20:42
Lead	**7.29**		**0.0119**	**0.0915**	**0.457**	**mg/Kg**	1	12-Dec-2018 20:42

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB27-8.0-9.0
Collection Date: 29-Nov-2018 12:08

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-31
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**2.33**		**0.0660**	**0.0943**	**0.471**	**mg/Kg**	1	12-Dec-2018 20:53
Lead	**4.67**		**0.0123**	**0.0943**	**0.471**	**mg/Kg**	1	12-Dec-2018 20:53

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB28-0.0-2.0
Collection Date: 29-Nov-2018 12:15

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-32
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.59**		**0.0655**	**0.0936**	**0.468**	**mg/Kg**	1	12-Dec-2018 20:55
Lead	**8.27**		**0.0122**	**0.0936**	**0.468**	**mg/Kg**	1	12-Dec-2018 20:55

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB28-3.0-4.0
Collection Date: 29-Nov-2018 12:18

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-33
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**0.565**		**0.0642**	**0.0917**	**0.458**	**mg/Kg**	1	12-Dec-2018 20:58
Lead	**5.29**		**0.0119**	**0.0917**	**0.458**	**mg/Kg**	1	12-Dec-2018 20:58

Note: See Qualifiers Page for a list of qualifiers and their explanation.

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
Sample ID: 03SB28-6.0-7.0
Collection Date: 29-Nov-2018 12:20

ANALYTICAL REPORT
WorkOrder:HS18120004
Lab ID:HS18120004-34
Matrix:Soil

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
METALS BY SW6020A	**Method:SW6020**					Prep:SW3050A / 11-Dec-2018		Analyst: JCJ
Arsenic	**1.60**		**0.0675**	**0.0965**	**0.482**	**mg/Kg**	1	12-Dec-2018 21:00
Lead	**5.96**		**0.0125**	**0.0965**	**0.482**	**mg/Kg**	1	12-Dec-2018 21:00

Note: See Qualifiers Page for a list of qualifiers and their explanation.

WEIGHT LOG

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

Batch ID: 135451 **Method:** METALS BY SW6020A **Prep:** 3050_I_LOW

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120004-26	1	0.5149	50 (mL)	97.11
HS18120004-28	1	0.5147	50 (mL)	97.14
HS18120004-29	1	0.545	50 (mL)	91.74
HS18120004-30	1	0.5466	50 (mL)	91.47
HS18120004-31	1	0.5304	50 (mL)	94.27
HS18120004-32	1	0.5343	50 (mL)	93.58
HS18120004-33	1	0.5454	50 (mL)	91.68
HS18120004-34	1	0.5183	50 (mL)	96.47

Batch ID: 135452 **Method:** METALS BY SW6020A **Prep:** 3050_I_LOW

SampID	Container	Sample Wt/Vol	Final Volume	Prep Factor
HS18120004-01	1	0.5298	50 (mL)	94.38
HS18120004-02	1	0.543	50 (mL)	92.08
HS18120004-03	1	0.5479	50 (mL)	91.26
HS18120004-04	1	0.513	50 (mL)	97.47
HS18120004-06	1	0.5116	50 (mL)	97.73
HS18120004-07	1	0.5233	50 (mL)	95.55
HS18120004-08	1	0.514	50 (mL)	97.28
HS18120004-10	1	0.5455	50 (mL)	91.66
HS18120004-11	1	0.5465	50 (mL)	91.49
HS18120004-13	1	0.53	50 (mL)	94.34
HS18120004-14	1	0.5262	50 (mL)	95.02
HS18120004-15	1	0.5305	50 (mL)	94.25
HS18120004-16	1	0.5212	50 (mL)	95.93
HS18120004-18	1	0.54	50 (mL)	92.59
HS18120004-19	1	0.5425	50 (mL)	92.17
HS18120004-21	1	0.5296	50 (mL)	94.41
HS18120004-22	1	0.5143	50 (mL)	97.22
HS18120004-23	1	0.5117	50 (mL)	97.71
HS18120004-24	1	0.5193	50 (mL)	96.28
HS18120004-25	1	0.5419	50 (mL)	92.27

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID 135451	**Test Name :** METALS BY SW6020A			**Matrix:** Soil		
HS18120004-26	03SB26-6.0-7.0	29 Nov 2018 10:13		11 Dec 2018 13:27	12 Dec 2018 20:26	1
HS18120004-28	03SB27-0.0-2.0	29 Nov 2018 11:55		11 Dec 2018 13:27	12 Dec 2018 20:29	1
HS18120004-29	03SB27-3.0-4.0	29 Nov 2018 12:00		11 Dec 2018 13:27	12 Dec 2018 20:31	1
HS18120004-30	03SB27-6.0-7.0	29 Nov 2018 12:05		11 Dec 2018 13:27	12 Dec 2018 20:42	1
HS18120004-31	03SB27-8.0-9.0	29 Nov 2018 12:08		11 Dec 2018 13:27	12 Dec 2018 20:53	1
HS18120004-32	03SB28-0.0-2.0	29 Nov 2018 12:15		11 Dec 2018 13:27	12 Dec 2018 20:55	1
HS18120004-33	03SB28-3.0-4.0	29 Nov 2018 12:18		11 Dec 2018 13:27	12 Dec 2018 20:58	1
HS18120004-34	03SB28-6.0-7.0	29 Nov 2018 12:20		11 Dec 2018 13:27	12 Dec 2018 21:00	1
Batch ID 135452	**Test Name :** METALS BY SW6020A			**Matrix:** Soil		
HS18120004-01	03SB18-0.0-2.0	29 Nov 2018 10:00		11 Dec 2018 13:33	14 Dec 2018 19:53	1
HS18120004-02	03SB19-0.0-2.0	29 Nov 2018 10:18		11 Dec 2018 13:33	14 Dec 2018 19:55	1
HS18120004-03	03SB19-3.0-4.0	29 Nov 2018 10:20		11 Dec 2018 13:33	14 Dec 2018 19:58	1
HS18120004-04	03SB19-6.0-7.0	29 Nov 2018 10:24		11 Dec 2018 13:33	14 Dec 2018 20:00	1
HS18120004-06	03SB20-0.0-2.0	29 Nov 2018 10:30		11 Dec 2018 13:33	14 Dec 2018 20:02	1
HS18120004-07	03SB20-0.0-2.0-FD	29 Nov 2018 10:30		11 Dec 2018 13:33	14 Dec 2018 20:04	1
HS18120004-08	03SB20-3.0-4.0	29 Nov 2018 10:35		11 Dec 2018 13:33	14 Dec 2018 20:07	1
HS18120004-10	03SB21-0.0-2.0	29 Nov 2018 10:45		11 Dec 2018 13:33	14 Dec 2018 20:16	1
HS18120004-11	03SB21-3.0-4.0	29 Nov 2018 10:50		11 Dec 2018 13:33	14 Dec 2018 20:27	1
HS18120004-13	03SB22-0.0-2.0	29 Nov 2018 11:05		11 Dec 2018 13:33	14 Dec 2018 20:29	1
HS18120004-14	03SB22-3.0-4.0	29 Nov 2018 11:10		11 Dec 2018 13:33	14 Dec 2018 20:31	1
HS18120004-15	03SB22-3.0-4.0-FD	29 Nov 2018 11:10		11 Dec 2018 13:33	14 Dec 2018 20:33	1
HS18120004-16	03SB22-6.0-7.0	29 Nov 2018 11:13		11 Dec 2018 13:33	14 Dec 2018 22:30	1
HS18120004-18	03SB23-0.0-2.0	29 Nov 2018 11:30		11 Dec 2018 13:33	14 Dec 2018 22:32	1
HS18120004-19	03SB23-3.0-4.0	29 Nov 2018 11:33		11 Dec 2018 13:33	14 Dec 2018 22:35	1
HS18120004-21	03SB24-0.0-2.0	29 Nov 2018 11:45		11 Dec 2018 13:33	14 Dec 2018 22:37	1
HS18120004-22	03SB25-0.0-2.0	29 Nov 2018 11:40		11 Dec 2018 13:33	14 Dec 2018 22:39	1
HS18120004-23	03SB26-0.0-2.0	29 Nov 2018 10:05		11 Dec 2018 13:33	14 Dec 2018 22:41	1
HS18120004-24	03SB26-0.0-2.0-FD	29 Nov 2018 10:05		11 Dec 2018 13:33	14 Dec 2018 22:44	1
HS18120004-25	03SB26-3.0-4.0	29 Nov 2018 10:10		11 Dec 2018 13:33	14 Dec 2018 22:46	1

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135451 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-135451** Units: **mg/Kg** Analysis Date: **12-Dec-2018 19:57**
Client ID: Run ID: **ICPMS04_329054** SeqNo: **4861941** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.100	0.500								U
Lead	0.100	0.500								U

LCS Sample ID: **LCS-135451** Units: **mg/Kg** Analysis Date: **12-Dec-2018 19:59**
Client ID: Run ID: **ICPMS04_329054** SeqNo: **4861942** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	9.119	0.500	10	0	91.2	80 - 120				
Lead	9.458	0.500	10	0	94.6	80 - 120				

MS Sample ID: **HS18120004-29MS** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:35**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861959** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.66	0.462	9.244	2.842	95.4	75 - 125				
Lead	16.52	0.462	9.244	7.362	99.1	75 - 125				

MSD Sample ID: **HS18120004-29MSD** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:38**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861960** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.67	0.464	9.28	2.842	95.1	75 - 125	11.66	0.0452	20	
Lead	16.98	0.464	9.28	7.362	104	75 - 125	16.52	2.74	20	

PDS Sample ID: **HS18120004-29PDS** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:40**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861961** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.46	0.459	9.174	2.842	93.9	75 - 125				
Lead	16.07	0.459	9.174	7.362	94.9	75 - 125				

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135451 **Instrument: ICPMS04** **Method: SW6020**

SD Sample ID: **HS18120004-29SD** Units: **mg/Kg** Analysis Date: **12-Dec-2018 20:33**
Client ID: **03SB27-3.0-4.0** Run ID: **ICPMS04_329054** SeqNo: **4861958** PrepDate: **11-Dec-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	3.005	2.29					2.842	5.71	10	
Lead	7.315	2.29					7.362	0.645	10	

The following samples were analyzed in this batch:

HS18120004-26	HS18120004-28	HS18120004-29	HS18120004-30
HS18120004-31	HS18120004-32	HS18120004-33	HS18120004-34

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135452 **Instrument: ICPMS04** **Method: SW6020**

MBLK Sample ID: **MBLK-135452** Units: **mg/Kg** Analysis Date: **14-Dec-2018 19:49**
Client ID: Run ID: **ICPMS04_329261** SeqNo: **4866984** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	0.100	0.500								U
Lead	0.100	0.500								U

LCS Sample ID: **LCS-135452** Units: **mg/Kg** Analysis Date: **14-Dec-2018 19:51**
Client ID: Run ID: **ICPMS04_329261** SeqNo: **4866985** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	9.338	0.500	10	0	93.4	80 - 120				
Lead	9.804	0.500	10	0	98.0	80 - 120				

MS Sample ID: **HS18120004-10MS** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:20**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4866998** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	10.17	0.459	9.184	1.743	91.8	75 - 125				
Lead	19.21	0.459	9.184	10.17	98.5	75 - 125				

MSD Sample ID: **HS18120004-10MSD** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:22**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4866999** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	11.17	0.464	9.287	1.743	102	75 - 125	10.17	9.37	20	
Lead	21.34	0.464	9.287	10.17	120	75 - 125	19.21	10.5	20	

PDS Sample ID: **HS18120004-10PDS** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:25**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4867000** PrepDate: **11-Dec-2018** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Arsenic	10.9	0.458	9.166	1.743	99.9	75 - 125				
Lead	20	0.458	9.166	10.17	107	75 - 125				

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: HS18120004

QC BATCH REPORT

Batch ID: 135452 **Instrument: ICPMS04** **Method: SW6020**

SD Sample ID: **HS18120004-10SD** Units: **mg/Kg** Analysis Date: **14-Dec-2018 20:18**
Client ID: **03SB21-0.0-2.0** Run ID: **ICPMS04_329261** SeqNo: **4866997** PrepDate: **11-Dec-2018** DF: **5**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%D	%D Limit	Qual
Arsenic	1.71	2.29					1.743	0	10	J
Lead	10.41	2.29					10.17	2.42	10	

The following samples were analyzed in this batch:

HS18120004-01	HS18120004-02	HS18120004-03	HS18120004-04
HS18120004-06	HS18120004-07	HS18120004-08	HS18120004-10
HS18120004-11	HS18120004-13	HS18120004-14	HS18120004-15
HS18120004-16	HS18120004-18	HS18120004-19	HS18120004-21
HS18120004-22	HS18120004-23	HS18120004-24	HS18120004-25

Client: Aptim Environmental & Infrastucture, Inc.
Project: Longhorn Army Ammunition Plant LHAAP-03
WorkOrder: **HS18120004**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
M	Manually integrated, see raw data for justification
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL/SDL

Acronym	Description
DCS	Detectability Check Study
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SD	Serial Dilution
SDL	Sample Detection Limit
TRRP	Texas Risk Reduction Program

CERTIFICATIONS,ACCREDITATIONS & LICENSES

Agency	Number	Expire Date
North Carolina	624-2018	31-Dec-2018
Arkansas	88-0356	27-Mar-2019
Texas	T10470231-18-21	30-Apr-2019
North Dakota	R193 2018-2019	30-Apr-2019
Illinois	004438	29-Jun-2019
Louisiana	03087	30-Jun-2019
Dept of Defense	ANAB L2231	22-Dec-2018
Kentucky	123043 - 2018	30-Apr-2019
Kansas	E-10352 2018-2019	31-Jul-2019
Oklahoma	2018-156	31-Aug-2019

Sample Receipt Checklist

Client Name: CBI-Houston
Work Order: HS18120004

Date/Time Received: **30-Nov-2018 09:40**
Received by: **PJM**

Checklist completed by: *Pablo Marinez* eSignature 1-Dec-2018 Date

Reviewed by: *RJ Modashia* eSignature 3-Dec-2018 Date

Matrices: **SOIL, WATER**

Carrier name: **FedEx Priority Overnight**

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
TX1005 solids received in hermetically sealed vials?	Yes ☐	No ☐	N/A ☑
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	2.1C/2.5C UC/C	IR # 11	
Cooler(s)/Kit(s):	44426		
Date/Time sample(s) sent to storage:	12/1/18 9:20		
Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☑
pH adjusted?	Yes ☐	No ☐	N/A ☑
pH adjusted by:			

Login Notes: Trip Blank not listed on CoC, logged in on hold

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

APTIM

COC ID: LHAAP03-NOV2018-ALSHT-1811-29 TURNAROUND TIME: normal RUSH: Page 1 of 3

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-03			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stancliff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company	Fedex		

HS18120004

Aptim Environmental & Infrastucture, Inc.
Longhorn Army Ammunition Plant LHAAP-29

SAMPLE DETAILS								ANALYSIS REQUESTED		
Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	ANALYSIS: Metals (As & Pb) by 6020	
035SB18-0.0-2.0	035SB18	0	2	FT	Soil	11/29/18	1000	1	X	
035SB19-0.0-2.0	035SB19	0	2	FT			1018	1	X	
035SB19-3.0-4.0	035SB19	3	4				1020	1	X	
035SB19-6.0-7.0	035SB19	6	7				1024	1	X	
035SB19-8.0-9.0	035SB19	8	9				1026	1	X	— HOLD SAMPLE
035SB20-0.0-2.0	035SB20	0	2				1030	1	X	
035SB20-0.0-2.0-FD	035SB20	0	2				1030	1	X	
035SB20-3.0-4.0	035SB20	3	4				1035	1	X	
035SB20-6.0-7.0	035SB20	6	7				1038	1	X	— HOLD SAMPLE
035SB21-0.0-2.0	035SB21	0	2				1045	1	X	
035SB21-0.0-2.0-MS	035SB21	0	2				1045	1	X	
035SB21-0.0-2.0-MSD	035SB21	0	2				1045	1	X	
035SB21-3.0-4.0	035SB21	3	4				1050	1	X	
035SB21-6.0-7.0	035SB21	6	7				1055	1	X	— HOLD SAMPLE
035SB22-0.0-2.0	035SB22	0	2				1105	1	X	
035SB22-3.0-4.0	035SB22	3	4				1110	1	X	

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
		11/29/18 1900	PM/ALS	11/30/18 09:40

Cooler 44426
Temp 2.1
IR 11
CF 0.4

APTIM

COC ID: LHAAP03-NOV2018-ALSHT-1811-29 TURNAROUND TIME: normal RUSH: Page 1 of 3

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-03			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stancliff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company	Fedex		

SAMPLE DETAILS								ANALYSIS REQUESTED	
Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	Metals (As & Pb) by 6020
035B22-3.0-4.0-FD	035B22	3	4	FT	Soil	11/29/18	1110	1	X
035B22-6.0-7.0	035B22	6	7				1113	1	X
035B22-8.0-9.0	035B22	8	9				1115	1	X — HOLD SAMPLE
035B23-0.0-2.0	035B23	0	2				1130	1	X
035B23-3.0-4.0	035B23	3	4				1133	1	X
035B23-6.0-7.0	035B23	6	7				1135	1	X — HOLD SAMPLE
035B24-0.0-2.0	035B24	0	2				1145	1	X
035B25-0.0-2.0	035B25	0	2				1140	1	X
035B26-0.0-2.0	035B26	0	2				1005	1	X
035B26-0.0-2.0-FD	035B26	0	2				1005	1	X
035B26-3.0-4.0	035B26	3	4				1010	1	X
035B26-6.0-7.0	035B26	6	7				1013	1	X
035B26-8.0-9.0	035B26	8	9				1015	1	X — HOLD SAMPLE
035B27-0.0-2.0	035B27	0	2				1155	1	X
035B27-3.0-4.0	035B27	3	4				1200	1	X
035B27-3.0-4.0-MS	035B27	3	4				1200	1	X

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
	[signature]	11/29/18 1900	PM / ALS	11/30/18 09:40

HS18120004

Aptim Environmental & Infrastucture, Inc.
Longhorn Army Ammunition Plant LHAAP-29

Cooler 44426
Temp 2.1
IR 11
CF 0.4

APTIM

COC ID: LHAAP03-NOV2018-ALSHT-1811-29 TURNAROUND TIME: normal RUSH: Page 3 of 3

PROJECT/CLIENT INFO				LABORATORY				OTHER INFO			
Facility Name	Longhorn AAP			Lab Name	ALS Laboratories			Email Invoice To	FedInvoices@aptim.com		
Project Number	501032			Lab Contact	RJ Modashia						
	LHAAP-03			Email	RJ.Modashia@alsglobal.com			Email Report To	Susan.Huang@aptim.com		
Address	1203-B East Grand Avenue			Address	10450 Stancliff Rd., Suite 210			Mail Reports To	Susan Huang		
	PMB 202							Address	4005 Port Chicago Highway, Suit 200		
City	Marshall	State	TX	City	Houston	State	TX	City	Concord	State	CA
Postal Code	75670	Country	USA	Postal Code	77099	Country	USA	Postal Code	94520	Country	USA
Phone Number	713.243.7264			Phone Number	281.575.2279 or 281.530.5656						
Project Manager	Praveen Srivastav							Shipping Company	Fedex		

SAMPLE DETAILS / ANALYSIS REQUESTED

Sample ID	Location	Start Depth	End Depth	Depth Unit	Field Matrix	Date	Time (24hr)	# Of Cont.	ANALYSIS: Metals (As & Pb) by 6020
035B27-3.0-4.0-MSD	035B27	3	4	FT	Soil	11/29/18	1200	1	X
035B27-6.0-7.0	035B27	6	7				1205	1	X
035B27-8.0-9.0	035B27	8	9				1208	1	X
035B28-0.0-2.0	035B28	0	2				1215	1	X
035B28-3.0-4.0	035B28	3	4				1218	1	X
035B28-6.0-7.0	035B28	6	7				1220	1	X
035B28-8.0-9.0	035B28	8	9				1224	1	X → HOLD SAMPLE

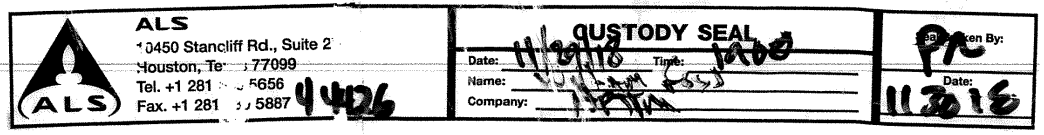
HS18120004

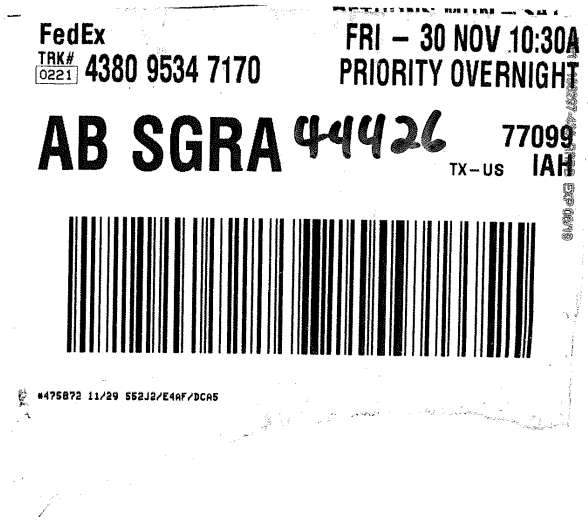
Aptim Environmental & Infrastucture, Inc.

Longhorn Army Ammunition Plant LHAAP-29

ADDITIONAL COMMENTS/SPECIAL INSTRUCTIONS	RELINQUISHED BY/AFFILIATION	DATE/TIME	ACCEPTED BY/AFFILIATION	DATE/TIME
		11/29/18 1900	APTIM / ALS	11/30/18 09:40

Cooler 44426
Temp 2.1
IR11
CF-0.4


ALS
10450 Stancliff Rd., Suite 2
Houston, Te 77099
Tel. +1 281 5656
Fax. +1 281 5887
4426
CUSTODY SEAL
Date: 11/29/18 Time: 1400
Name:
Company:
Date:
11/30/18


FedEx
TRK# 0221 4380 9534 7170
FRI – 30 NOV 10:30A
PRIORITY OVERNIGHT
AB SGRA 4426
77099
TX-US IAH
#4758?2 11/29 552J2/E4AF/DCA5

Appendix B

Sample Collection Logs for November 2018 Soil Samples

Sample Collection Log

Project Name: **Longhorn AAP**

Location ID: **03SB18**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB18-0.0-2.0

DATE/TIME: 11/29/2018 / 10:00

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03S819-3.0-4.0

DATE/TIME: 11/29/2018 / 10:20

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03S819-6.0-7.0

DATE/TIME: 11/29/2018 / 10:24

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03S819-8.0-9.0

DATE/TIME: 11/29/2018 / 10:26

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB19**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB19-0.0-2.0

DATE/TIME: 11/29/2018 / 10:19

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB19**

Project No: **501032**

Sampler(s):

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB19-3.0-4.0

DATE/TIME: 11/29/2018 / 10:20

Sample Interval: 3 - 4 FT

Sampling Method:

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
No COC Specified	None		

Sampler:		

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB19**

Project No: **501032**

Sampler(s):

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB19-6.0-7.0

DATE/TIME: 11/29/2018 / 10:24

Sample Interval: 6 - 7 FT

Sampling Method:

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
No COC Specified	None		

Sampler:		

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-0.0-2.0

DATE/TIME: 11/29/2018 / 10:30

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB20-0.0-2.0-FD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-0.0-2.0-FD

DATE/TIME: 11/29/2018 / 10:30

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: FD

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-3.0-4.0

DATE/TIME: 11/29/2018 / 10:35

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB20**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB20-6.0-7.0

DATE/TIME: 11/29/2018 / 10:38

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Location ID: **03SB21**

Project No: **501032**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB21-0.0-2.0

DATE/TIME: 11/29/2018 / 10:45

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB21-0.0-2.0-MS and MSD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB21**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB21-3.0-4.0

DATE/TIME: 11/29/2018 / 10:50

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB21**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB21-6.0-7.0

DATE/TIME: 11/29/2018 / 10:55

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-0.0-2.0

DATE/TIME: 11/29/2018 / 11:05

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-3.0-4.0

DATE/TIME: 11/29/2018 / 11:10

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB22-3.0-4.0-FD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-3.0-4.0-FD

DATE/TIME: 11/29/2018 / 11:10

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: FD

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-6.0-7.0

DATE/TIME: 11/29/2018 / 11:13

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB22**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB22-8.0-9.0

DATE/TIME: 11/29/2018 / 11:15

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB23**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB23-0.0-2.0

DATE/TIME: 11/29/2018 / 11:30

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB23**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB23-3.0-4.0

DATE/TIME: 11/29/2018 / 11:33

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB23**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB23-6.0-7.0

DATE/TIME: 11/29/2018 / 11:35

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB24**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB24-0.0-2.0

DATE/TIME: 11/29/2018 / 11:45

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB25**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB25-0.0-2.0

DATE/TIME: 11/29/2018 / 11:40

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-0.0-2.0

DATE/TIME: 11/29/2018 / 10:05

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB26-0.0-2.0-FD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-0.0-2.0-FD

DATE/TIME: 11/29/2018 / 10:05

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: FD

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-3.0-4.0

DATE/TIME: 11/29/2018 / 10:10

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-6.0-7.0

DATE/TIME: 11/29/2018 / 10:13

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB26**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB26-8.0-9.0

DATE/TIME: 11/29/2018 / 10:15

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-0.0-2.0

DATE/TIME: 11/29/2018 / 11:55

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-3.0-4.0

DATE/TIME: 11/29/2018 / 12:00

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes: 03SB27-3.0-4.0-MS and MSD

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-6.0-7.0

DATE/TIME: 11/29/2018 / 12:05

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB27**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB27-8.0-9.0

DATE/TIME: 11/29/2018 / 12:08

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-0.0-2.0

DATE/TIME: 11/29/2018 / 12:15

Sample Interval: 0 - 2 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-3.0-4.0

DATE/TIME: 11/29/2018 / 12:18

Sample Interval: 3 - 4 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-6.0-7.0

DATE/TIME: 11/29/2018 / 12:20

Sample Interval: 6 - 7 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Sample Collection Log

APTIM

Project Name: **Longhorn AAP**

Project No: **501032**

Location ID: **03SB28**

Sampler(s): **William Foss**

FIELD CONDITIONS

SAMPLING INFORMATION

Sample No: 03SB28-8.0-9.0

DATE/TIME: 11/29/2018 / 12:24

Sample Interval: 8 - 9 Ft

Sampling Method: DP

Sample Purpose: REG

Sample Matrix: SO

Sample Notes:

Chain of Custody	COC Notes	Analysis Group	Analytic Method
LHAAP03-NOV2018-ALSHT-181129	None	METALS	SW6020A

Sampler:		William Foss

Appendix C

State of Texas Well Completion Report for Monitoring Well 03WW01

STATE OF TEXAS WELL REPORT for Tracking #162475

Owner:	**Longhorn Army Ammunition Plant**	Owner Well #:	**03WW01**
Address:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Grid #:	**35-23-6**
Well Location:	**Hwy 143 @ Spur 449, LHAAP Karnack , TX 75661**	Latitude:	**32° 41' 10" N**
Well County:	**Harrison**	Longitude:	**094° 09' 15" W**
Elevation:	**No Data**	GPS Brand Used:	**Garmin e-trex**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date: Started: **11/18/2008**
Completed: **11/18/2008**

Diameter of Hole: Diameter: **8.25 in From Surface To 30 ft**

Drilling Method: **Hollow Stem Auger**

Borehole Completion: Gravel Packed From: **18 ft to 30 ft**
Gravel Pack Size: **20/40**

Annular Seal Data: 1st Interval: **From 16 ft to 18 ft with 1 Bentonite (#sacks and material)**
2nd Interval: **From 0 ft to 16 ft with 5 Cement (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Tremmie Pipe**
Cemented By: **Driller**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Sleeve Installed**

Water Level: Static level: **No Data**
Artesian flow: **No Data**

Packers: **No Data**

Plugging Info: Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality: Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No Data**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data: The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information: **ETTL Engineers & Consultants Inc.**
1717 E. Erwin

	Tyler , TX 75702
Driller License Number:	**2126**
Licensed Well Driller Signature:	**H. Douglas Hinds**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking **#162475**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-9.5 Sandy lean clay - brown
9.5-15.5 Silty sand - brown-gray
15.5-23.5 Clayey sand - brown
23.5-30 Sandy clay - gray

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
2 New PVC Sch. 40 0 - 20
2 New PVC Sch. 40 - slotted 20 - 30 0.010"