LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

ADMINISTRATIVE RECORD

Volume 19

2018

Bate Stamp Numbers

00863564 - 00864792

Prepared for

Department of the Army
Longhorn Army Ammunition Plant

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LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
ADMINISTRATIVE RECORD – CHRONOLOGICAL INDEX

VOLUME 19

2018

A. Title: Meeting Minutes – Longhorn Army Ammunition Plant Restoration Advisory Board (RAB) Meeting Minutes
Author(s): U.S. Army Corps of Engineers
Recipient: All Parties
Date: July 27, 2017
Bate Stamp: 00863564 – 00863617

B. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Monthly Managers' Meeting Minutes
Author(s): AECOM Technical Services
Recipient: All Stakeholders
Date: September 14, 2017
Bate Stamp: 00863618 – 00863628

C. Title: Report – Final Community Involvement Plan, Longhorn Army Ammunition Plant, Harrison County, Texas
Author(s): U.S. Army Corps of Engineers/Dawson Technical, LLC
Recipient: All Parties
Date: August 2017
Bate Stamp: 00863629 – 00863696

D. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Monthly Managers' Meeting Minutes
Author(s): Bhate Environmental Associates, Inc.
Recipient: All Stakeholders
Date: October 19, 2017
Bate Stamp: 00863697 – 00863703

E. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Restoration Advisory Board (RAB) Meeting Minutes
Author(s): Bhate Environment Associates, Inc.
Recipient: All Parties
Date: October 19, 2017
Bate Stamp: 00863704 – 00863741

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F. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Monthly Managers' Meeting Minutes
Author(s): Bhate Environmental Associates, Inc.
Recipient: All Stakeholders
Date: November 16, 2017
Bate Stamp: 00863742 – 00863747

G. Title: Report – 2017 Comprehensive Land Use Control (LUC) Management Plan, Former Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): U.S. Army Corps of Engineers
Recipient: All Stakeholders
Date: November 28, 2017
Bate Stamp: 00863748 – 00864165

H. Title: Report – Surface Water Data Transmittal – 2017, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): Bhate Environmental Associates, Inc.
Recipient: All Stakeholders
Date: March 22, 2018
Bate Stamp: 00864166 – 00864621

I. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Monthly Managers' Meeting Minutes
Author(s): Bhate Environmental Associates, Inc.
Recipient: All Stakeholders
Date: December 13, 2017
Bate Stamp: 00864622 – 00864634

VOLUME 19 (cont'd)

2018

J. Title: Report – Revised Final Remedial Action Work Plan Contingency Remedy for Western Plume LHAAP-35A(58), Shops Area, Group 4, Longhorn Army Ammunition Plant, Karnack, Texas, Revised January 2018
Author(s): Bhate Environment Associates, Inc.
Recipient: All Stakeholders
Date: January 11, 2018
Bate Stamp: 00864635 – 00864665

K. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Monthly Managers' Meeting Minutes
Author(s): Bhate Environment Associates, Inc.
Recipient: All Stakeholders
Date: January 18, 2018
Bate Stamp: 00864666 – 00864736

L. Title: Meeting Minutes – Longhorn Army Ammunition Plant, Monthly Managers' Meeting Minutes
Author(s): Bhate Environment Associates, Inc.
Recipient: All Stakeholders
Date: February 15, 2018
Bate Stamp: 00864737 – 00864791

M. Title: Longhorn Army Ammunition Plant (AAP) Administrative Record and Information Repository Clarified, Longhorn Army Ammunition Plant, Karnack, Texas
Author(s): U.S. Army
Recipient:
Date: December 5, 2017
Bate Stamp: 00864792 – 00864792

Subject:	**Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Karnack Community Center, Karnack, Texas**
Date of Meeting:	**July 27, 2017; 6:00 – 7:00 PM**

Meeting Participants:

LHAAP/BRAC:	Rose M. Zeiler
USACE:	Aaron Williams
AECOM:	Elspeth Sharp, Craig Holloway
USEPA Region 6:	Rich Mayer, Kent Becher (USGS Liaison)
TCEQ:	April Palmie
CLI (TAG):	Laura-Ashley Overdyke
RAB:	**Present:** Paul Fortune, Carol Fortune, Richard LeTourneau, Judy VanDeventer, Tom Walker, Terry Britt, Charles Dixon, John Pollard, Jr. **Absent:** Nigel Shivers
Public:	Keats Mullikin, Becky Mullikin, Dan Murphy, Patricia Clifton, W. Lee Guice, Carl D. Dunn, Kathy Dunn

An agenda for the RAB meeting, five handouts (Groundwater Treatment Plant [GWTP] – Processed Groundwater Volumes, LHAAP-04 ROD Fact Sheet, Harrison Bayou and Goose Prairie Creek – Perchlorate Data, LHAAP-04 ROD Responsiveness Summary, and a color copy of the AECOM slide presentation were provided for meeting attendees.

Welcome and Introduction

Mr. Paul Fortune, RAB Co-Chair, called the meeting to order. Mr. Fortune asked for introductions of new attendees. Ms. Laura-Ashley Overdyke, the Caddo Lake Institute (CLI) Executive Director and Technical Assistance Grant (TAG) point of contact, was introduced to the RAB.

Open Items - Dr. Rose M. Zeiler

RAB Administrative Issues

Dr. Zeiler opened the discussion of RAB Administrative Issues with the minutes from the January 2017 RAB meeting. Since the April RAB meeting was replaced with a site tour, this was the first opportunity to discuss the January 2017 minutes.

Minutes

Ms. Sharp said that the draft January 2017 RAB meeting minutes were sent to RAB members along with the July meeting agenda. Dr. Zeiler asked the RAB members if anyone wanted to make a motion to approve the minutes from the January 2017 RAB meeting. Ms. Judy VanDeventer made a motion to accept the draft January 2017 minutes as written and Mr. Terry Britt seconded the motion. The approved January 2017 RAB minutes will be posted on the LHAAP website.

Miscellaneous

Mr. Terry Britt asked if the new contractor for the next PBR had been selected yet. Mr. Aaron Williams said that the selection committee has met once and that the next PBR contract will be awarded prior to the end of period of performance for the current PBR contract, which ends September 30, 2017. Ms. Judy VanDeventer asked why the work was split into two contracts. Mr. Williams explained that sites that had Records of Decision (RODs) or Remedial Designs (RDs) were grouped together because the scope of work was well defined. Mr. Williams explained that the remaining sites were grouped together in another contract because their scope was less well defined.

Ongoing Outreach/Website

Ms. Sharp discussed the various methods used to notify the public about the RAB meetings (newspaper, radio stations, fliers posted, etc…). Ms. Overdyke asked for the address for the Longhorn environmental website. Ms. Sharp replied that the address is www.longhornaap.com which was also provided in the printed version of the presentation handout. Ms. Sharp mentioned that the website was recently updated with the LHAAP-16 RD Fact Sheet and Notice of Availability of Final Record of Decision for LHAAP-04.

Defense Environmental Restoration Program (DERP) Update – AECOM (Elspeth Sharp)

LHAAP-04 Final Record of Decision

Ms. Sharp discussed the site history for LHAAP-04 Former Pilot Wastewater Treatment Plant, the Remedial Action Objectives, and the selected remedy. The Final ROD was signed by Army BRAC and EPA with TCEQ concurrence. Ms. Judy VanDeventer asked why TCEQ didn't sign the ROD. Ms. April Palmie responded that CERCLA is a Federal program, and the EPA is the appropriate agency to sign the agreement. Ms. Palmie pointed out that the TCEQ concurred with the ROD before EPA signed.

LHAAP-16 Remedial Design

Ms. Sharp discussed the site history for LHAAP-16 Landfill and the final RD. The RD includes landfill cap maintenance, in-situ bioremediation (ISB), and four biobarriers. Mr. Charles Dixon asked what is a biobarrier and how is it different than mid-plume ISB. Ms. Sharp explained that the biobarriers are passive devices where contaminated water flows through a zone of injected emulsified vegetable oil (EVO). Microorganisms in the soil are stimulated by eating the EVO and dechlorinating the dissolved solvents. Dr. Zeiler explained that the mid-plume ISB was targeting known contamination in the shallow and intermediate zone. The focused injections are active rather than passive like the biobarriers.

Ms. Overdyke asked how the effectiveness of the biobarriers is evaluated. Dr. Zeiler discussed how the RD was based upon data gathered during a pilot test where they evaluated various injection spacings, pressures, droplet sizes, etc…

Mr. Paul Fortune asked if LHAAP-16 is the most contaminated site at LHAAP. Dr. Zeiler said that LHAAP-18/24 was more contaminated primarily because of the unlined evaporation pond. Dr. Zeiler discussed how capping is a presumptive remedy for remediating landfills. The LHAAP-16 RD using ISB will be evaluated during the 2-year performance monitoring period. Ms. Overdyke asked why no biobarriers were planned along the southeast near Harrison Bayou. Dr. Zeiler explained that the biobarriers were designed to capture groundwater flow patterns immediately downgradient of the Landfill and just before Harrison Bayou to the north.

Mr. Carl Dunn asked why hotspots seem to occur at high elevations. Ms. Sharp explained that the shape of the contaminant plume is due to groundwater gradients and hydrogeologic conditions such as aquitards. Mr. Dunn asked how directly injected material forms a picket fence. Dr. Zeiler explained that EVO, the treatment, is injected directly through rods that are pushed into the subsurface at spaced intervals (boreholes) that might resemble a picket fence in cross section. The material is injected at sufficient pressure to cause the material to expand and migrate between boreholes. The material from individual boreholes will blend together to form a permeable barrier wall that will intercept groundwater.

Groundwater Treatment Plant Update

Mr. Craig Holloway discussed the acid spill that occurred in December 2016 and the steps taken to bring the GWTP back on-line. After the spill, the GWTP was put into recycle mode until perchlorate discharge limits were met. In April 2017, the number of extraction wells was slowly increased to gradually ramp up the flow and ensure compliance. By May 2017, the GWTP was extracting, treating, and discharging at full flow rates.

Site-wide Environmental Restoration Issues – Dr. Zeiler and Ms. Sharp

Environmental Contract Ending

Ms. Sharp explained that AECOM's contract ends on September 30, 2017. AECOM's remaining responsibilities include LHAAP-29 Feasibility Study (FS), LHAAP-12 2016 Remedial Action Operation (RA-O) report, and GWTP operation and reporting. Mr. Paul Fortune asked if future GWTP operations will fall under the small business contract. Mr. Williams confirmed that future GWTP operation is part of the Small Business MATOC Environmental Remediation Services Contract.

Surface Water Sampling

Ms. Sharp showed the locations for periodic surface water samples. A summary of perchlorate results for Harrison Bayou and Goose Prairie Creek were provided in the handouts.

Perimeter Well Sampling

Dr. Zeiler discussed that the perimeter well sampling was discontinued after December 2016. A decision was made by the Federal Facility Agreement (FFA) representatives on January 31, 2017 regarding the perimeter well sampling that has been taking place as a requirement of the 1999 Unanimous Decision of the Dispute Resolution Committee. FFA representatives agreed that perimeter well sampling should be discontinued.

Next RAB Meeting Schedule and Closing Remarks

Dr. Zeiler proposed the next RAB meeting be held on **October 19, 2017** at the **Karnack Community Center at 6:00 p.m,** as long as there were no other conflicting meetings. Mr. Fortune said that date should be fine. Dr. Zeiler asked the RAB members to think about topics of discussion for the next meeting because the new contractor will have just started.

Adjourn

Motion to adjourn was made by Ms. Fortune and seconded by Ms. VanDeventer.

July 2017 Meeting Handouts:

- Meeting Agenda
- PowerPoint Presentation Slides
- Groundwater Treatment Plant [GWTP] – Processed Groundwater Volumes Handout
- LHAAP-04 Record of Decision Fact Sheet
- LHAAP-04 ROD Responsiveness Summary
- Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Acronyms

AECOM	AECOM Technical Services, Inc.
BRAC	Base Realignment and Closure
CLI	Caddo Lake Institute
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DERP	Defense Environmental Response Program
EVO	Emulsified Vegetable Oil
FFA	Federal Facility Agreement
FS	Feasibility Study
GWTP	Groundwater Treatment Plant
ISB	In-situ Bioremediation
LHAAP	Longhorn Army Ammunition Plant
MATOC	Multiple Award Task Order Contract
PBR	Performance-Based Remediation
RAB	Restoration Advisory Board
RA-O	Remedial Action Operation
RD	Remedial Design
ROD	Record of Decision
TAG	Technical Assistance Grant
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD
Karnack, Texas
(479) 635-0110

AGENDA

DATE:	Thursday, July 27, 2017
TIME:	6:00 – 7:00 PM
PLACE:	Karnack Community Center, Karnack, Texas

06:00 Welcome and Introduction

06:05 Open Items {RMZ}
- RAB Administrative Issues
- Minutes (January 2017 RAB Meeting)
- Ongoing Outreach/Website

06:15 Defense Environmental Restoration Program (DERP) Update {AECOM}
- LHAAP-04 ROD
- LHAAP-16 RD
- Groundwater Treatment Plant (GWTP) Update

06:40 Sitewide Environmental Restoration Issues {RMZ}
- Environmental Contract Ending
- Surface Water Sampling Update
- Termination of perimeter well sampling

06:50 Next RAB Meeting Schedule and Closing Remarks

07:00 Adjourn {RMZ}

Longhorn Army Ammunition Plant Restoration Advisory Board Meeting July 27, 2017

AECOM

Agenda

DATE:	Thursday, July 27, 2017
TIME:	6:00 – 7:00 PM
PLACE:	Karnack Community Center, Karnack, Texas

06:00 Welcome and Introduction

06:05 Open Items {RMZ}
- RAB Administrative Issues
- Minutes (January 2017 RAB Meeting)
- Ongoing Outreach/Website

06:15 Defense Environmental Restoration Program (DERP) Update {AECOM}
- LHAAP-04 ROD
- LHAAP-16 RD
- Groundwater Treatment Plant (GWTP) Update

06:40 Sitewide Environmental Restoration Issues {RMZ}
- Environmental Contract Ending
- Surface Water Sampling Update
- Termination of perimeter well sampling

06:50 Next RAB Meeting Schedule and Closing Remarks

07:00 Adjourn {RMZ}

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Ongoing Outreach - Notifications for October RAB Meeting

Å Published RAB meeting announcement in Marshall News Messenger on July 13, 2017

Å Requested the following radio stations to air January RAB Meeting Public Service Announcement (PSA):

ï KMHT Radio 103.9 (Karnack)

ï 98 Rocks (Alpha Media, Shreveport) and

ï Kiss Country 93.7 (Town Square Media, Shreveport)

Å Requested PSA to be placed on KTBS Channel 3, KTAL Channel 6 TV, KSLA Channel 12 Community/Local Events Calendar

Å Sent RAB announcement/agenda by email or USPS to individual RAB members and other interested parties

Å Mailed RAB announcement to churches in Karnack on July 13, 2017

Å Posted RAB Meeting Fliers at multiple locations in the community:

ï Shady Glade Café, Caddo Grocery, Fyffes Corner Store, Circle S Grocery, Run In Grocery, Family Dollar Store, Convenience Store at FM9 and FM199

The Army Wants You to be Informed!

ÅThe Army is committed to protecting human health and the environment; key to that commitment is engaging the community and increasing public participation in environmental restoration at LHAAP.

ÅYou are encouraged to:

ï Attend RAB meetings and/or become a member of the RAB

ï Visit the Longhorn environmental website at www.longhornaap.com

ï Make suggestions for improving communication ï the Army welcomes and appreciates community feedback

Minutes from Past RAB Meetings

ÅDiscussion of January 2017 RAB Meeting Minutes/Motion to accept

Website Update

Website Update

HOME BACKGROUND SITES REMEDIAL TECHNOLOGIES PLUME MAPS ADMIN RECORD GET INVOLVED

Environmental Restoration Program

LHAAP Fact Sheets

- LHAAP-16 RD Fact Sheet – July 14, 2016
- LHAAP-17 RD Fact Sheet – July 14, 2016
- LHAAP-16 RD Fact Sheet – April 2017

Get Involved Links

- Restoration Advisory Board
- Meeting Schedule
- Meeting Minutes
- CERCLA Investigation and Remediation Process
- **LHAAP Fact Sheets «**
- Final Record of Decisions (RODs) Approved

ornaap.com/pages/5-remedial-technologies

Website Update

HOME | BACKGROUND | SITES ▾ | REMEDIAL TECHNOLOGIES | PLUME MAPS | ADMIN RECORD | GET INVOLVED ▾

Longhorn Army Ammunition Plant

Environmental Restoration Program

Final Record of Decisions (RODs) Approved

- Notice of Availability of Final Records of Decision for LHAAP-16, LHAAP-17, LHAAP-001-R, and LHAAP-003-R
- Notice of Availability of Final Record of Decision for LHAAP-04

Get Involved Links

- Restoration Advisory Board
- Meeting Schedule
- Meeting Minutes
- CERCLA Investigation and Remediation Process
- LHAAP Fact Sheets
- **Final Record of Decisions (RODs) Approved «**

Longhorn Army Ammunition Plant Environmental Restoration Program

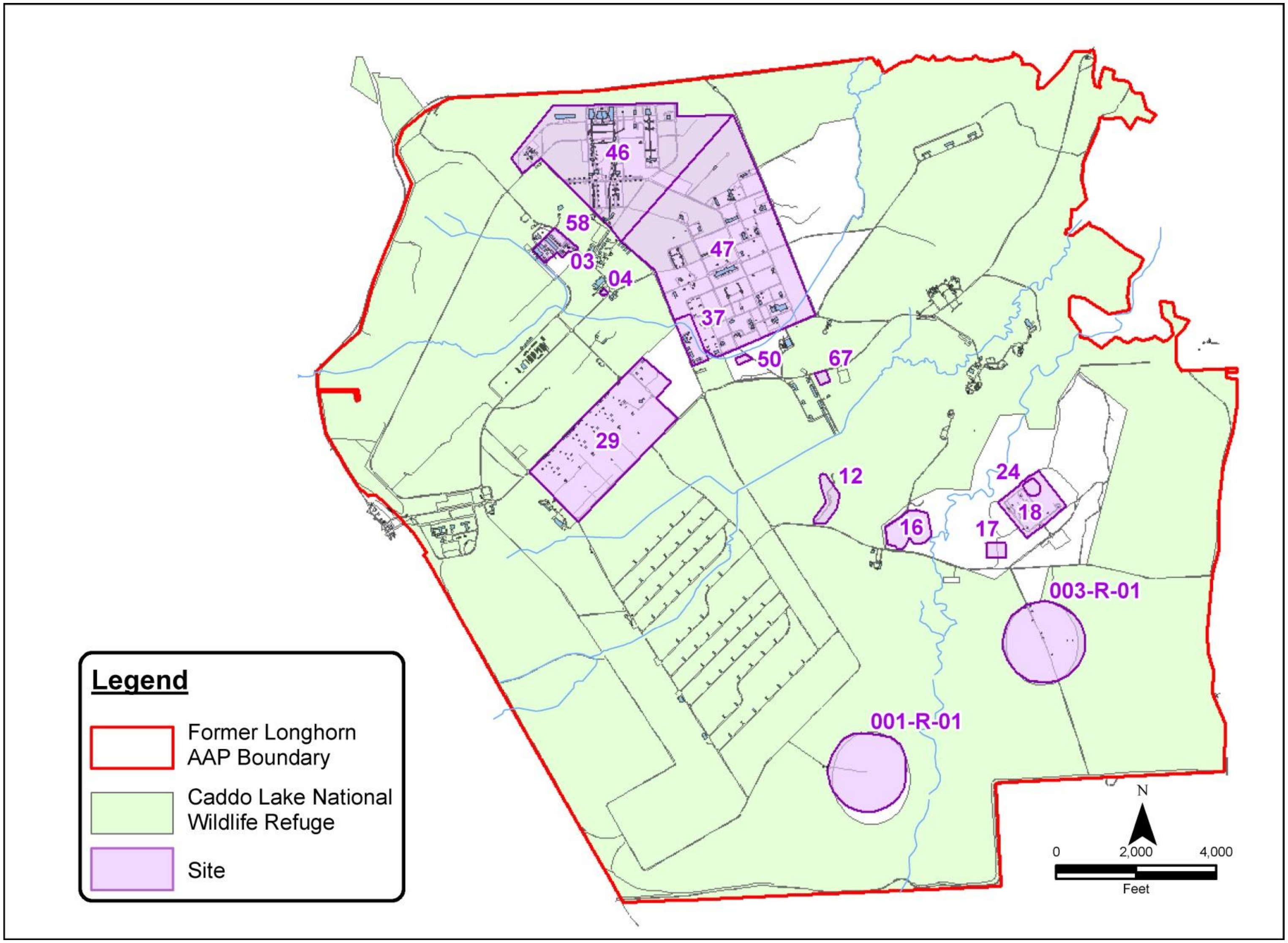
AECOM

Site-wide Environmental Restoration Issues

Active LHAAP Performance-Based Remediation Sites

LHAAP-03	Building 722 Paint Shop
LHAAP-04	Pilot Wastewater Treatment Plant
LHAAP-12	Landfill 12
LHAAP-16	Landfill 16
LHAAP-17	Burning Ground No.2/Flashing Area
LHAAP-18	Burning Ground No.3
LHAAP-24	Unlined Evaporation Pond
LHAAP-29	Former TNT Production Area
LHAAP-37	Chemical Laboratory Waste Pad
LHAAP-46	Plant Area 2
LHAAP-47	Plant Area 3
LHAAP-50	Former Sump Water Tank
LHAAP-58	Maintenance Complex
LHAAP-67	Aboveground Storage Tank Farm
LHAAP-001-R	South Test Area/Bomb Test Area
LHAAP-003-R	Ground Signal Test Area

Longhorn Performance-Based Remediation Sites Map



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LHAAP-04 – Final Record of Decision

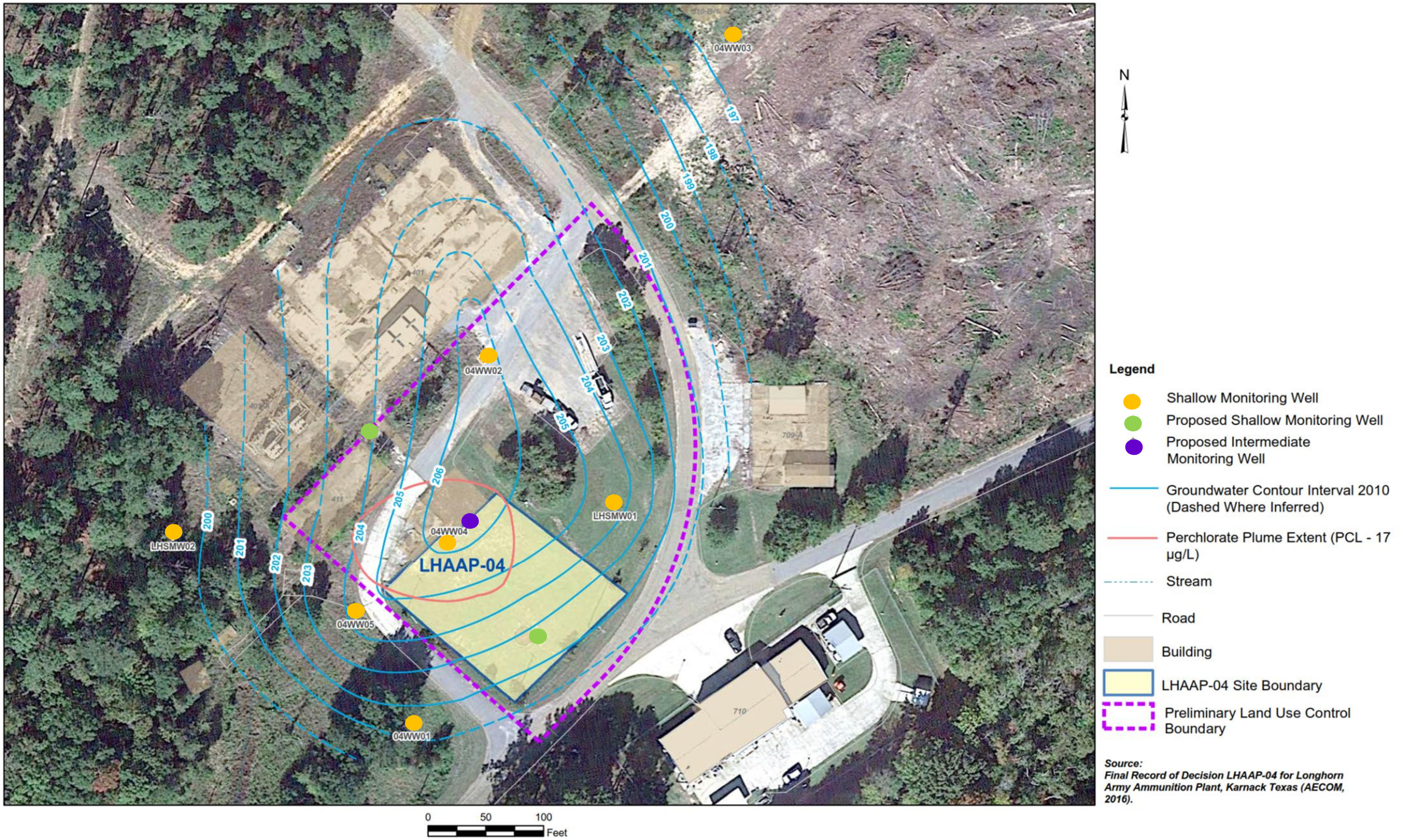
ÅLHAAP-04 ï Former Pilot Wastewater Treatment Plant

- 0.5 acres
- Wastewater treatment began in 1984
- Plant demolished in 1997
- Mercury and perchlorate contaminated soil excavated and disposed off-site in 2009
- Perchlorate detected in shallow zone groundwater at concentrations exceeding the TRRP Tier 1 residential groundwater PCL

ÅFinal Record of Decision (ROD)

- Signed by Army BRAC December 15, 2017
- Concurrence by TCEQ February 7, 2017
- Signed by EPA March 30, 2017

LHAAP-04 – Final Record of Decision



LHAAP-04 – Final Record of Decision

ÅRemedial Action Objectives (RAOs)

- Protect human health by preventing ingestion of groundwater contaminated with perchlorate;
- Return groundwater to its potential beneficial use, wherever practicable, within a reasonable time period given the particular site circumstances; and
- Prevent groundwater contaminated with perchlorate from migrating into nearby surface water.

ÅSelected Remedy:

- In-Situ Bioremediation (ISB);
- Long-Term Monitoring (LTM) of Groundwater; and
- Land Use Controls (LUCs):
  - Maintain integrity of remedial or monitoring systems
  - Prevent use of groundwater as potable water source
  - Restrict land use to nonresidential

LHAAP-04 – Final Record of Decision

- Initial Notice of Land Use Controls to Public Officials sent June 26, 2017

- Public Notice of Availability of ROD
  - Marshall Newspaper publication
  - Mailouts via USPS to local officials
  - LHAAP Website

- Copy of the Final ROD is available to the public at the Marshall Public Library, 300 S. Alamo, Marshall, Texas, 75670
  - Library hours are 10:00 A.M. to 8:00 P.M. Monday through Thursday, and 10:00 A.M. to 5:30 P.M. Friday and Saturday.

- Copies of Responsiveness Summaries and Fact Sheets at sign-in table.

- For more information, contact Dr. Rose M. Zeiler, Longhorn Army Ammunition Plant, P.O. Box 220, Ratcliff, Arkansas, 72951; phone number 479-635-0110; e-mail rose.m.zeiler.civ@mail.mil.

LHAAP-04 – Post-ROD Schedule

ÅPost ROD Schedule

- Draft Remedial Design ï March 2018
- Draft Remedial Action Work Plan ï August 2018

LHAAP-16 – Remedial Design

ÅLHAAP-16 Landfill

- Landfill received solid and industrial waste until 1980s
- Harrison Bayou located along northeastern edge of site
- COCs are trichloroethene [TCE], cis-1,2-dichloroethene [DCE], vinyl chloride [VC]), perchlorate, and five metals
- In 1996 and 1997 a groundwater extraction system was installed as a treatability study to prevent the groundwater plume from migrating to Harrison Bayou
- Final ROD issued September 2016
- Selected remedy: cap maintenance, ISB, Biobarriers, Monitored Natural Attenuation (MNA), and LUCs

ÅLHAAP-16 Remedial Design finalized January 2017

LHAAP-16 – Remedial Design

ÅLHAAP-16 Remedial Design

- Landfill Cap Maintenance
  - Monitor, maintain, and repair the existing landfill cap, as necessary.
  - Perform cap inspections annually or as needed to evaluate vegetation, erosion, settlement, and drainage system.
- In-Situ Bioremediation (ISB)
  - Emulsified vegetable oil will be used to reduce contaminant concentration in most contaminated portion of Shallow and Intermediate Zone groundwater (referred to as Mid-Plume ISB).
- Biobarriers (ISB)
  - Three (3) biobarriers installed in shallow zone groundwater immediately downgradient of landfill (Biobarriers #1, #2, #3).
  - One (1) biobarrier near Harrison Bayou in Shallow Zone groundwater to prevent contaminated groundwater from seeping into the bayou.

LHAAP-16 – Remedial Design

ÅLHAAP-16 Remedial Design (continued)

- Performance Monitoring/MNA
  - First two years:
    - Monitor groundwater in the areas of active ISB to evaluate its effectiveness and to assess changes in groundwater geochemistry, concentrations of COCs, and their degradation products.
    - Perform quarterly groundwater monitoring to evaluate changes in concentrations of COCs and their degradation products in the areas outside the influence of active ISB. The eight quarters will be used to evaluate if MNA is effective, or if contingency action should be initiated.
  - If MNA is shown to be effective based on the first two years of data, implement LTM on a semiannual frequency for three years, then annually until the next five-year review.

LHAAP-16 – Remedial Design

ÅLHAAP-16 Remedial Design (continued)

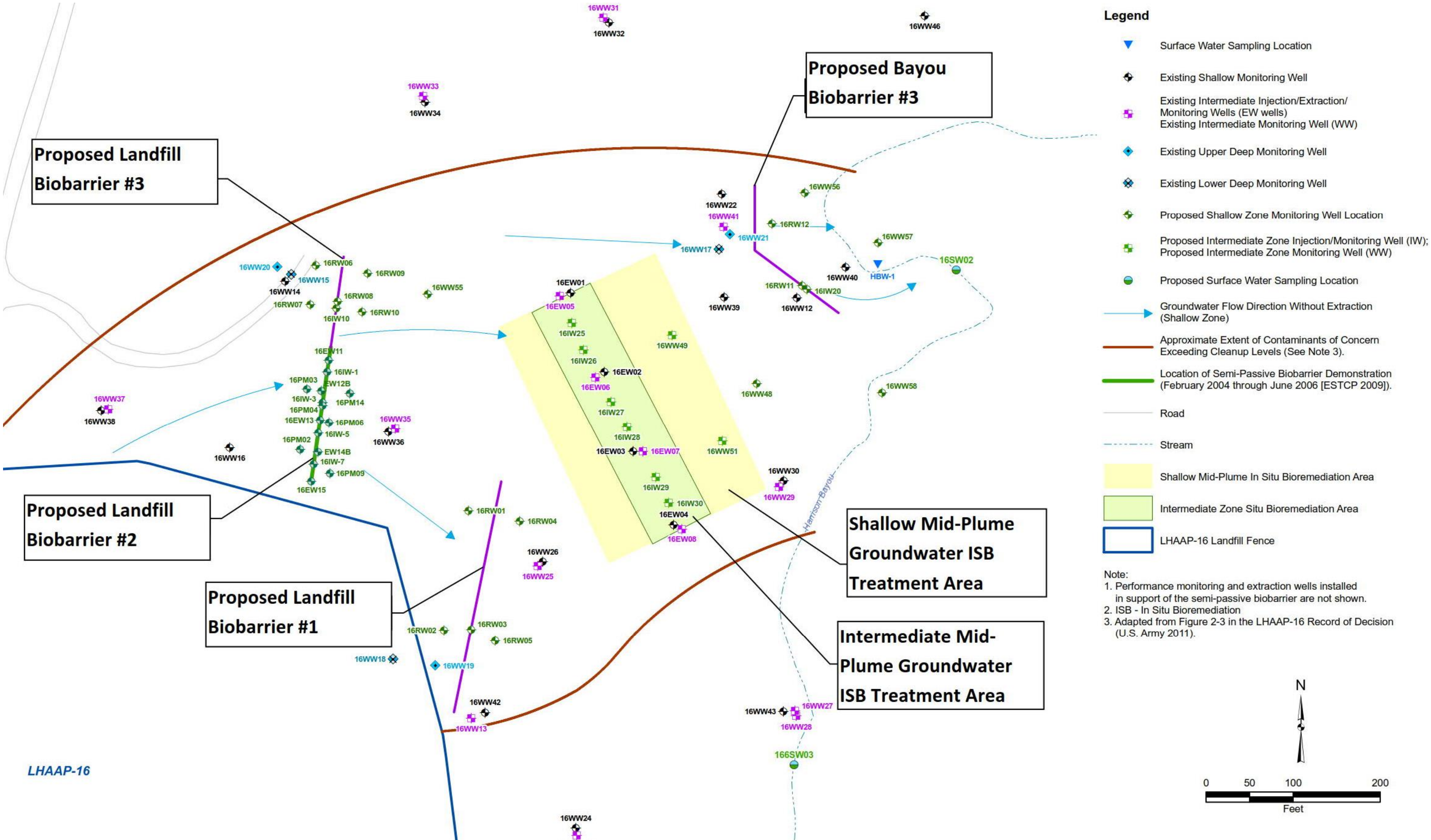
- Land Use Controls
  - Prohibit access to contaminated groundwater except for environmental monitoring and testing;
  - Preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
  - Restrict land use to nonresidential; and
  - Maintain the integrity of any current or future remedial or monitoring systems.
  - LUCs will remain in place as long as the landfill waste remains at the site or until the levels of COCs and COC by-products (i.e., including all hazardous substances, pollutants, and contaminants found at the site at cleanup levels) allow for unlimited use and unrestricted exposure.

LHAAP-16 – Remedial Design

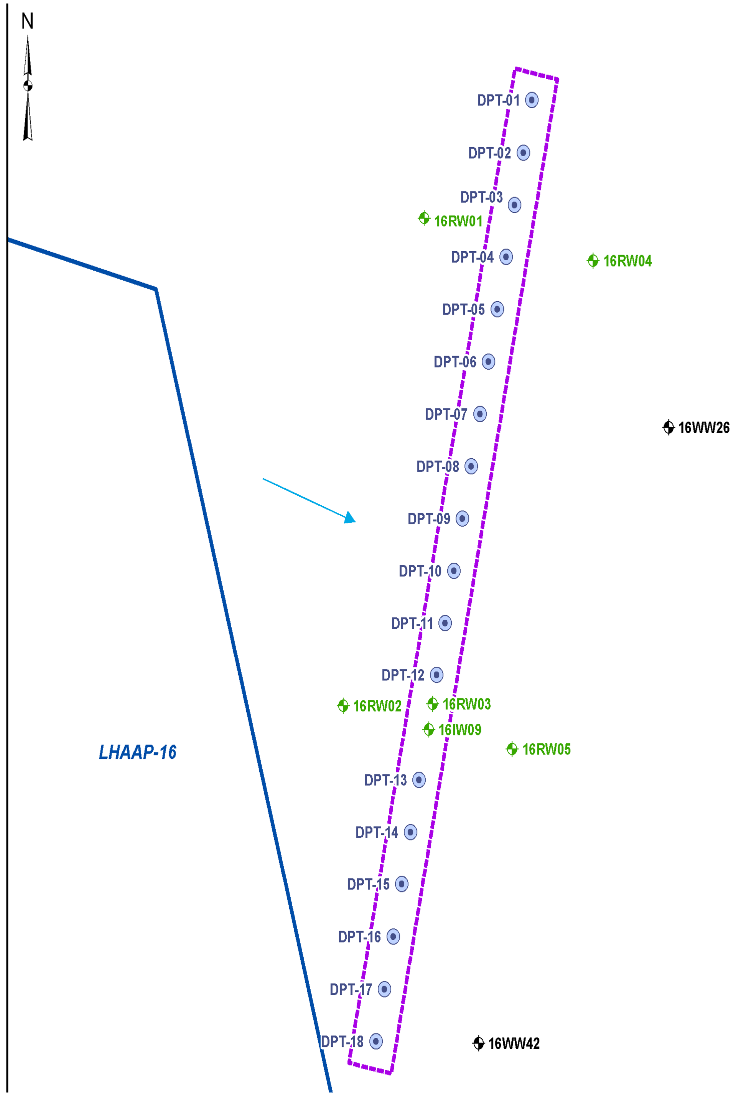
ÅLHAAP-16 Remedial Design (continued)

- Land Use Controls Implementation
  - Initial Notice: Initial notices of soil and groundwater contamination and land use restrictions were submitted to federal, state and local governments involved, and owners and occupants of properties subject to LUCs.
  - Finalizing LUC Boundaries: LUC boundaries will be finalized, approved by TCEQ and EPA, and a legal description appended to the survey plat.
  - Recording: LUCs will be recorded in Harrison County records.
  - Notification: The Texas Department of Licensing and Regulation will be notified of the LUCs.

LHAAP-16 – Remedial Design



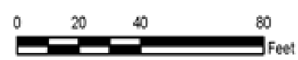
LHAAP-16 – Remedial Design



LHAAP-16
Landfill Biobarrier #1
Design

Legend

- Proposed Well Location
- Existing Well Location
- Proposed Direct Push Injection Point
- Groundwater Flow Direction Without Extraction (Shallow Zone)
- Target In-Situ Reaction Zone Based on Design Radius of Influence
- LHAAP-16 Landfill Fence



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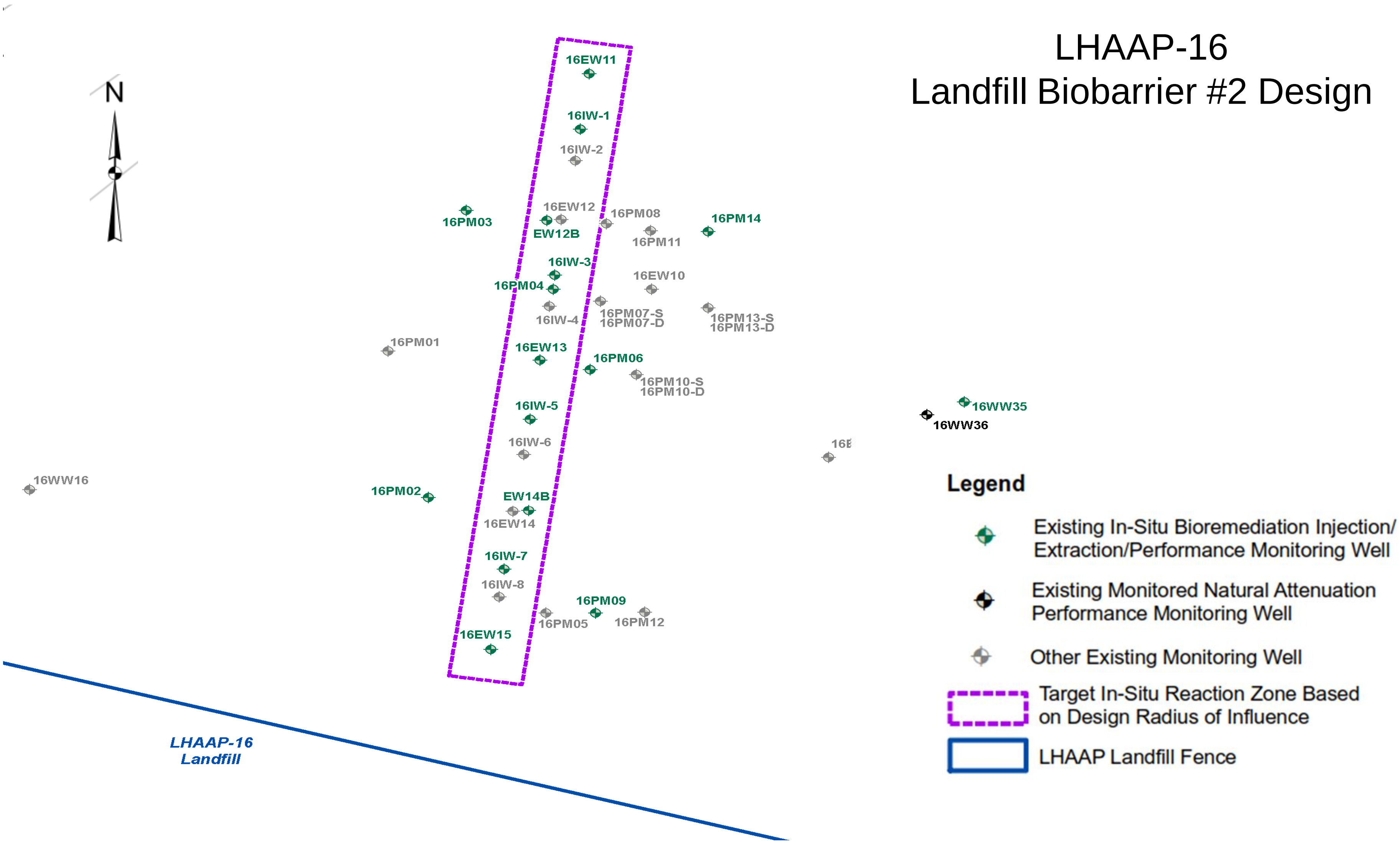
LHAAP-16 – Remedial Design



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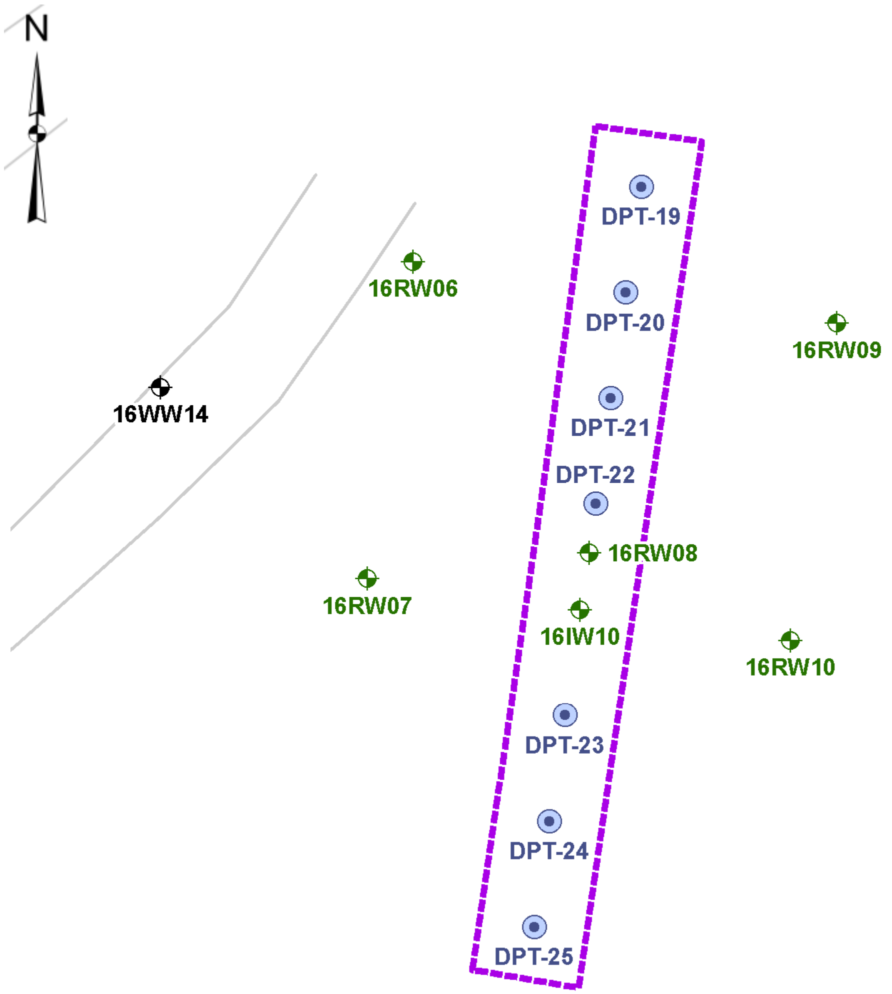
LHAAP-16 – Remedial Design

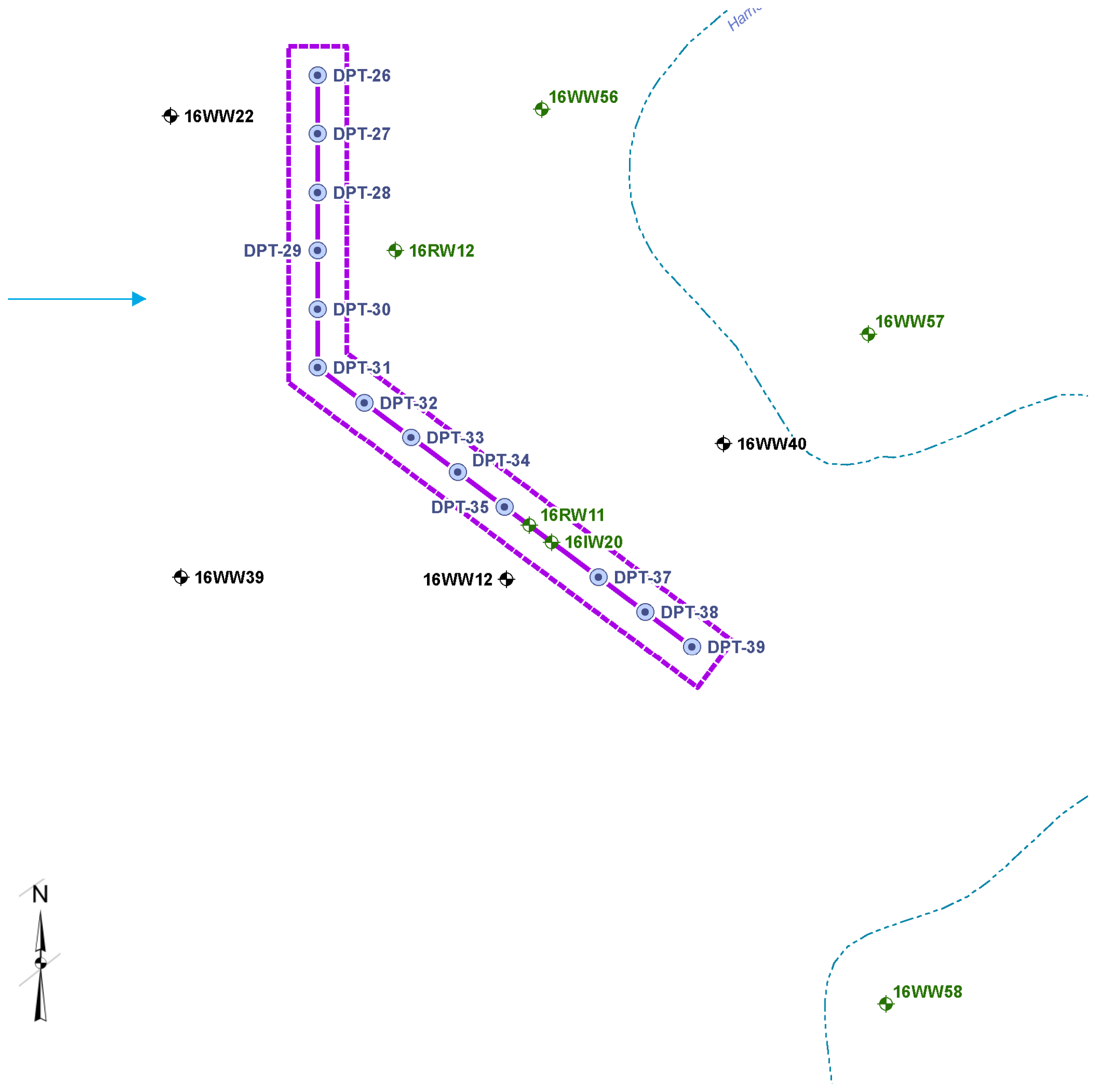


LHAAP-16
Landfill Biobarrier #3 Design

Legend

- Existing Shallow Monitoring Well
- Proposed Shallow Well Location
  IW -- Injection Well Location
  RW - Recovery Well Location
- Proposed Direct Push Injection Point
- Target In-Situ Reaction Zone Based on Design Radius of Influence

LHAAP-16 – Remedial Design

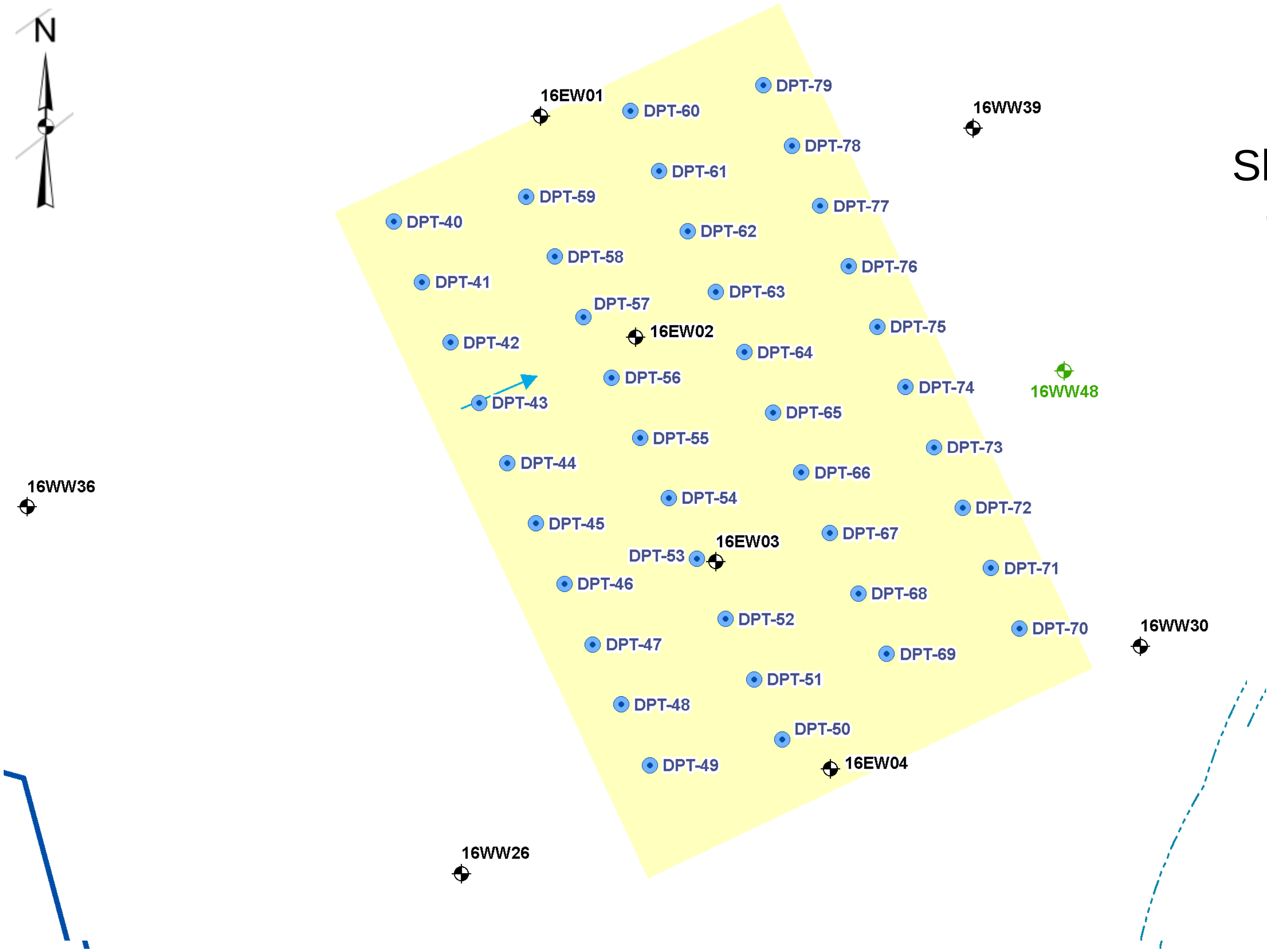


LHAAP-16
Bayou Biobarrier Design

Legend

- Proposed Direct Push Injection Point
- Proposed Shallow Well Location
  IIW = Injection Well
  RW = Recovery Well Location
- Existing Shallow Monitoring Well Location
- Groundwater Flow Direction Without Extraction (Shallow Zone)
- Target In-Situ Reaction Zone Based on Design Radius of Influence

LHAAP-16 – Remedial Design



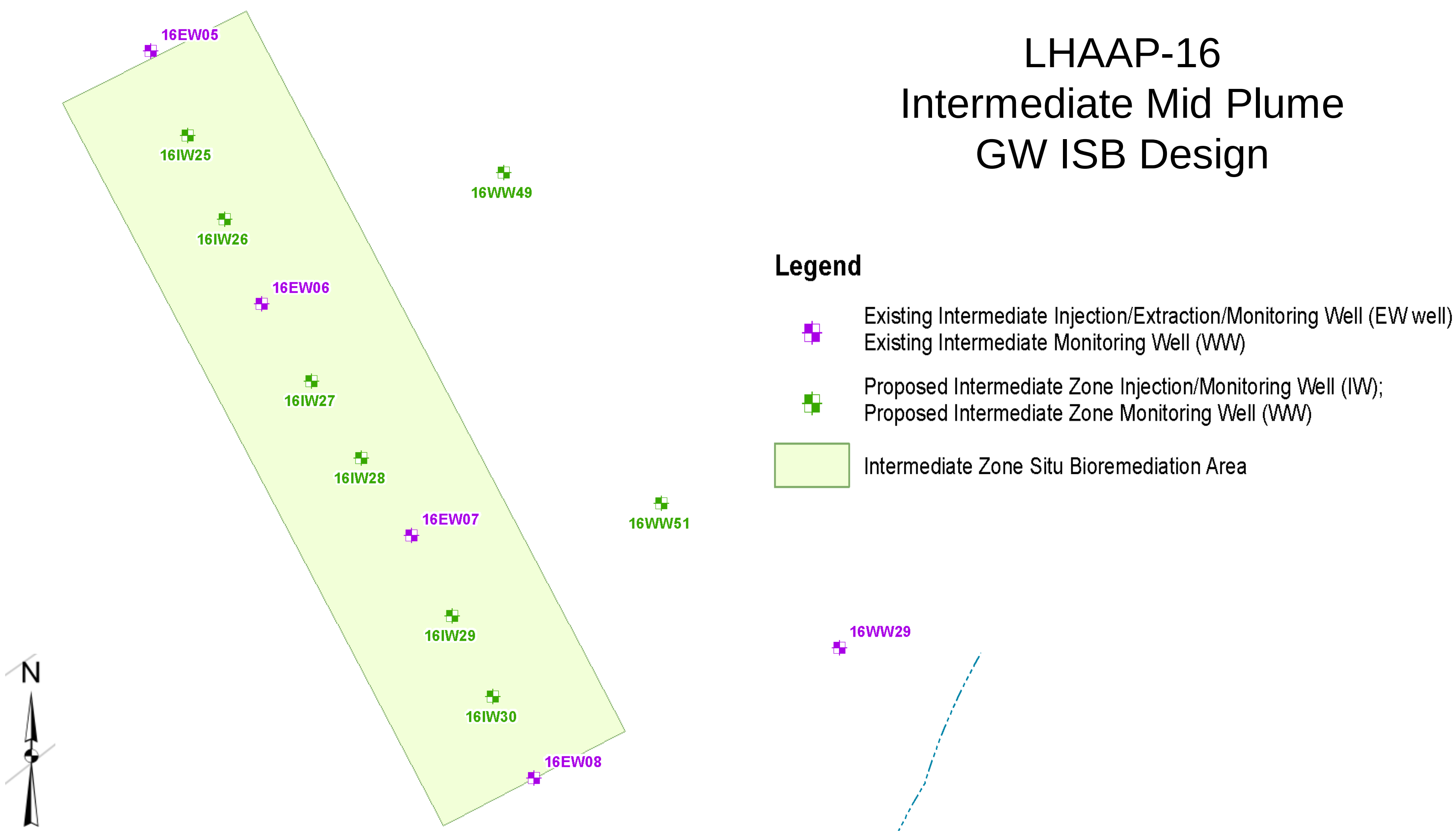
LHAAP-16 Shallow Mid Plume GW ISB Design

Legend

- Existing Shallow Monitoring Well (WW) or Extraction Well (EW) Location
- Proposed Shallow Monitoring Well Location
- Proposed Direct Push Injection Point
- Stream
- Groundwater Flow Direction Without Extraction (Shallow Zone)
- Shallow In Situ Bioremediation Area
- LHAAP-16 Landfill Fence

AECOM

LHAAP-16 – Remedial Design

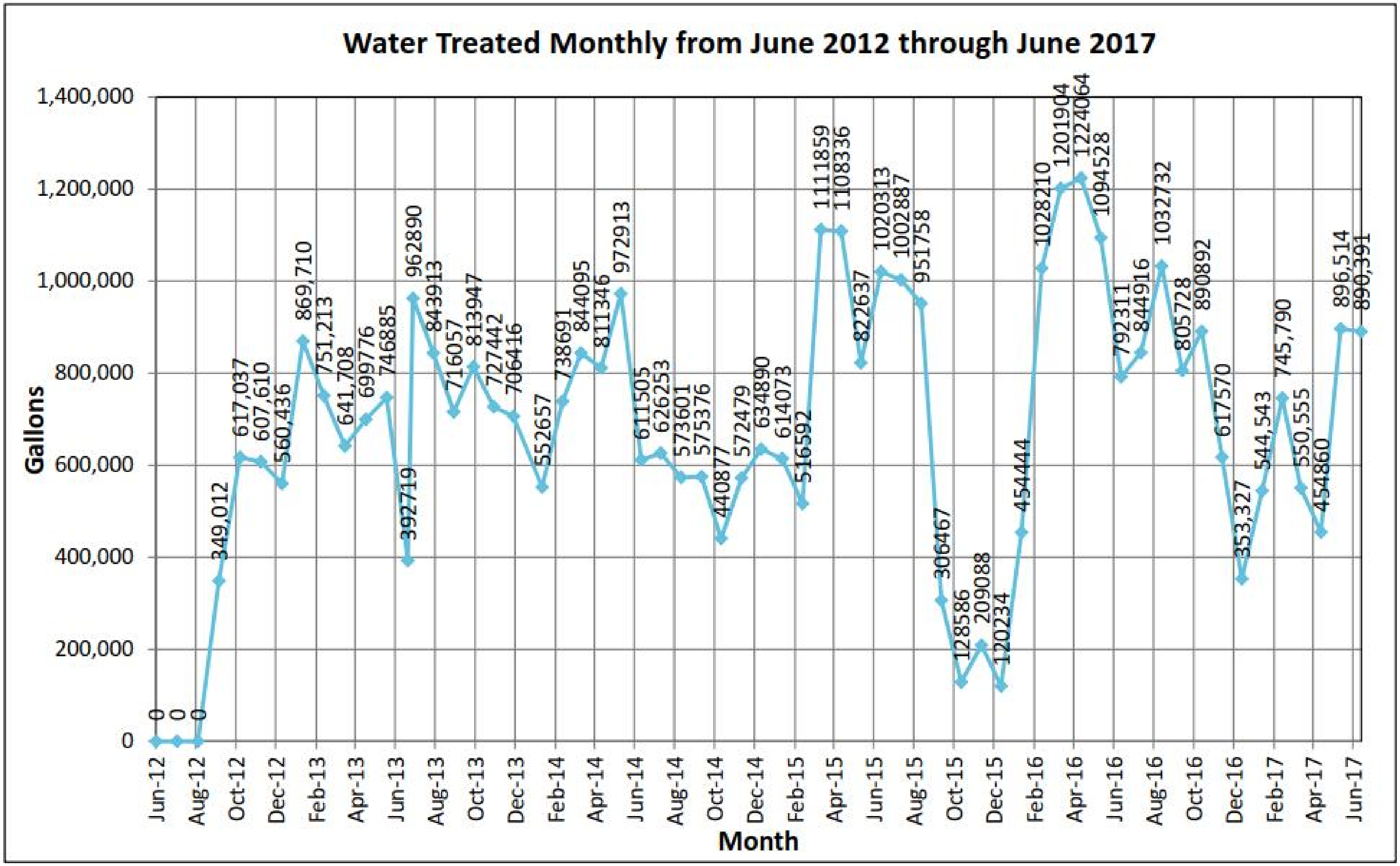


AECOM

Groundwater Treatment Plant (GWTP) Update

- Acid spill occurred in December 2016. Spilled materials were contained and neutralized within the GWTP
- GWTP was put into internal recycle mode (limited extraction, limited discharge) until perchlorate levels were below discharge limits in March 2017
- Extraction and discharge rates were gradually increased in April 2017 with increased monitoring to ensure compliance
- Ion exchange scavenger system was installed in May 2017
- Since May 2017, the GWTP has been extracting, treating, and discharging water at normal flow rates

GWTP Update (continued)

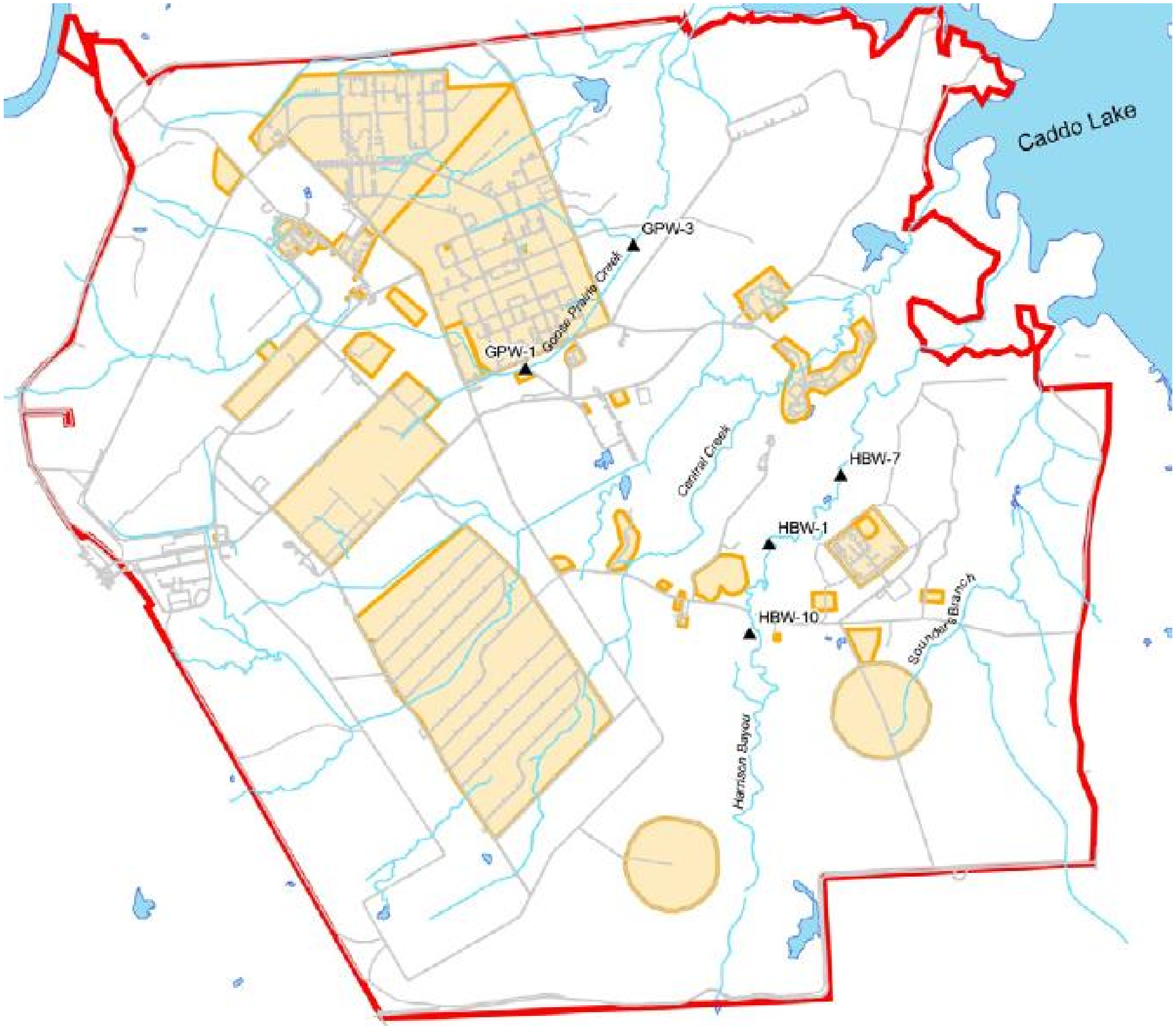


AECOM

Deliverables, Environmental Contract Ending

- Current AECOM PBR contract ends September 30, 2017
- The remaining AECOM contract deliverables (reports and plans) are:
  - Final LHAAP-29 Feasibility Study (FS)
  - Final LHAAP-12 2016 RAO
  - Groundwater Treatment Plant Operation and Reporting

Surface Water Sampling Locations



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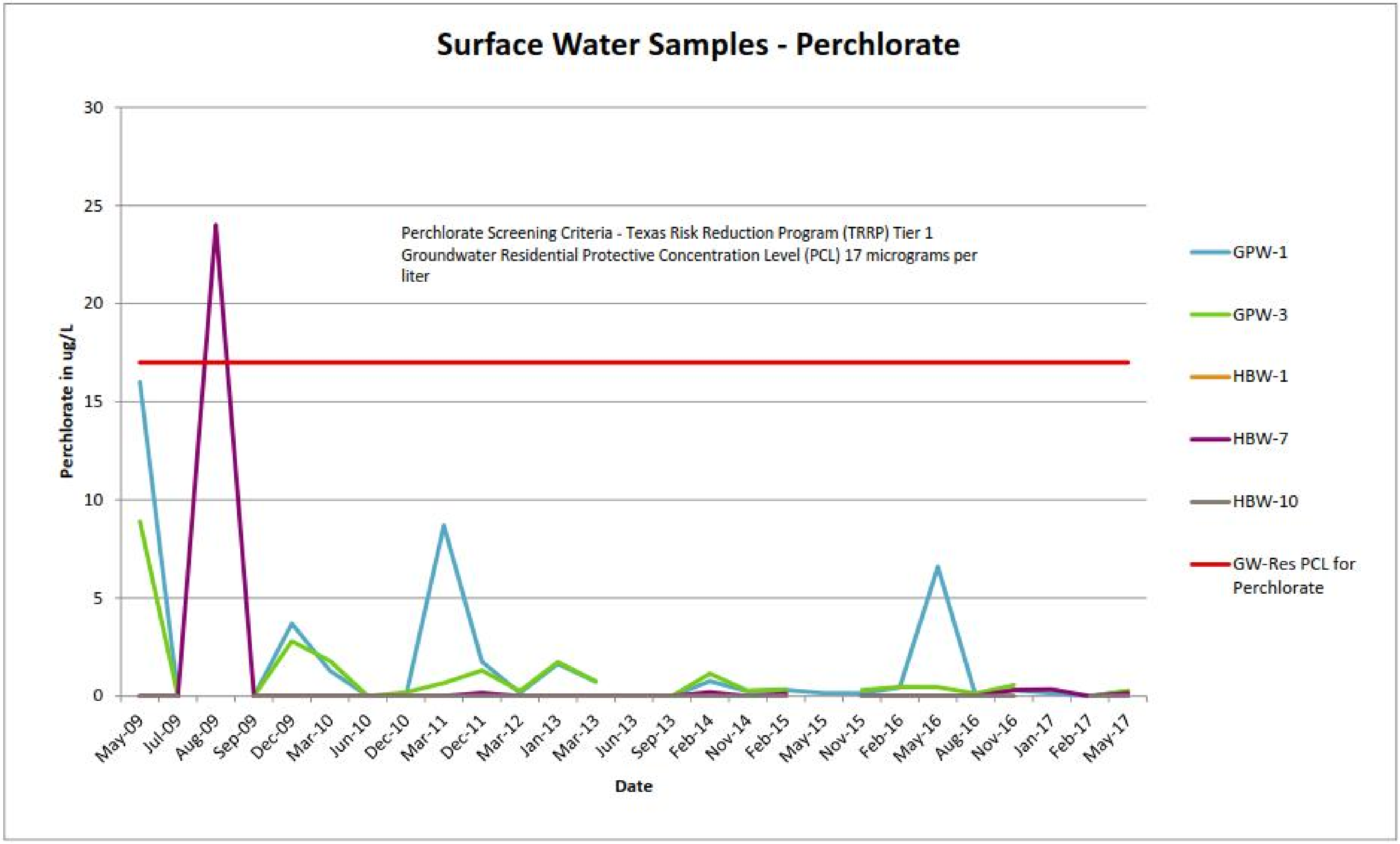
Surface Water Sampling



GPW ï Goose Prairie Creek
HBW ï Harrison Bayou

AECOM

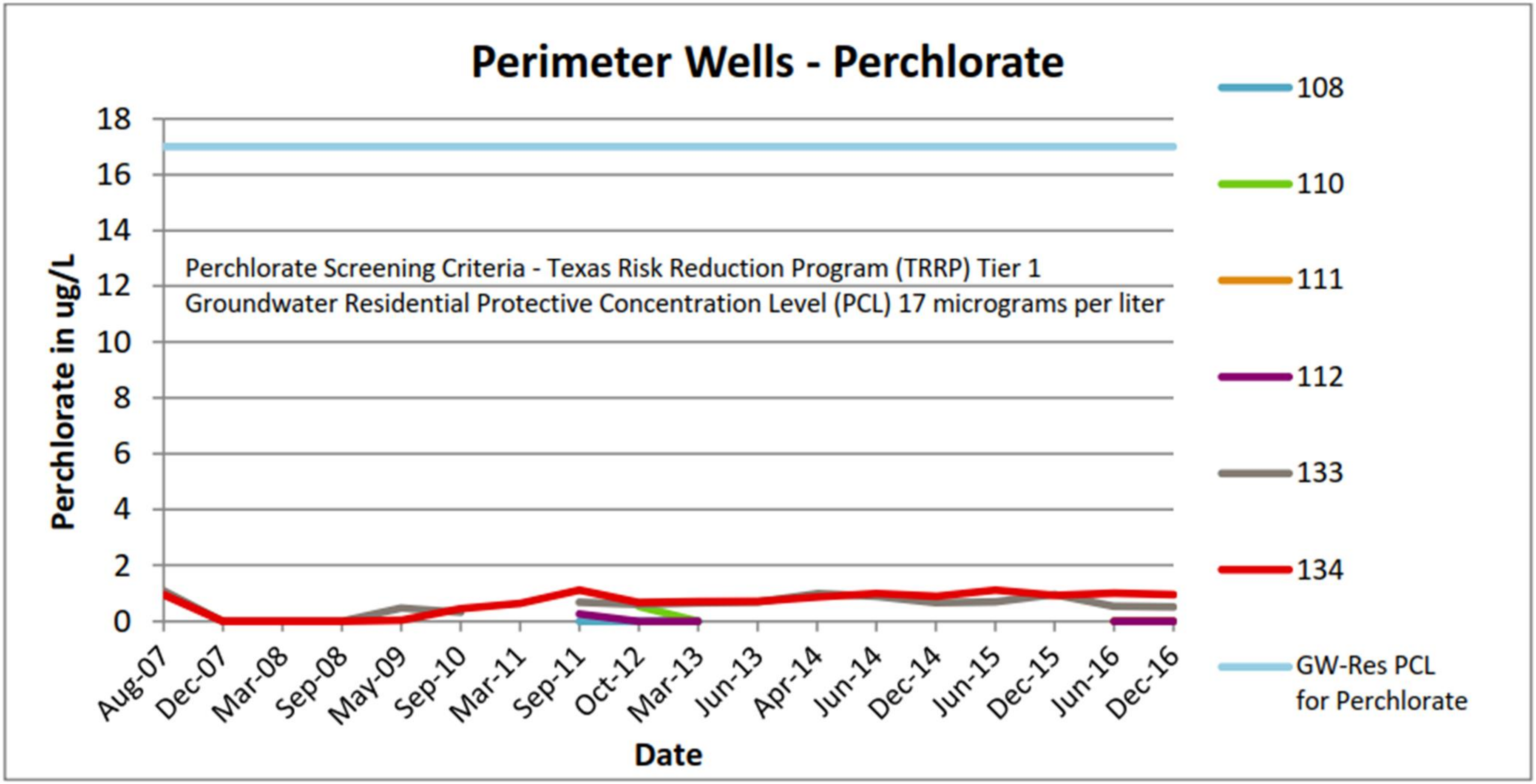
Perimeter Well Sampling

ÅA decision was made by the FFA representatives on January 31, 2017 regarding the perimeter well sampling that has been taking place as a requirement of the 1999 Unanimous Decision of the Dispute Resolution Committee.

ÅFFA representatives agreed that perimeter well sampling should be discontinued.

Perimeter Well Sampling

Perimeter sampling discontinued. Last samples collected Nov/Dec 2016.



AECOM

Next RAB Meeting Schedule and Closing Remarks

ÅSchedule October 2017 RAB Meeting

Å Other Issues/Remarks?

AECOM

Questions?

LHAAP-04, Former Pilot Wastewater Treatment Plant
SELECTED REMEDY In-Situ Bioremediation, Groundwater Long-Term Monitoring, and Land Use Controls

Site History

LHAAP-04, known as Site 04 or the former pilot wastewater treatment plant, is approximately 0.5 acres and is located in the central portion of LHAAP at the northwest corner of 6th and 60th Streets near the former fire station. LHAAP-04 is surrounded by light duty roads. Wastewater treatment operations began at LHAAP-04 in 1984. The demolition of the former pilot wastewater treatment facility structures, tanks, and piping, and the disposal of the associated wastes were completed in the summer of 1997 as part of the Resource Conservation and Recovery Act (RCRA) closure of the plant. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program, excavation of soil impacted with mercury and perchlorate at the LHAAP-04 site was completed in 2009 along the southern edge of the slab, which formerly housed storage tanks for the former pilot wastewater treatment facility. The Final ROD was issued in March 2017 with a selected remedy of in-situ bioremediation (ISB), long-term monitoring (LTM) of groundwater, and land use controls (LUCs).

Site Characteristics

Goose Prairie Creek runs approximately 700 feet to the south of LHAAP-04. The site consists of soils with mixed layers of mostly silts and clay with some thin layers of sands. The shallow zone water bearing sand at monitoring well 04WW04 appears to be only one to two feet thick with the surrounding monitoring wells mostly showing clay or silt layers at the same depth. No monitoring wells have been completed in the intermediate or deep saturated zones at LHAAP-04. Based on 2010 groundwater measurements, the groundwater flow direction in the shallow saturated zone below LHAAP-04 flows away from monitoring well 04WW02 in all directions. The regional groundwater flow direction beneath the facility is generally east-northeast towards Caddo Lake.

Chemical of Concern (COC)

The COC is perchlorate in groundwater.

Description of the Selected Remedy

In-Situ Bioremediation (ISB)

ISB in the groundwater next to monitoring well 04WW04 will be performed. ISB involves the addition of a carbon source into the shallow zone to promote naturally occurring biological processes to reduce perchlorate concentrations to below its cleanup level. In addition, subsurface injections of microorganisms in the shallow zone will also be conducted as needed to reduce the perchlorate levels.

Long-Term Monitoring (LTM)

LTM will be conducted to confirm that perchlorate concentrations in groundwater are declining through treatment to attain the groundwater cleanup level.

LUCs include:

- Maintain the integrity of any current or future remedial or monitoring systems until these components of the remedy are no longer needed to achieve the groundwater cleanup levels.
- Prohibit the use of groundwater as a drinking water source until the levels of COCs in the soil and groundwater allow for unlimited use and unrestricted exposure.
- Restrict the land to nonresidential usage until the levels of COCs in surface and subsurface soil and groundwater allow for unlimited use and unrestricted exposure.

CERCLA Five Year Reviews

Five-Year reviews will be performed to document that the remedy remains protective of human health and the environment.

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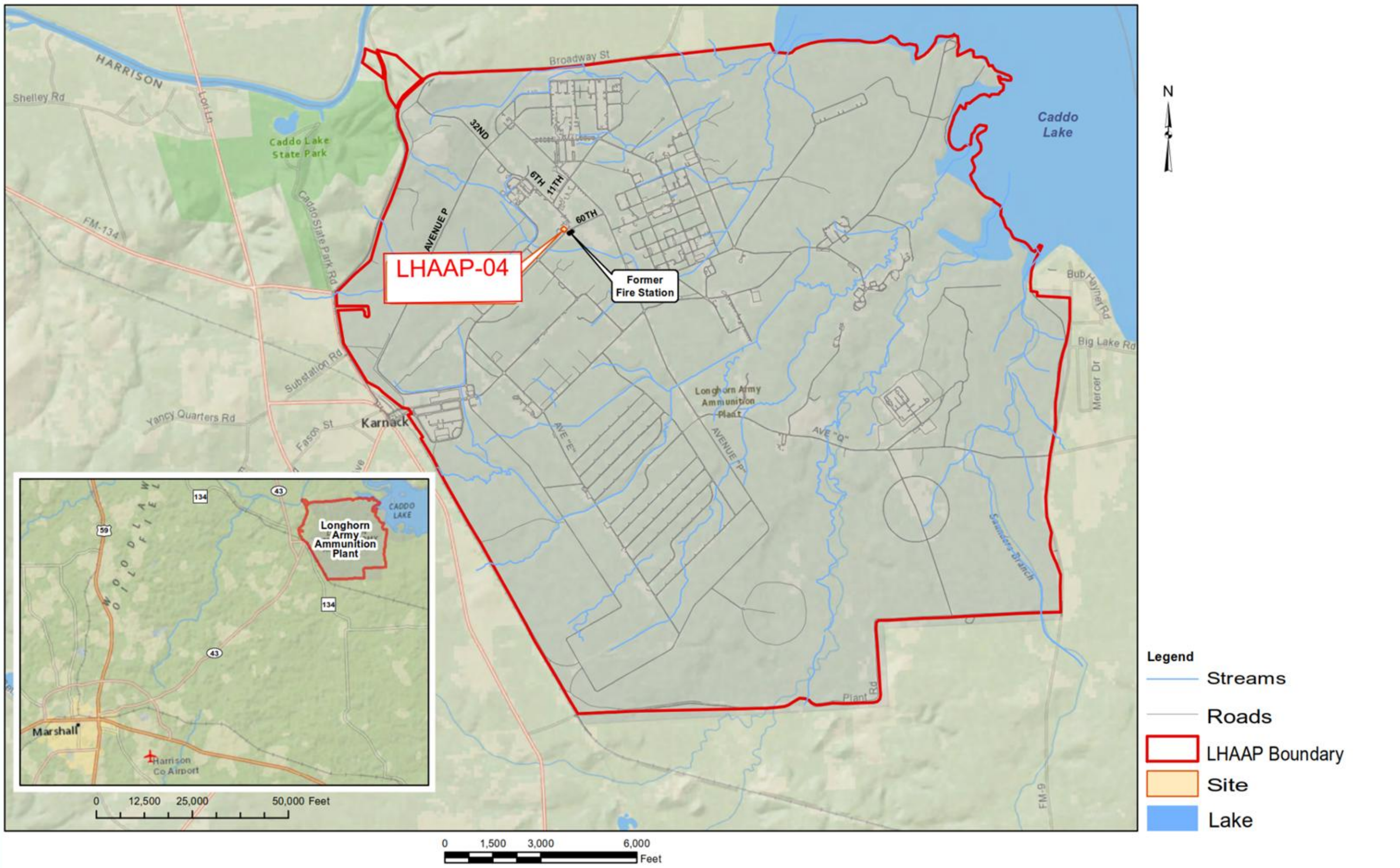
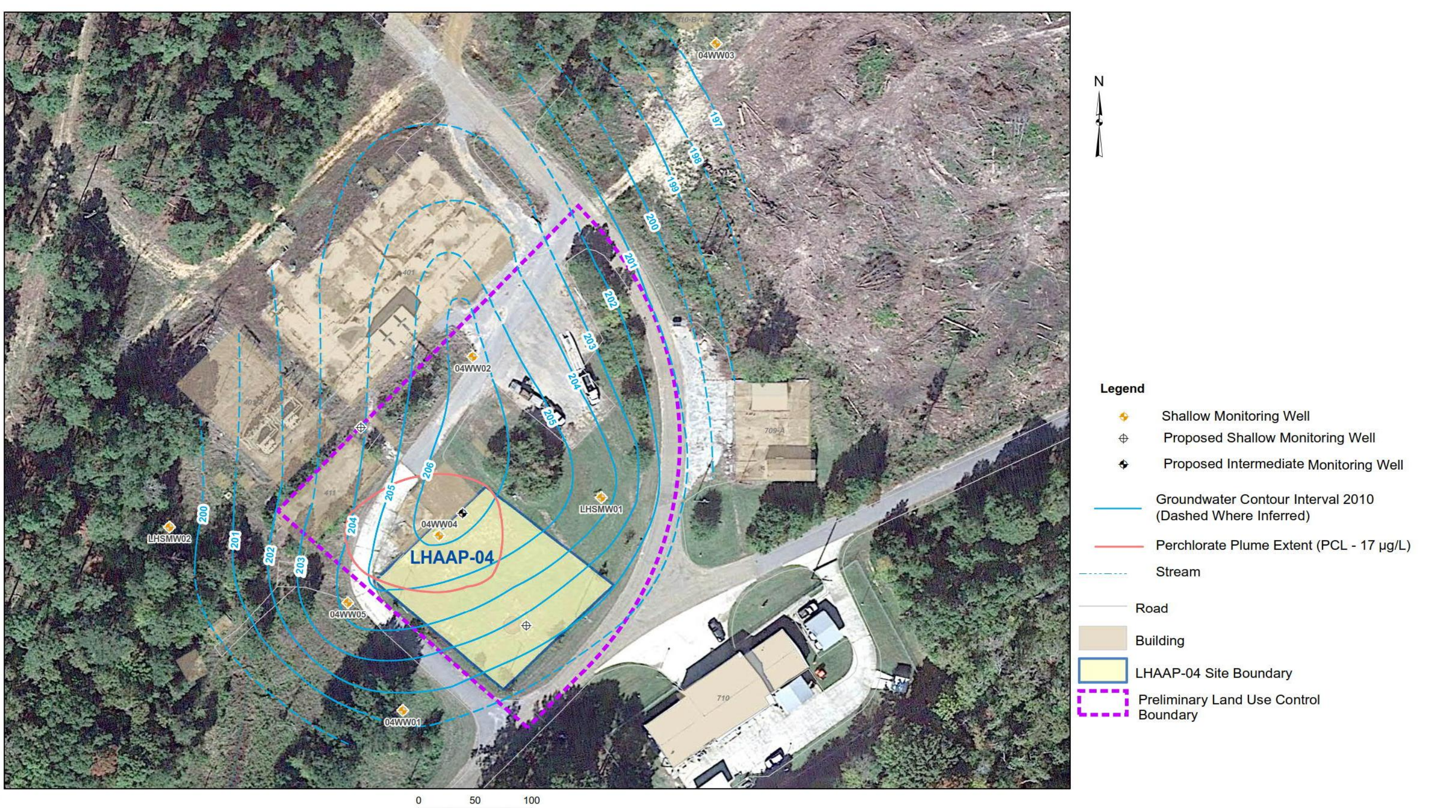
LHAAP-04, Former Pilot Wastewater Treatment Plant
SELECTED REMEDY In-Situ Bioremediation, Groundwater Long-Term Monitoring, and Land Use Controls





00863608

Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water.

Processed Water Data
(in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199

Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716

Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547

Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456

Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012

Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057

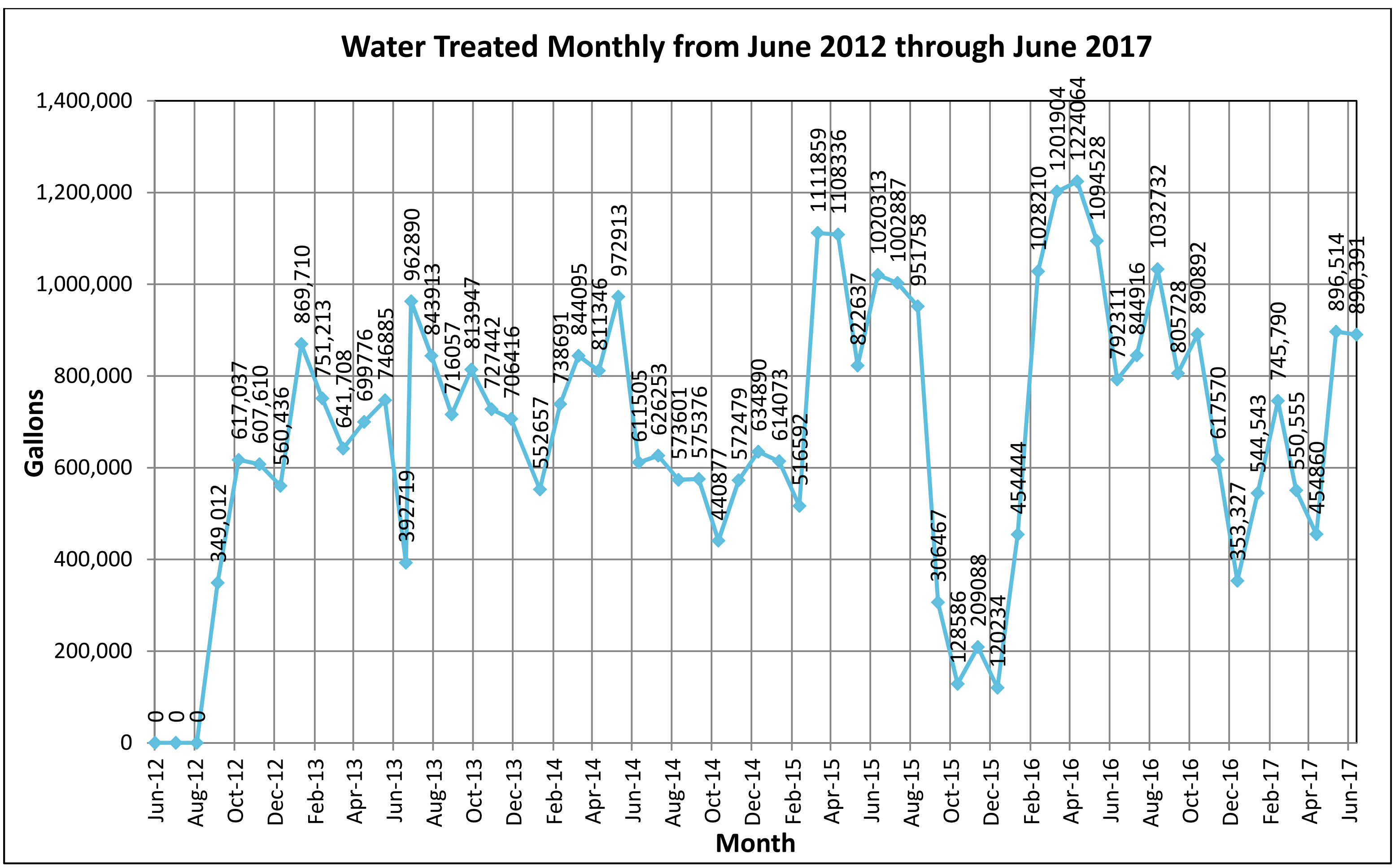
Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376

Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467

Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728

Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391

*Indicates Estimate



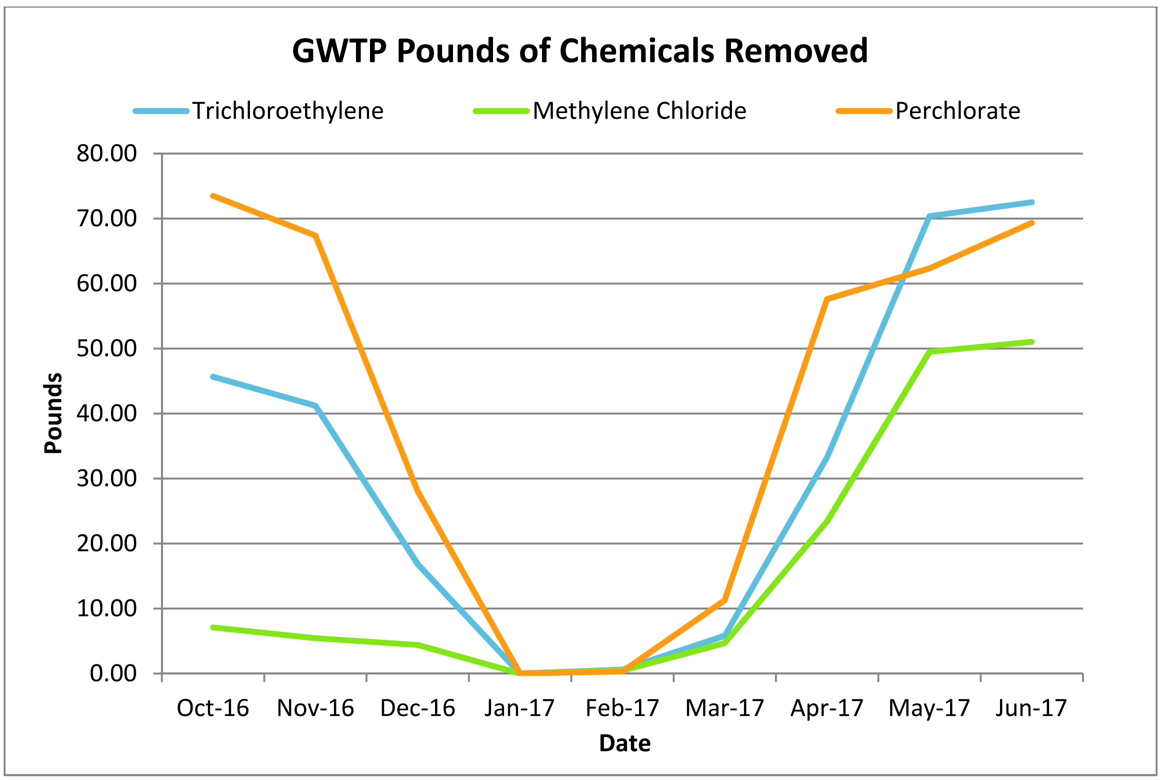
The pounds of chemicals removed for the 4th Quarter of 2016 and 1st and 2nd Quarters of 2017 can be found below and are calculated by the following formula:

$$\frac{\text{(GWTP Influent Contaminant Concentration [}\mu\text{g/L] x Volume [gallons] x 3.785 [liters per gallon])}}{\text{(453,600,000 }\mu\text{g per pound)}}$$

Approximate Amount of Pounds of Chemicals Removed From LHAAP-18/24

	Trichloroethylene	Methylene Chloride	Perchlorate
Oct-16	45.65	7.08	73.49
Nov-16	41.21	5.44	67.39
Dec-16	16.85	4.40	28.05
Jan-17	0.00	0.00	0.00
Feb-17	0.59	0.47	0.32
Mar-17	5.82	4.67	11.28
Apr-17	33.28	23.41	57.60
May-17	70.38	49.51	62.35
Jun-17	72.52	51.02	69.34

ND – no data available



Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Oct-16	0	642,876	0	0	0
Nov-16	0	576,898	0	0	0
Dec-16	0	236,688	0	0	0
Jan-17	0	0	0	0	0
Feb-17	0	0	0	0	14,355
Mar-17	127,242	0	0	0	14,400
Apr-17	113,038	0	236,821	0	0
May-17	205,665	0	534,155	0	0
Jun-17	467,830	0	294,550	490,574	0

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

Quarter	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**
Creek Sample ID	**Jul 1999**	**Sep 1999**	**Feb 2000**	**Apr 2000**	**Aug 2000**	**Dec 2000**	**Feb 2001**	**Apr 2001**	**July 2001**	**Oct 2001**	**Jan 2002**
GPW-1	<1.0U	-	4	<4.0 U	<4.0 U	<4.0 U	-	2.65	<4.0 U	<4.0 U	<4.0 U
GPW-3	<1.0U	<4.0 U	17	8	<4.0 U	<4.0 U	-	2.28	<4.0 U	<4.0 U	<4.0 U
HBW-1	-	<80.0 U	310	23	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-7	-	<8.0 U	370	110	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-10	-	<8.0 U	905	650	<4.0 U	-	<4.0 U	-	<4.0 U	-	-

Quarter	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**3rd**	**4th**	**2nd**	**3rd**	**4th**
Creek Sample ID	**June 2002**	**Sept 2002**	**Dec 2002**	**Feb 2003**	**June 2003**	**Aug 2003**	**July 2004**	**Dec 2006**	**May 2007**	**Aug 2007**	**Dec 2007**
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 U	<1.0 U	7.48
HBW-1	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	99.3	<0.2U	<1.0 U	<1.0 U	122	<1.0 U
HBW-7	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	<4.0 U	<0.2U	<1.0 U	<1.0 U	1.02	<1.0 U
HBW-10	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	-	<0.2U	<1.0 U	<1.0 U	<1.0 U	<1.0 U

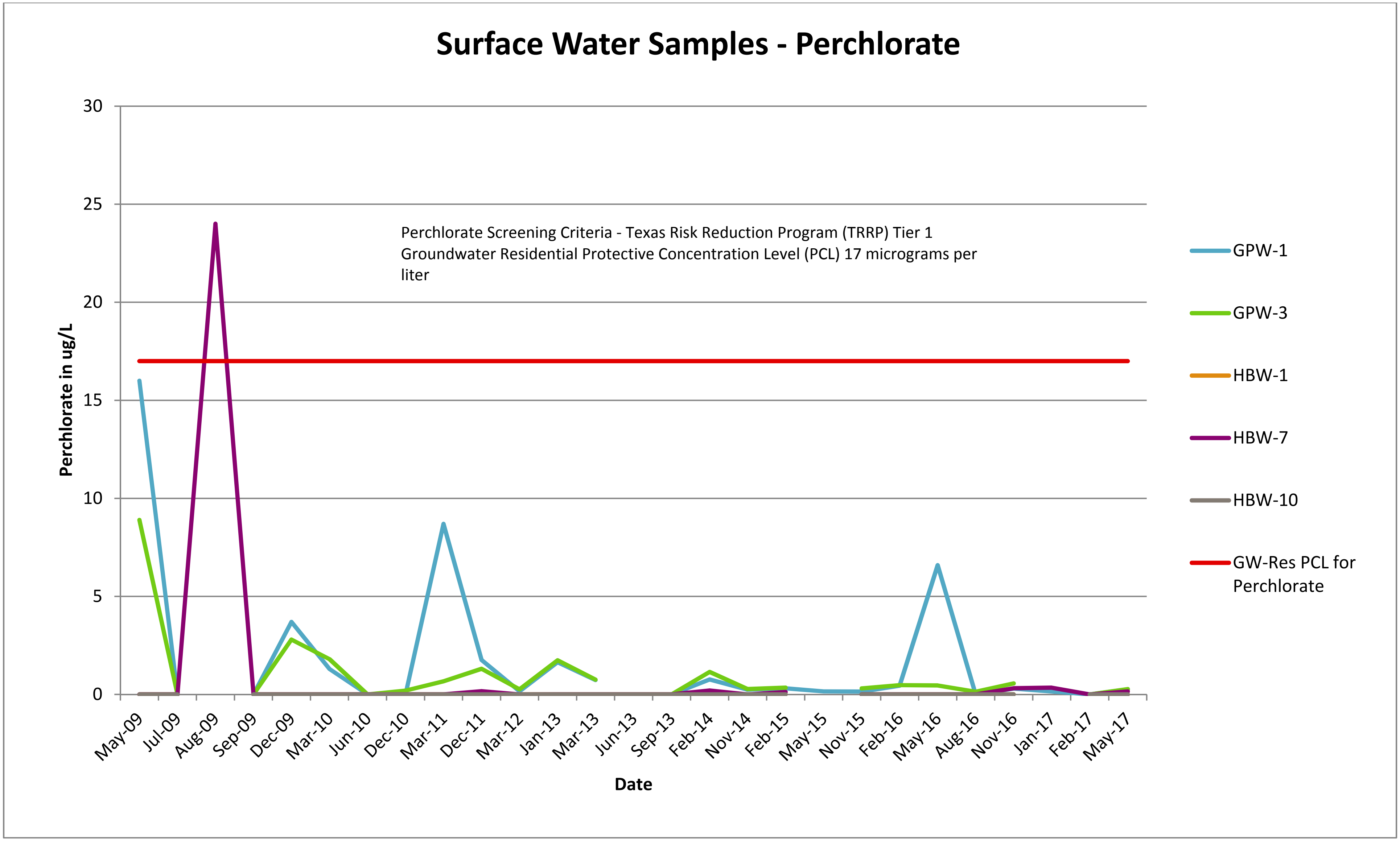
Quarter	**1st**	**2nd**	**3rd**	**4th**	**2nd**	**3rd**	**3rd**	**3rd**	**4th**	**1st**	**2nd**
Creek Sample ID	**Mar 2008**	**Jun 2008**	**Sep 2008**	**Dec 2008**	**May 2009**	**Jul 2009**	**Aug 2009**	**Sep 2009**	**Dec 2009**	**Mar 2010**	**Jun 2010**
GPW-1	27	<0.5U	<0.5U	<0.22U	16	<4U	NS	<1.2U	3.7	1.3J	<0.6U
GPW-3	21.9	9.42	1.1	<0.22U	8.9	<4U	NS	<0.6U	2.8	1.8J	<0.6U
HBW-1	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.5U	<0.6U
HBW-7	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	24	<1.2U	<0.275U	1.5U	<0.6U
HBW-10	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.2U	<0.6U

Quarter	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**
Creek Sample ID	**Sep 2010**	**Dec 2010**	**Mar 2011**	**Jun 2011**	**Sep 2011**	**Dec 2011**	**Mar 2012**	**Jun 2012**	**Not Applicable**	**Jan & Feb 2013**	**Mar 2013**
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	NS	1.74	0.754
HBW-1	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U
HBW-7	dry	<0.1U	<0.2U	dry	dry	0.171J	0.1U	dry	NS	<0.2U	<0.2U
HBW-10	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U

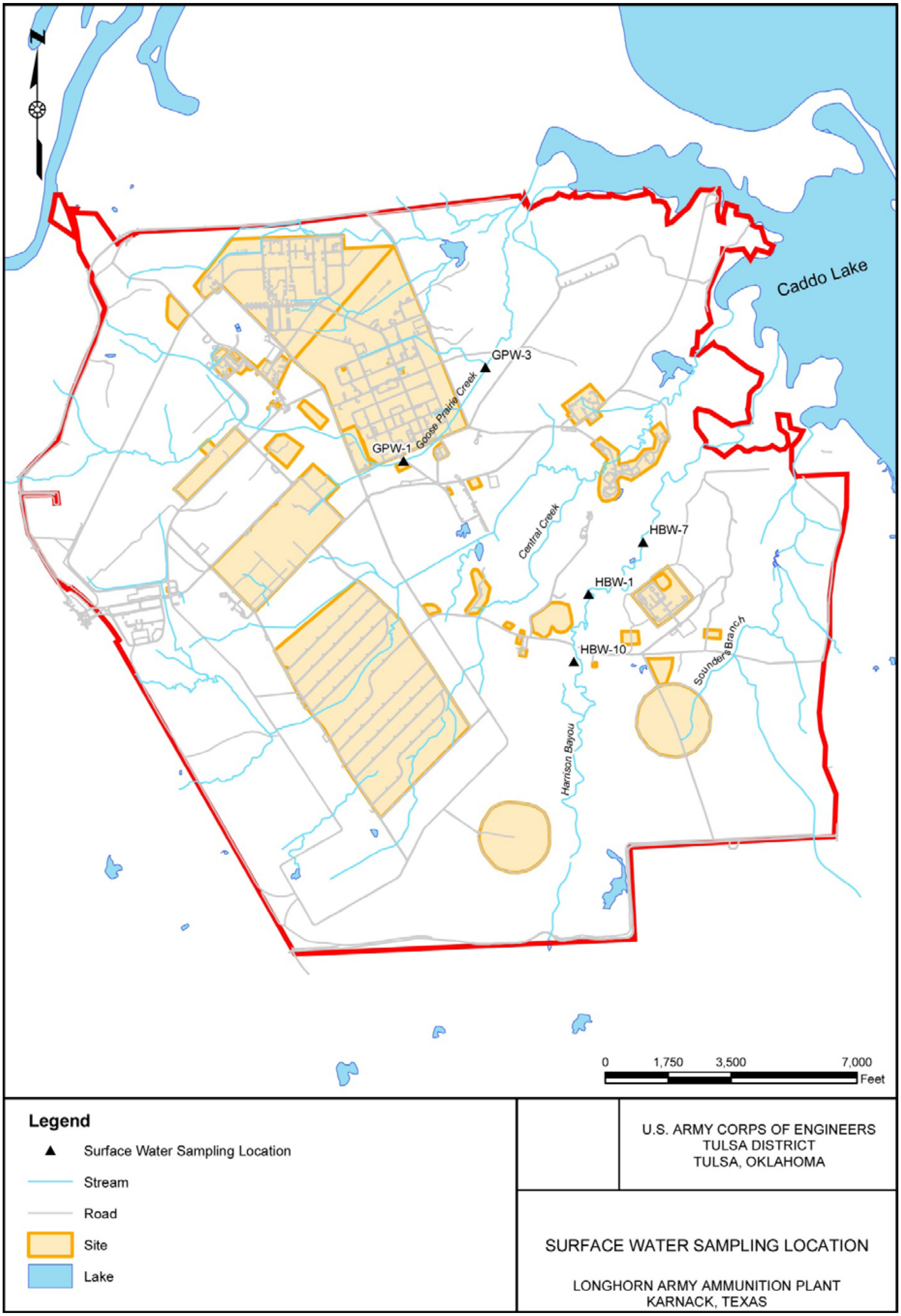
Quarter	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3nd**	**4th**	**1st**	**2nd**	**3rd**	**4th**
Creek Sample ID	**Jun 2013**	**Sept 2013**	**Dec 2013**	**Feb 2014**	**May 2014**	**Aug 2014**	**Nov 2014**	**Feb 2015**	**May 2015**	**Aug 2015**	**Nov 2015**
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry	dry	0.311 J
HBW-1	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U
HBW-7	<0.2U	<0.2 U	dry	0.201 J	dry	dry	<0.2 U	0.124 J	dry	dry	<0.2 U
HBW-10	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U

Quarter	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**
Creek Sample ID	**Feb 2016**	**May 2016**	**Aug 2016**	**Nov 2016**	**Feb 2017**	**May 2017**
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274
HBW-1	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J	<1 U	0.155
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U

NS – not sampled U – non-detect J – Estimated Dry – no surface water


Surface Water Samples - Perchlorate
30
25
20
15
10
5
0
Perchlorate in ug/L
Perchlorate Screening Criteria - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL) 17 micrograms per liter
May-09
Jul-09
Aug-09
Sep-09
Dec-09
Mar-10
Jun-10
Dec-10
Mar-11
Dec-11
Mar-12
Jan-13
Mar-13
Jun-13
Sep-13
Feb-14
Nov-14
Feb-15
May-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Jan-17
Feb-17
May-17
Date
GPW-1
GPW-3
HBW-1
HBW-7
HBW-10
GW-Res PCL for Perchlorate

Longhorn Army Ammuntion Plant Creek Sampling Locations



00863613

LHAAP-04 Record of Decision Responsiveness Summary

RESPONSI ENESS SUMMARY

The Responsiveness Summary serves three purposes. First, it provides the U. S. Army, USEPA, and the TCEQ with information about community concerns with the Preferred Alternative at LHAAP-04 as presented in the Proposed Plan. Second, it shows how the public's comments were considered in the decision-making process for selection of the remedy. Third, it provides a formal mechanism for the U.S. Army to respond to public comments

The U.S. Army, the USEPA, and the TCEQ provide information regarding LHAAP-04 through public meetings, the Administrative Record for the facility, and announcements published in the Marshall News Messenger newspapers. **Section 2.3** discusses community participation on LHAAP-04, including the dates for the public comment period, the date, location, and time of the public meetings, and the location of the Administrative Record. The following documents related to community involvement were added to the Administrative Record:

- Transcript of the public meeting on January 9, 2013
- Presentation slides from the January 9, 2013 public meeting
- Written questions and comments from the public during the public comment period, and the U.S. Army response to those comments.

1 Stakeholder Issues and Lead Agency Responses

This section responds to significant issues raised by stakeholders including the public and community groups that were received in written or verbal form.

1 1 Question Recommendation No 1

Extent of groundwater contamination: The only monitor well at the site, well 04WW04, contains high concentrations of perchlorate. This well is only 18 feet deep. A single well is insufficient. Both the lateral and vertical extent of groundwater contamination are unknown.

Recommendation: The three additional monitor wells the U.S. Army plans to install will better define the extent of contamination.

Response – The LHAAP-04 site is currently monitored by a total of seven wells, although only one well is technically within the very small area of the site (approximately 150 feet by 150 feet). The site is well-monitored as the remainder of the wells are within 250 feet of the impacted well, Three additional wells planned for installation as part of the RD will help further refine the perchlorate plume footprint and depth of contamination..

1 2 Question Recommendation No 2

Groundwater Contaminants: Samples from well 04WW04 do not appear to have been analyzed for contaminants other than perchlorate. Other groundwater contaminants may be present.

Recommendation: The U.S. Army should sample all monitor wells and the fire station well for all contaminants that might reasonably be expected to occur at the site. In addition to perchlorate, this would include volatile organic compounds (VOCs) (e.g., methylene chloride, trichloroethylene, explosives (e.g., TNT, DNT), and metals (e.g., arsenic, thallium). If contaminants are found that are not amenable to restoration under the Proposed Plan (e.g., metals), the U.S. Army should modify the plan to ensure that all the contaminants will be cleaned up.

Response – Groundwater samples from three shallow monitoring wells (04WW01, 04WW02, and 04WW03) were analyzed for VOCs, SVOCs, metals, pesticides, PCBs, explosives, perchlorate, and dioxins/furans during the RI (Jacobs, 2003). No VOCs, SVOCs, perchlorate, pesticides, explosives, and PCBs were detected in the samples. Inorganic constituent concentrations were detected at or lower than the protective concentration level (PCL) or background comparison levels. Eight dioxin/furan compounds (with no established MCL or PCL) were detected in groundwater samples (Jacobs, 2003). Subsequently, perchlorate was identified as the only groundwater COC at the site with its source being historical perchlorate impacts in soil. Parameters, other than those discussed in the Proposed Plan and the ROD, will not be added to the monitoring program.

1 Question Recommendation No

Residual soil contamination: The U.S. Army has stated that contaminated soil probably remains beneath some portions of the site.

Recommendation: The U.S. Army should either perform an assessment to determine whether the contaminated soil is likely to be a source of groundwater contamination, or explain why such an assessment is not necessary.

Response – Residual contaminated soil, if any, is likely to be restricted to the two grid areas FL09 and FL11 (where confirmation samples could not be collected due to groundwater infiltration). Contaminated soil was removed from these two areas up to depths of 14 ft bgs. However, samples collected from the remaining north side wall just above the groundwater interface indicated perchlorate concentrations less than cleanup levels. Residual soil contamination, if any, is likely to be in the saturated zone and will be addressed as part of groundwater remedy.

1 4 Question Recommendation No 4

Concrete slab: The U.S. Army does not appear to have investigated the soil or groundwater beneath the concrete slab.

Recommendation: The U.S. Army should either perform an investigation, or explain why it is not necessary.

Response –The concrete slab was penetrated in six locations near the tank pad/foundations. See **Figure 2-2** of the Final Removal Action Work Plan (Shaw, 2009c). Based on perchlorate results from soil samples taken from under the slab, a section of the concrete was removed. See **Figure 2-1** and **Figure 2-8** of the Final Completion Report (Shaw, 2011). Soil was excavated to a depth of five feet below top of concrete in section FL08 and to a depth of twelve feet below top of concrete in section FL07. Perchlorate concentrations in final floor confirmation samples from FL07 and FL08 were less than the GWP-Ind MSC. Monitoring well 04WW04 is located adjacent to the concrete slab and soil removal at section FL07. Therefore, further investigation beneath the concrete slab is not warranted.

1 Question Recommendation No

Perchlorate cleanup standard: The U.S. Army's cleanup standard for perchlorate in groundwater is the same as the State of Texas' standard for industrial use (GWP-Ind): 72 µg/L. However, the USEPA has decided to regulate perchlorate under the SDWA and has established an Interim Drinking Water Health Advisory of 15 µg/L. The USEPA and the Army are currently discussing this issue.

Recommendation: Pending the outcome of discussions with the USEPA, the Army should assume that the perchlorate cleanup will be 15 µg/L, and plan accordingly.

Note – The purpose of excavating the perchlorate contaminated soils was to protect the underlying groundwater. A more stringent perchlorate groundwater standard may mean that the cleanup standards for soils will also have to be more stringent.

Response – The cleanup level for perchlorate is 17 µg/L, which is the TRRP Tier 1 Groundwater Residential PCL. The cleanup level for perchlorate was revised as a result of dispute resolution between the Army and the EPA.

1 6 Question Recommendation No 6

Surface water modeling: The U.S. Army has concluded that contaminated groundwater will not adversely affect surface water in Goose Prairie Creek. This conclusion is based on modeling performed in 2007. However, in its Proposed Plan for LHAAP-47, the U.S. Army stated that the uncertainties associated with the model were unacceptable, and it would not be used to assess the effect of groundwater contaminants on Goose Prairie Creek.

Recommendation: The U.S. Army should explain why it is using the model at LHAAP-04 but not at LHAAP-47.

Response – References to use of surface water modeling for LHAAP-04 will be removed from this and the future documents. Surface water directly overlies the LHAAP-47 plume and surface water monitoring is planned in conjunction with the final remedy for that site. At LHAAP-04 surface water is not located on the site directly on top of the groundwater plume. It is located ~700 feet from the site and based upon the localized, small nature of the plume, no impact to surface water is anticipated. Surface water data from 2010 and 2011 indicates perchlorate concentrations below TRRP Tier 1 Groundwater Residential PCL.

1 7 Question No 7

Public Comment Period: What is the duration of the public comment period? When does the public comment period end?

Response – The duration of the public comment period is 30 days. The period began on January 1, 2013, and was extended through January 31, 2013.

1 Question No

Cleanup Level for Perchlorate in Groundwater: The U.S. Army proposes that the cleanup level for perchlorate in groundwater be 72 µg/L whereas the USEPA states that the cleanup level for perchlorate shall be 15 µg/L. The U.S. Army may have to switch over and use 15 µg/L as the cleanup level.

Response – The cleanup level for perchlorate is 17 µg/L, which is the TRRP Tier 1 Groundwater Residential PCL. The cleanup level for perchlorate was revised as a result of dispute resolution between the Army and the EPA.

1 Question No

Growth of Microorganisms during ISB: How do you encourage the growth of microorganisms? What is the relationship between microorganisms' growth and reduction in contaminants?

Response – The material (substrate) that is injected into the aquifer during ISB provides the food source for the growth of native microorganisms in the aquifer. These microorganisms increase in population (via reproduction) and during the corresponding metabolism, they break down the contaminants in groundwater.

Perchlorate, the COC in groundwater at LHAAP-04 site is more amenable to ISB than some other contaminants found at the LHAAP. Evaluation of data collected quarterly in the first two years of the ISB implementation will help determine need for additional injections (additional substrate into the aquifer), or bioaugmentation culture (to add/enhance the right type of microbes into the aquifer). Providing the substrate (food source) to the microbes helps sustain and grow their population with corresponding decrease in the COC levels until the cleanup level is attained.

1 10 Question No 10

Submittal of Questions and Appropriate Response: If someone sends in written comments to the U.S. Army, who does it go to, who actually reads them, who responds, do they respond to all comments?

Response – Dr. Rose Zeiler, with the U.S. Army is the point of contact for correspondence associated with comments/responses. Dr. Zeiler's official contact information (mail, email, and telephone no.) is provided in the Proposed Plan. Formal comments are accepted verbally at the public meeting or via email or mail sent to the attention of Dr. Zeiler. All written comments on the Proposed Plan should be submitted to her. Verbal comments asked during the public meeting are captured by the court reporter. A concerted response from the team is provided to the comments and included in the Responsiveness Summary of the ROD. Similar questions are grouped together and a comprehensive answer is provided to that group of questions.

2 Technical and Legal Issues

This section is used to expand on technical and legal issues. However, there are no issues of that nature beyond the technical issues already discussed in **Section 3.1**.

Subject: **Final Minutes, Monthly Managers' Meeting, Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **Teleconference; Call-In 844-712-3247, access code 32317675**
Date of Meeting: **September 14, 2017 – 10:00 AM**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
AEC:	Nick Smith (NS)
EPA:	Dorelle Harrison (DH), Kent Becher (KB) (USGS Liaison)
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW)
AECOM:	Elspeth Sharp (ES), Craig Holloway (CH), JoLynn Snow (JS)
USFWS:	Paul Bruckwicki (PB)

Welcome **RMZ**

Action Items

AECOM Technical Services, Inc. (AECOM)

- CH discussed the GWTP Operations Summary handout and the power outage and malfunctioning transformer at the GWTP during August 2017.
- Revise GWTP discharge protocol to incorporate July 27, 2017 discussion with Army, TCEQ, and EPA and resubmit for review. **Completed August 28, 2017.** EPA provided comments September 8, 2017. Protocol to be included in future quarterly GWTP reports.
  - RMZ asked DH what the timeframe of EPA approval would be, if it will be possible to get approval this week in order to get it included in the AR update next week. DH said he would work with Rich Mayer (RM) to try to get that done.
- AECOM to update LHAAP website regarding dispute resolution. **In progress.**

Army

- No outstanding action items.

EPA

- Considering conducting surface water sampling for perchlorate only using event samplers in the drainage ditch near the perchlorate grinding building. **In progress.**
  - KB said the event has been delayed due to the hurricane recovery efforts.

Texas Commission on Environmental Quality (TCEQ)

- No outstanding action items.

United States Army Environmental Command (AEC)

- Draft CRP/CIP update.
  - NS said the Draft CRP/CIP is out for public comment.
- Project to establish real-time on-site perchlorate analyses. **Ongoing**.
  - RMZ said it is going well and it is expected to be up and running in October.

United States Fish and Wildlife Service (USFWS)

- No outstanding action items.

Schedule Review **RMZ**

- Restoration
- Contract (AW). No update.

Defense Environmental Restoration Program (DERP) Performance-Based Remediation (PBR) Update **AECOM**

ES asked attendees to refer to the Document and Issue Tracker dated 9/14/17, which was distributed with the agenda. It includes currently projected dates for submittal of remaining project milestone deliverables to EPA and TCEQ.

- Item 1 (GWTP Quarterly Report) – Submitted Draft Q4 2016 to EPA and TCEQ for review on 8/18/17. Received one comment from TCEQ on 9/5/17. Draft Q1 2017 report planned for submittal to EPA and TCEQ by 9/17/17. The Q2 2017 report is in process.
- Item 13 (MMM) – July 2017 MMM minutes were submitted to EPA and TCEQ on 8/17/17. Received EPA and TCEQ approval on 8/17/17. Submitted August 2017 MMM minutes to EPA and TCEQ on 9/11/17. Received TCEQ approval on 9/13/17.
- Item 14-2 (LHAAP-29 Feasibility Study [FS] Addendum) – Draft report was submitted to EPA and TCEQ for review on 4/18/17. Received comments from EPA and TCEQ on 5/18/17 and 5/22/17 respectively. Draft Final submitted to EPA and TCEQ on 8/18/17. Received EPA approval on 9/8/17 and TCEQ approval on 9/11/17. It will be entered into the Q2 2017 AR update.
- Item 16 (RAB/Website) – Draft July 2017 RAB meeting minutes were sent to RAB members on 8/17/17. Updates to website to remove references to ongoing dispute will continue.
- Item 17-2 (GWTP Sampling and Analysis Plan) – Final Sampling and Analysis plan was submitted to TCEQ and EPA on 9/13/17. It will be entered into the Q2 2017 AR update.
- Item 17-3 (GWTP Continuing Operations and Maintenance [O&M]) – Discussed earlier under AECOM Action Items.
- Item 18 (Administrative Record Update) – AECOM is currently preparing 2017 Q2 AR update.
- Item 21 (Smart Map) – AECOM continues to upload current data to the Smart Map.

Monthly data – See attached August 2017 Validated LHAAP Data.

Military Munitions Response Program (MMRP) Update **Army**

Other Environmental Restoration **Army**

- Site 18/24 Perchlorate Discharge Criteria MFR to the AR
  - RMZ said it is in progress.
- Quarterly Reporting and Requirements

- GWTP Evaluation – discussed earlier in meeting.
- Surface Water Quarterly Update – surface water samples were collected in August 2017 at Harrison Bayou but could not be collected at Goose Prairie Creek
- Administrative Record Update – discussed earlier in meeting.
- Website Update – discussed earlier in meeting.

- Annual Reporting
  - LUC Management Plan Update
  - CRP/CIP Revision (Biennial) – RMZ said this is with public comment and should have RAB comments by 9/22/17. She asked that AECOM send a reminder to the RAB members for review.

USFWS Update
- No update.

Schedule Next Managers' Meeting
- October 2017 MMM will be held at the LHAAP site trailer, October 19, 2017 at 10:00 AM CST. The next RAB will be held October 19, 2017.

Adjourn

Attachments:
- **August 2017 Validated LHAAP Data:**
  - GWTP Effluent: Weekly, Bi-Weekly, and Monthly sampling (July/August 2017)
  - GWTP Influent: Monthly Sampling (August 2017)

ACRONYM LIST

AEC	United States Army Environmental Command
AECOM	AECOM Technical Services, Inc.
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BRAC	Base Realignment and Closure
CH	Craig Holloway
CIP	Community Involvement Plan
CRP	Community Relations Plan
CST	Central Standard Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
EPA	United States Environmental Protection Agency
ES	Elspeth Sharp
FS	Feasibility Study
GWTP	Ground Water Treatment Plant
JS	JoLynn Snow
KB	Kent Becher
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MFR	Memorandum for Record
MMM	Monthly Managers' Meeting
MMRP	Military Munitions Response Program
NS	Nick Smith
O&M	Operation and Maintenance
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
RAB	Restoration Advisory Board
RM	Rich Mayer
RMZ	Rose M. Zeiler
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

LHAAP Data alidated
August 2017

GWTP Effluent	*Weekly Perchlorate Sampling- July/August 2017*	
	Perchlorate (6850)	
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling - July/August 2017*	
	Ammonia (350.1)	Metals (6010C)
	Ortho-Phosphate (365.2)	Metals (6020A)
	Organic Carbon (415.1)	Hexavalent Chromium (7196A)
	VOC (8260B)	1,4-Dioxane (8270D-SIM)
	Anions (9056)	
GWTP Influent	*Monthly Sampling - August 2017*	
	Metals (6010C)	
	Metals (6020A)	
	Perchlorate (6850)	
	Hexavalent Chromium (7196A)	

GWTP Effluent Perchlorate Sampling - July August 2017

Location ID Sample Date	Units	Daily Maximum Conc	LH1 24-SP6 0-6460 7 26 2017	LH1 24-SP6 0-6462-AFTER ION 2 2017	LH1 24-SP6 0-6462-BEFORE ION 2 2017	LH1 24-SP6 0-6464 AFTER ION 2017	LH1 24-SP6 0-6464 BEFORE ION 2017
Location Description			GWTP–Collected from a spigot after lead ion exchange vessel.	GWTP–Collected from a spigot after lead ion exchange vessel.	GWTP-Collected before lead ion exchange vessel.	GWTP–Collected from a spigot after lead ion exchange vessel.	GWTP-Collected before lead ion exchange vessel.
Perchlorate (6 0)							
PERCHLORATE	µg/L	17	1.15	0.9	24.3	0.762	68.9

µg/L - micrograms per liter

GWTP Effluent Weekly Sampling - July August 2017

Location ID Sample Date	Units	Daily Maximum Conc	LH1 24-SP6 0-6460 7 26 2017	LH1 24-SP6 0-6462 2 2017	LH1 24-SP6 0-6464 2017
Location Description			GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.		
Ammonia as N (0 1)					
AMMONIA AS N	mg/L		14.5	9.56	5.36
Ortho-Phosphate (6 2)					
ORTHO-PHOSPHATE	mg/L		2.12	3.34	2.55
Organic Carbon (41 1)					
TOTAL ORGANIC CARBON (TOC)	mg/L		74	67.9	57.6

mg/L - milligrams per liter

GWTP Effluent Bi-Weekly Sampling - July August 2017

Location ID Sample Date	Units	Daily Maximum Conc	LH1 24-SP6 0-64 7 26 2017	LH1 24-SP6 0-646 2017
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650 Sampled Biweekly.	
olatile Organic Compounds (260B)				
1,1,1,2-TETRACHLOROETHANE	µg/L		NA	<0.5 U
1,1,1-TRICHLOROETHANE	µg/L	7,230	<0.5 U	<0.5 U
1,1,2,2-TETRACHLOROETHANE	µg/L		NA	<0.4 U
1,1,2-TRICHLOROETHANE	µg/L	216.9	<0.5 U	<0.5 U
1,1-DICHLOROETHANE	µg/L	14,032	<0.25 U	<0.25 U
1,1-DICHLOROETHENE	µg/L	253	<1 U	<1 U
1,1-DICHLOROPROPENE	µg/L		NA	<0.5 U
1,2,3-TRICHLOROBENZENE	µg/L		NA	<0.3 U
1,2,3-TRICHLOROPROPANE	µg/L		NA	<1 U
1,2,4-TRICHLOROBENZENE	µg/L		NA	<0.4 U
1,2,4-TRIMETHYLBENZENE	µg/L		NA	<0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L		NA	<2 U
1,2-DIBROMOETHANE	µg/L		NA	<0.5 U
1,2-DICHLOROBENZENE	µg/L		NA	<0.25 U
1,2-DICHLOROETHANE	µg/L	181	<0.5 U	<0.5 U
1,2-DICHLOROPROPANE	µg/L	5	NA	<0.4 U
1,3,5-TRIMETHYLBENZENE	µg/L		NA	<0.5 U
1,3-DICHLOROBENZENE	µg/L		NA	<0.5 U
1,3-DICHLOROPROPANE	µg/L		NA	<0.4 U
1,4-DICHLOROBENZENE	µg/L		NA	<0.25 U
2,2-DICHLOROPROPANE	µg/L		NA	<0.5 U
2-BUTANONE	µg/L		NA	4.17 J
2-CHLOROTOLUENE	µg/L		NA	<0.25 U
2-HEXANONE	µg/L		NA	<5 U
4-CHLOROTOLUENE	µg/L		NA	<0.5 U
4-METHYL-2-PENTANONE	µg/L		NA	<5 U
ACETONE	µg/L	2,395	<5 U	4.1 J
BENZENE	µg/L	181	<0.25 U	<0.25 U
BROMOBENZENE	µg/L		NA	<0.25 U
BROMOCHLOROMETHANE	µg/L		NA	<0.4 U
BROMODICHLOROMETHANE	µg/L		NA	<0.5 U
BROMOFORM	µg/L		NA	<1 U
BROMOMETHANE	µg/L		NA	<1 U
CARBON DISULFIDE	µg/L		NA	<1 U
CARBON TETRACHLORIDE	µg/L	181	<0.5 U	<0.5 U
CHLOROBENZENE	µg/L	47,180	NA	<0.25 U
CHLOROETHANE	µg/L		NA	<1 U
CHLOROFORM	µg/L	3,615	<0.25 U	<0.25 U
CHLOROMETHANE	µg/L		NA	<1 UJ
CIS-1,2-DICHLOROETHENE	µg/L		NA	5.88
CIS-1,3-DICHLOROPROPENE	µg/L		NA	<0.5 U
DIBROMOCHLOROMETHANE	µg/L		NA	<0.5 U
DIBROMOMETHANE	µg/L		NA	<0.5 U
DICHLORODIFLUOROMETHANE	µg/L		NA	<0.5 U
ETHYLBENZENE	µg/L	57,025	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	µg/L		NA	<0.5 U
ISOPROPYLBENZENE	µg/L		NA	<0.5 U

GWTP Effluent Bi-Weekly Sampling - July August 2017

Location ID Sample Date	Units	Daily Maximum Conc	LH1 24-SP6 0-64 7 26 2017	LH1 24-SP6 0-646 2017
M,P-XYLENE	µg/L	83.6	<1 U	<1 U
METHYLENE CHLORIDE	µg/L	1,699	<0.5 U	<0.5 U
NAPHTHALENE	µg/L		NA	<0.4 U
N-BUTYLBENZENE	µg/L		NA	<0.5 U
N-PROPYLBENZENE	µg/L		NA	<0.25 U
O-XYLENE	µg/L	83.6	<0.5 U	<0.5 U
P-ISOPROPYLTOLUENE	µg/L		NA	<0.5 U
SEC-BUTYLBENZENE	µg/L		NA	<0.5 U
STYRENE	µg/L	5,987	<0.25 U	<0.25 U
TERT-BUTYLBENZENE	µg/L		NA	<0.5 U
TETRACHLOROETHENE	µg/L	180.7	<0.5 U	<0.5 U
TOLUENE	µg/L	4,189	<0.5 U	<0.5 U
TRANS-1,2-DICHLOROETHENE	µg/L		NA	<0.5 U
TRANS-1,3-DICHLOROPROPENE	µg/L		NA	<1 U
TRICHLOROETHENE	µg/L	181	0.41 J	0.675 J
TRICHLOROFLUOROMETHANE	µg/L		NA	<0.5 U
VINYL CHLORIDE	µg/L	72	<0.5 U	<0.5 U
Anions (0 6)				
CHLORIDE	mg/L		688	663
SULFATE	mg/L		30.9	76

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

mg/L - milligrams per liter

NA - not analyzed

U - Undetected: The analyte was analyzed for, but not detected.

µg/L - micrograms per liter

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

00863627

GWTP Effluent Monthly Sampling - August 2017

Location ID Sample Date	Units	Daily Maximum Conc	LH1 24-SP6 0-6461-GRAB 2 2017
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Monthly.
Metals (6010C)			
SELENIUM	mg/L	0.012	<0.01 U
Metals (6020A)			
BARIUM	mg/L	2	0.165
LEAD	mg/L	0.0046	<0.001 U
SILVER	mg/L	0.003	<0.001 U
Hexavalent Chromium (71 6A)			
HEXAVALENT CHROMIUM	mg/L	0.1244	<0.01 U
olatile Organic Compounds (260B)			
1,1,1-TRICHLOROETHANE	µg/L	7,230	<0.5 U
1,1,2-TRICHLOROETHANE	µg/L	216.9	<0.5 U
1,1-DICHLOROETHANE	µg/L	14,032	<0.25 U
1,1-DICHLOROETHENE	µg/L	253	<1 U
1,2-DICHLOROETHANE	µg/L	181	<0.5 U
ACETONE	µg/L	2,395	<5 U
BENZENE	µg/L	181	<0.25 U
CARBON TETRACHLORIDE	µg/L	181	<0.5 U
CHLOROFORM	µg/L	3,615	<0.25 U
ETHYLBENZENE	µg/L	57,025	<0.5 U
M,P-XYLENE	µg/L	83.6	<1 U
METHYLENE CHLORIDE	µg/L	1,699	<0.5 U
O-XYLENE	µg/L	83.6	<0.5 U
STYRENE	µg/L	5,987	<0.25 U
TETRACHLOROETHENE	µg/L	180.7	<0.5 U
TOLUENE	µg/L	4,189	<0.5 U
TRICHLOROETHENE	µg/L	181	0.253 J
VINYL CHLORIDE	µg/L	72	<0.5 U
Semi- olatile Organic Compounds (270D-SIM)			
1,4-DIOXANE*	µg/L	134.2	23.5

* Calculated Effluent Limit

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

mg/L - milligrams per liter

U - Undetected: The analyte was analyzed for, but not detected.

µg/L - micrograms per liter

GWTP Influent Monthly Sampling - August 2017

Location ID **Sample Date**	**Units**	**LH1 24-SP140-7461-GRAB** **2 2017**
Location Description		GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.
Metals (6010C)		
SELENIUM	mg/L	<0.01 U
Metals (6020A)		
SILVER	mg/L	<0.001 U
Perchlorate (6 0)		
PERCHLORATE	µg/L	13,800
Hexavalent Chromium (71 6A)		
HEXAVALENT CHROMIUM	mg/L	<0.01 U

mg/L - milligrams per liter

U - Undetected: The analyte was analyzed for, but not detected.

µg/L - micrograms per liter

Responses to September 25, 2017 TAG Comments on
Draft Final Community Involvement Plan,
Longhorn Army Ammunition Plant,
Harrison County, Texas
August 2017

Comment No. 1 – Section 2.3, Paragraph 2: Seems like it would be useful to the public to go ahead and say which risk level LHAAP is. "DERP guidance requires that sites in the IRP program be prioritized for cleanup based primarily on relative risk by grouping sites or areas of concern (AOCs) into high, medium, and low priority categories. Relative risk is evaluated using three factors: the contaminant hazard factor (i.e., the types of contaminants present and how hazardous they are); the migration pathway factor (whether the contaminants are moving, and in what direction); and the receptor factor (potential of humans or plants/animals to be exposed to the contaminants). For further information on how relative risk is evaluated for IRP sites, refer to the DoD Relative Risk Site Evaluation Primer (1996)."

Response: All three factors are used to estimate risk at individual environmental sites. The results (low, medium, and high) vary by. The text will be revised to add the following sentence: "All three factors are used to estimate risk at individual environmental sites at Longhorn. The results (low, medium and high) vary by site".

Comment No. 2 – Section 2.3 Paragraph 3: Seems like it would be useful to the public to say which of these 3 LHAAP has: "The MMRP addresses non-operational range lands that are suspected or known to Contain unexploded ordnance (UXO), discarded military munitions, or munitions constituents (MC)."

Response: Of the three only UXO has been found at LHAAP MMRP sites. Sections 3.11 and 3.12 were revised to replace "an IRA was completed in 2009" with "a MEC (UXO) removal action was completed in 2008".

Comment No. 3 – Section 5.0: Please add an email address and possibly a contact name – "… community members should contact the following representative. Longhorn Army Ammunition Plant Environmental Division, BRAC Field: Longhorn Army Trailer, Groundwater Treatment Plant, Compound Highway 134 and Spur 449, Karnack, Texas 75661, 479-635-0110".

Response: Revised point of contact to include a contact name and e-mail address.

Comment No. 4 – Appendix D Mayor City of Uncertain: Please update mayor of the City of Uncertain. Mayor Pro-tem is Greg Jones. Same email, phone 214-604-8387. Currently says "Mayors/City Council: City of Uncertain, Sam Canup, Mayor, 199 Cypress Drive, P.O. Box 277, Uncertain, Texas 75661, 903-789-3443, tel: (903)789-3443, info@cityofuncertain.com".

Response: The name of the Mayor of the City of Uncertain has been updated to Mayor Pro-tem Greg Jones and the phone number changed to 214-604-8387.

FINAL COMMUNITY INVOLVEMENT PLAN
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

Prepared Under:

U.S. Army Environmental Command
2450 Connell Road, Building 2264, Rm 125
Fort Sam Houston, Texas 78234
Contract No. Contract No. W912PL-16-D-0042

U.S. Army Corps of Engineers, Los Angeles District
915 Wilshire Boulevard, Suite 930
Los Angeles, California 90017

Prepared by:

DAWSON

DAWSON Technical LLC
112 E Pecan Street Suite 300
San Antonio, Texas 78205

October 2017

TABLE OF CONTENTS

TABLES

FIGURE

APPENDICES

LIST OF ACRONYMS

AMC	Army Materiel Command
AOC	Area of Concern
AR	Army Regulation
ARAR	Applicable or Relevant and Appropriate Requirement
Army	Department of the Army
AST	Aboveground Storage Tank
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIP	Community Involvement Plan
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
DD	Decision Document
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DoD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Division
FFA	Federal Facility Agreement
FRA	Final Remedial Action
FS	Feasibility Study
FY	Fiscal Year
GWTP	Groundwater Treatment Plant
HTRW	Hazardous, Toxic and Radioactive Waste
IRA	Interim Remedial Action
IRP	Installation Restoration Program
LAP	Load, Assembly, and Pack
LHAAP	Longhorn Army Ammunition Plant
LTM	Long-Term Management
LUC	Land Use Control
MC	Munitions Constituents
MEC	Munitions and Explosives of Concern
mm	Millimeter
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
MR	Munitions Response
MRSPP	Munitions Response Site Prioritization Protocol
MSC	Medium-Specific Concentration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPL	National Priorities List
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl

POC	Point of Contact
POL	Petroleum, Oil and Lubricants
PP	Proposed Plan
RAB	Restoration Advisory Board
RA-C	Remedial Action-Construction
RA-O	Remedial Action-Operation
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RIP	Remedy-in-Place
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SWMU	Solid Waste Management Unit
TAG	Technical Assistance Grant
TAPP	Technical Assistance for Public Participation
TASC	Technical Assistance Services for Communities
TCE	Trichloroethylene
TCEQ	Texas Commission on Environmental Quality
TNT	Trinitrotoluene
TRC	Technical Review Committee
USAEC	U.S. Army Environmental Command
UEP	Unlined Evaporation Pond
USC	Unites States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
UU/UE	Unlimited Use/Unrestricted Exposure
UXO	Unexploded Ordnances
VOC	Volatile Organic Compound
WWII	World War II
WWTP	Wastewater Treatment Plant

1.0 OVERVIEW OF COMMUNITY INVOLVEMENT PLANS

The Department of the Army (Army) has prepared this Community Involvement Plan (CIP) update for the Defense Environmental Restoration Program (DERP) at Longhorn Army Ammunition Plant (LHAAP). The CIP provides guidance for public involvement associated with the Installation Restoration Program (IRP) and Military Munitions Response Program (MMRP) cleanup sites at LHAAP. Active sites within the program are currently in various phases of investigatory and remedial action activities.

The Army has prepared the LHAAP CIP in accordance with current United States Environmental Protection Agency (USEPA) guidance. The community involvement requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the Resource Conservation and Recovery Act (RCRA) of 1976, as amended by the Hazardous and Solid Waste Act of 1984, are outlined herein.

1.1 Purpose

Applicable and effective communication, and the timely exchange of information are essential for maintaining community understanding and support for LHAAP and to ensure the success of community involvement. The purposes of the community involvement process are to:

- Establish effective and comprehensive methods for informing the community of installation cleanup program actions;
- Solicit input and identify concerns that the local community may have regarding current and future cleanup program activities; and
- Maintain a strategy that supports pro-active, two-way communication between the Army and the local community.

The CIP identifies activities that encourage two-way communication between the Army installation and the local community. This communication includes providing opportunities for the community to learn about and comment on the IRP and MMRP. This CIP has been developed to provide a line of communication for sharing public information. The target audiences are local citizens and neighbors; installation residents and tenants; federal, state, and local officials and agencies; and local businesses and civic interest groups.

2.0 INSTALLATION AND IRP BACKGROUND

2.1 Installation Location and Description

LHAAP is located in central east Texas, in the northeastern corner of Harrison County, approximately 14 miles northeast of Marshall, Texas and 40 miles west of Shreveport, Louisiana. The closed installation occupies approximately 1,100 acres of the original 8,416-acre installation and is bounded by Caddo Lake to the east and State Highway 43 to the west. The shores of Caddo Lake have wetland areas and streams that fall within the boundary of the installation; the remaining surrounding area is primarily rural and forested lands. While active, LHAAP was under the jurisdiction of Army Materiel Command (AMC) and its mission was the production of trinitrotoluene (TNT), pyrotechnic items, and rocket motors. The location of LHAAP is shown on **Figure 1**.

2.2 History of Installation Operations

LHAAP was established in 1942 to produce 2,4,6-TNT flake, and production continued through World War II (WWII) until 1945. Monsanto Chemical Company was the first contract operator at the installation. Between August 1945 and February 1952, the installation was on standby status. From February 1952 until 1956, pyrotechnic ammunition (photoflash bombs, simulators, hand signals, and tracers for 40millimeter [mm] ammunition) was produced under Universal Match Corporation as the contracting operator. Between 1956 and 1965, Thiokol continued the production of pyrotechnic ammunition in addition to rocket motor production. Prior to 1994, operations at the installation consisted of compounding pyrotechnic and propellant mixtures; load, assembly, and pack (LAP) activities; receipt and shipment of containerized cargo; maintenance and/or layaway of standby facilities and equipment; and static firing and elimination of Pershing I and II rocket motors.

In August 1990, LHAAP was placed on the National Priorities List (NPL). Subsequent to the RCRA Hazardous and Solid Waste Amendments of 1984, LHAAP applied for a RCRA Part B permit. In February 1992, the RCRA Part B permit was signed.

The Army declared the installation was excess to its needs in July 1997. On October 21, 2000, a Memorandum of Agreement (MOA) between the Army and the United States Fish and Wildlife Service (USFWS) designated approximately 7,200 acres as a wildlife refuge within the perimeter of the former installation. In 2002, the Base Realignment and Closure (BRAC) office was tasked with disposal of the installation property. Since May 2004, approximately 7,300 acres have been transferred to the USFWS as the Caddo Lake National Wildlife Refuge. The remaining acreage is expected to be transferred to USFWS when restoration activities are complete.

2.3 Overview of the Army Cleanup Program

The DERP was formally established by Congress in 1986 and provides for the cleanup of Department of Defense (DoD) sites under the jurisdiction of the Secretary of Defense. The key objective of the cleanup program is to reduce, or eliminate when possible, threats to human health and the environment that result from historical use or disposal practices. The two environmental restoration activities categorized under DERP that apply to LHAAP are the IRP and the MMRP.

The IRP is a comprehensive program to address required response actions for releases of hazardous substances and pollutants or contaminants; petroleum, oil and lubricants (POLs); hazardous wastes or hazardous waste constituents; explosive compounds released to soil, surface water, sediment, or groundwater as a result of ammunition or explosives production or manufacturing at ammunition plants. The IRP category also includes response activities to address unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC) posing an explosive, human health, or environmental hazard that are incidental to an existing IRP site. DERP guidance requires that sites in the IRP program be prioritized for cleanup based primarily on relative risk by grouping sites or areas of concern (AOCs) into high, medium, and low priority categories. Relative risk is evaluated using three factors: the contaminant hazard factor (i.e., the types of contaminants present and how hazardous they are); the migration pathway factor (whether the contaminants are moving, and in what direction); and the receptor factor (potential of humans or plants/animals to be exposed to the contaminants). All three factors are used to estimate risk at individual environmental sites. The results (low, medium and high) vary by site. This has not been an issue at LHAAP. For further information on how relative risk is evaluated for IRP sites, refer to the DoD *Relative Risk Site Evaluation Primer* (1996).

The MMRP addresses non-operational range lands that are suspected or known to contain UXO, DMM, or MC. In the MMRP, relative cleanup priorities are assigned using the DoD Munitions Response Site Prioritization Protocol (MRSPP) (32 Code of Federal Regulations [CFR] Part 179). Data is gathered during a comprehensive site investigation or characterization to identify munitions contaminant types, sources, transport processes, receptors, and exposure pathways. The data is evaluated to determine if a munitions response (MR) area requires further investigation and to assign a priority for subsequent action. Only UXO have been found at LHAAP MMRP sites.

Each Army installation must implement a cleanup strategy that protects human health and the environment and reduces relative risk.

2.3.1 Phases of Cleanup Process

The investigation and restoration of sites contaminated by past practices is conducted in steps, or phases, with provisions for emergency removal actions or other rapid responses if an imminent danger to public health is identified. The main steps, or phases, in the cleanup process are briefly described below. The names used here are specific to the CERCLA process. The equivalent phase names used in the RCRA program are provided in **Appendix A**.

- **Preliminary Assessment (PA)** – This is the initial review and analysis of available information to determine whether a release is likely to have occurred. The PA describes the potential source and nature (type) of releases, includes a preliminary evaluation of threats to the health and welfare of the public and the environment, and recommends subsequent phases in the cleanup process. The relative risk is evaluated during this phase. The decision to close out a site may be made at the end of the PA phase if there is enough data to support that decision.

- **Site Inspection (SI) –** This phase is conducted for AOCs that are identified during the PA, or for munitions response areas. The SI determines the relative cleanup priority, characterizes the presence or absence of contamination, and determines the next appropriate phase. Screening level human health and/or ecological risk assessments may be performed for MMRP sites during this phase. A decision to close out a site may be made at the end of the SI phase if there is enough data to support that decision.

- **Remedial Investigation (RI)/ Feasibility Study (FS) –** The nature (types) and extent (vertical and horizontal boundaries) of the contamination, and severity of any threat to human health and environment are determined in the RI. Human health and/or ecological risk assessments are conducted during the RI phase.

  Potential remedial (cleanup) alternatives are developed and evaluated during the FS phase to address any threats to human health and the environment. The remedial alternatives are evaluated based on an established set of USEPA criteria. The criteria evaluation allows the Army to identify the remedial alternative that best meets the applicable or relevant and appropriate requirements (ARARs) and mitigates threats to human health and the environment.

- The proposed plan (PP) is a synopsis of the RI/FS that summarizes for the public what the remedial alternatives are, how they were evaluated, how they compared to one another, and which alternative the Army identified as the preferred remedy. After coordination with relevant regulators, the PP is distributed to the public for review and comment before a final remedy is selected. A summary fact sheet also is made available to the public at this point in the process. After the public review and comment on the PP, the selected remedy is revised as needed and documented in a Record of Decision (ROD) or a Decision Document (DD). A ROD or DD is a legal document that specifies the selected remedy, its objectives, and its endpoint. While the Army is always a signatory to a ROD for one of its installations, federal or state regulatory signatures also may be required based on a site's NPL and/or RCRA status. Further information on this process is available in *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (USEPA, July 1999).

- **Remedial Design (RD) –** This phase begins after the final remedy has been selected and documented in a ROD. The RD phase includes establishing information and performance objectives, obtaining design information from the military installation, and discussing the design concept with technical experts.

- **Remedial Action-Construction (RA-C) –** The RA-C phase is the construction of and/or implemented cleanup remedy noted in the ROD and designed in the RD phase. When the RA-C phase is complete, the Army classifies the site as Remedy-in-Place (RIP).

- **Remedial Action-Operation (RA-O) –** The RA-O phase takes place while the remedy is operating or in progress, and the performance of the remedy is monitored to measure progress toward the remediation goals.

- **Long-Term Management (LTM)** – Post-project activities such as long-term monitoring or LTM also may be required to document the continued effectiveness of the selected remedy. At the point in the restoration process when restoration goals have been met and No Further Action (NFA) is warranted, "closeout" occurs. For any site that is not restored to a condition that allows unlimited use/unrestricted exposure (UU/UE), the protectiveness of the remedy is reviewed during the Five-Year Review process.

2.3.2 Regulatory/Policy

The DERP is the statutory authority that establishes an environmental restoration program for DoD. The scope of the DERP is defined in 10 United States Code (USC) § 2701(b), which states: *"Goals of the program shall include the following: (1) identification, investigation, research and development, and cleanup of contamination from a hazardous substance, or pollutant or contaminant; (2) correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment; (3) demolition and removal of unsafe buildings and* *structures, including buildings and structures of the DoD at sites formerly used by or under the jurisdiction of the Secretary."*

When Congress established the DERP, they directed that DoD cleanup efforts be consistent with the CERCLA. CERCLA requires that cleanup efforts at federal facilities be conducted in accordance with the requirements in Section 120, 42 USC § 9620 of CERCLA. Executive Order 12580 delegates authority for implementing CERCLA to various federal officials, including the DoD. In order to have a common framework for managing a national cleanup program, the Army uses CERCLA as the primary legislative authority for managing environmental cleanup. However, the RCRA is also an acceptable legislative authority for managing environmental cleanup. RCRA is implemented by the USEPA, but it allows for the authorization of the state governments to enforce hazardous waste regulatory programs.

According to CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the Army is the lead agency responsible for all remedial actions at the installation that are not solely related to underground storage tanks (USTs), with oversight by the USEPA and Texas Commission on Environmental Quality (TCEQ) (formerly the Texas Water Commission). However, RCRA regulates how the remedial actions pertaining to solid and hazardous wastes and USTs, should be managed to avoid potential threats to human health and the environment. The role of the state is outlined in CERCLA §120(f) and 40 CFR §300.500, which affords the State an opportunity to participate in the planning and selection of the remedial action, including review of all applicable data in development of studies, reports, and action plans. Within this process, when a state promulgated environmental or facility siting law becomes an ARAR, the remedial action must meet that requirement, unless a waiver is invoked. This CIP is based on guidance for CERCLA cleanup activities, §§ 9601 to 9675, as implemented by the NCP 40 CFR Part 300.

Due to concerns identified during environmental investigations in the early 1980s, LHAAP was placed on the NPL on August 9, 1990, with a Hazard Ranking Score of 40. The NPL is a list of national priorities among the known and threatened releases of hazardous substances throughout the United States. Sites that score higher than a 28.5 on the Hazard Ranking System (a screening device to evaluate a site's relative threat to human health and the environment) are eligible for inclusion on the NPL. Installations on the NPL are tracked under the USEPA's Superfund Program and may require additional investigation by the USEPA. A site can be deleted from the NPL if it is determined that no further cleanup response is required. LHAAP, USEPA, and TCEQ entered into a Federal Facility Agreement (FFA) for remedial activities at LHAAP which became effective on December 30, 1991. The general purpose of an FFA is to ensure that environmental impacts are thoroughly investigated and necessary remedial action is taken to protect public health, welfare, and environment; establish a framework and schedule for response actions; and facilitate involvement of all parties in those actions. The following sites are part of the FFA: LHAAP-001, -011, -012, -013, -014, -016, -017, -018, -024, -027, -029, and -032. Other sites were later added to the NPL; however, the FFA was not revised to include these sites: LHAAP-003, -004, -037, -046, -047, -049, -050, -058, -067, -001-R-01, -003-R-01, and -004-R-01.

The Army is the lead Agency at LHAAP and documentation pertaining to NPL sites listed in the FFA are submitted to USEPA and TCEQ for review and concurrence. Non-NPL sites are addressed under CERCLA with TCEQ as the lead regulator. LHAAP is obligated to conduct remedial actions in accordance with CERCLA, RCRA, and the policy and procedures documented in the DERP Manual (March 2012).

2.4 Cleanup Program at LHAAP

The IRP was initiated at LHAAP in June 1979, following environmental investigations in the 1970s. The MMRP was initiated in February 2002. Initially, a large number of potential cleanup sites were identified at LHAAP; however, since the 1980s, multiple investigations and sampling events have been conducted by the Army and currently there are 41 designated restoration sites at the installation. Restoration sites at LHAAP include areas impacted by ammunition production, burning, and storage activities; storage and disposal of wastes and hazardous materials; leaks and spills from aboveground storage tanks (ASTs) and USTs; and historic installation activities and operations. Multiple DDs and RODs have been signed for various sites since 2008. Contaminants of concern (COCs) include volatile organic compounds (VOCs); perchlorate; heavy metals; explosives; and POLs. Individual site cleanup/exit strategies are discussed in **Section 3.0**.

In accordance with DoD guidance (DoD Manual 4715.20, March 2012) and U.S. Army environmental regulation (AR 200-1, 2007), this installation-specific CIP is an integral requirement of DERP and is implemented by Army personnel. The plan serves as a guide and toolbox for IRP- and MMRP-related personnel and contractors, as well as for installation officials and personnel, in their efforts to inform and involve the local community. This plan is available to the public as part of the Administrative Record and Information Repository. Information Repository and Administrative Record locations and contact information are provided in **Appendix B**.

3.0 ACTIVE CLEANUP SITES AT LHAAP

The schedule for active LHAAP IRP sites, defined as LHAAP-001, -002, -003, -004, -006, -007, -008, -011, -012, -016, -017, -018, -019, -024, -029, -035, -036, -037, -046, -047, -049, -050, -051, -052, -055, -056, -058, -059, -060, -063, -064, -065, -066, -067, -068, -069, -070, and -071 are summarized in **Table 1**. The schedule for active MMRP sites, defined as LHAAP-001-R-01, LHAAP-003-R-01, and LHAAP-004-R-01, are summarized on **Table 2**. Site descriptions and cleanup/exit strategies are discussed in the following sections.

3.1 Closed Sites Under LTM with Land Use Restrictions

Investigations have been completed for the following sites. These sites are in the LTM phase with land usage restrictions. The LTM phase includes Five-Year Review reports in the form of a memorandum report or letter certifying proper land use. LTM is expected to continue indefinitely. A brief context for each site is included below.

- **LHAAP-001 (Inert Burning Grounds [SWMU 1])**

  Site LHAAP-001 (Solid Waste Management Unit [SWMU] 1 is closed and suitable for non-residential use. A no action ROD was signed by the Army and co-signed by USEPA with concurrence from TCEQ in February 1998.

- **LHAAP-011 (SUS TNT Burial Site at Ave P&Q [SWMU 11])**

  Site LHAAP-011 is closed and suitable for industrial use. An NFA ROD was signed by the Army and co-signed by USEPA with concurrence from TCEQ in February 1998.

- **LHAAP-052 (Magazine Area Washout)**

Site LHAAP-052 consists of a standpipe near the intersection of Avenue E and 19th that was used to wash out trucks used for transport of TNT. An NFA DD was finalized in September 2015.

- **LHAAP-063 (Burial Pits)**

LHAAP-063 was used in the late-1950s for the detonation of Plant 3 reject material of unknown composition. An NFA DD was finalized in September 2015.

- **LHAAP-070 (Loading Dock-Magazine Area)**

A spill of boxes of TNT was reported at LHAAP-070; however, site investigations have not identified visual evidence of TNT contamination, and NFA was required. An NFA DD was finalized in September 2015.

- **LHAAP-071 (Oil Spill, Building 813)**

In 1978, an oil tank spill occurred at LHAAP-071. The spill was contained before it could reach Central Creek. An NFA DD was finalized in September 2015.

3.2 Sites with Notifications for Land Use Filed with Harrison County

Investigations have been completed for the following sites and notifications (not a remedy or land use control [LUC]) have been filed with Harrison County, TX stating the sites are suitable for non-residential use in accordance with Texas Administrative Code Title 30 §335.566. The sites are in the LTM phase which includes Five-Year Review reports in the form of a letter stating the use of the site remains non-residential. LTM is expected to continue indefinitely at these sites. A brief context for the sites is included below.

- **LHAAP-002 (Vacuum Truck Overnite Parking Lot)**

Site LHAAP-002 is located within the LHAAP-058 LUC boundary.

- **LHAAP-006 (Building 54F Solvent)**

An NFA DD was signed for LHAAP-006 in December 2008.

- **LHAAP-007 (Building 50G Drum Processing)**

Site LHAAP-007 was originally closed under RCRA in 1987. An NFA DD under CERCLA was signed in December 2008.

- **LHAAP-008 (Sewage Treatment Plant)**

Site LHAAP-008 was originally closed under RCRA in 1987. An NFA DD under CERCLA was signed in December 2008.

- **LHAAP-019 (Construction Materials Landfill)**

An NFA DD under CERCLA was signed in early 2014.

- **LHAAP-035 (Sumps [145] Various)**

Sumps were located in different production areas throughout LHAAP and remediation activities were consolidated under LHAAP-035. Many of the sumps were removed or closed in 1996. Several buildings where the sumps were located had historical perchlorate use. The following sites with previous sumps are associated with LHAAP-35: LHAAP-002, -003, -004, -006, -007, -008, -036, -037, -058, -060, -065, and -068. The RA-C phase consisted of soil removal around the sumps. An NFA DD was signed in 2010.

- **LHAAP-036 (Explosive Waste Pads [27])**

Site LHAAP-036 consisted of 20 waste pads made of four feet by eight feet concrete pads with metal roofs. An NFA DD was signed in November 2010.

- **LHAAP-049 (Former Acid Storage Area)**

Site LHAAP-049 was used from 1942 to 1945, for the storage and formulation of acids and acid mixtures to support TNT production during WWII. LHAAP-049 was originally grouped under LHAAP-029 due to the associated plant functions (the acid plant was where acids were received and prepared for use in the TNT manufacturing). In 2009, the final site evaluation was completed and the NFA ROD was finalized in 2010.

- **LHAAP-051 (Photographic Laboratory/Bldg #60B)**

Site LHAAP-051, or Building 60B, was used to process x-ray film and was closed under RCRA. An NFA DD was signed in December 2008.

- **LHAAP-055 (Septic Tank [10])**

Site LHAAP-055 was closed under RCRA guidelines. An NFA DD under CERCLA was signed in December 2008.

- **LHAAP-056 (Vehicle Wash Rack and Oil/Water Separator)**

Site LHAAP-056 consisted of a wash rack that sloped to a drain that was connected to an oil/water separator. Discharge to an on-site drainage ditch was permitted. The sump on the site was investigated under LHAAP-035. An NFA DD was signed in early 2014. The site is in LTM. The site is located within the LHAAP-058 LUC boundary.

- **LHAAP-059 (Building 725)**

Building 725 was constructed as a pesticide storage building in 1984 to support maintenance activities at the installation. Site inspections determined that there had been no significant releases of contamination at the site. An NFA DD was finalized in August 2008. The site is located within the LHAAP-058 LUC boundary.

- **LHAAP-060 (Former Storage Building #411 and #714)**

Site LHAAP-060 consists of two buildings that were formerly used to store pesticides and herbicides. An NFA DD was signed in December 2008. This site is located within the LHAAP-058 LUC boundary.

- **LHAAP-064 (Transformer Storage)**

Site LHAAP-064 was used for the storage of non-polychlorinated biphenyl (PCB) transformers. An NFA DD was signed in December 2008.

- **LHAAP-065 (Building 209)**

Building 209 was used for chemical storage of items such as paints and solvents. The building has a concrete floor with floor drains connected to sumps. A DD was finalized for the site in early 2014. The site is in LTM. The site is located within the LHAAP-058 LUC boundary.

- **LHAAP-066 (Transformer at Building 401)**

The transformer located at Building 401 dripped oil for approximately one year; however, the transformer did not contain PCBs, so NFA was required. An NFA DD was signed in December 2008. The site is located within the LHAAP-058 LUC boundary.

- **LHAAP-068 (Mobile Storage Tank Parking Area)**

In 1993, LHAAP-068 was corrected under RCRA guidelines. An NFA DD was signed in December 2008. The site is located within the LHAAP-058 LUC boundary.

- **LHAAP-069 (Service Station UST's)**

  In 1993, LHAAP-069 was corrected under RCRA guidelines. An NFA DD was finalized in early 2014. The site is in LTM. The site is located within the LHAAP-058 LUC boundary.

3.3 Sites in the RA-O Phase

Investigations have been completed for the following sites and the sites are in the RA-O phase with Five-Year Reviews. RA-O is expected to continue indefinitely. A brief context for the sites is included below.

- **LHAAP-012 (Active Landfill [SWMU 12])**

  Site LHAAP-012, or Landfill 12, was previously referred to as the Active Landfill. The site encompasses seven acres which were used for disposal of non-hazardous industrial waste. The landfill was used intermittently from 1963 through 1978, and continuously until March 1994. The rear portion of the landfill was closed before 1994. COCs at LHAAP-012 are VOCs in groundwater. Site inspections conducted in 1993 identified the need for an early interim remedial action (IRA) in the form of a landfill cap to reduce further contamination of the site's groundwater. Installation of the cap was completed in 1997 by using treated soils from LHAAP-18 as subgrade fill. In 1998, cap maintenance was initiated. In 2002, the RI was completed, which identified the presence of COCs and contaminants of potential concern (COPCs). In 2005, the FS was finalized and the recommended final remedy included monitored natural attenuation (MNA) with LUCs (cap protective provisions and groundwater restrictions). In August 2006, sampling for MNA was initiated. The PP addressing human and ecological risk was completed. In July 2006, the ROD was signed, followed by the RD in June 2007. An installation-wide ecological risk assessment did not identify COCs in the surrounding sediment or surface water. RA-O involves continued groundwater monitoring and LUC maintenance.

- **LHAAP-037 (Chemical Laboratory Waste Pad)**

  Site LHAAP-037, or the Chemical Laboratory Waste Pad, is the collection point for spent solvents from the quality assurance lab and consists of one 55-gallon drum on a concrete pad. COCs at LHAAP-037 are VOCs in groundwater. The ROD was finalized in August 2010, and included MNA and LUCs. The RD was finalized in August 2011. The Remedial Action Work Plan (RAWP) was finalized in 2013, and RIP was achieved in September 2013. The RA-O phase was placed on hold in 2012, while a two-year aerobic bioplug demonstration was implemented at the site. The study was completed in 2014, and the aquifer was monitored for return to pre-study conditions before proceeding to the RA-O. RA-O involves continued groundwater monitoring and LUC maintenance.

- **LHAAP-046 (Plant 2 Area)**

Facilities at LHAAP-046 were used for production of JB-2 propellant fuel between 1944 to 1945. Between 1952 to 1956, the site was used to produce pyrotechnic ammunition: photoflash bombs, simulators, and tracers for 40mm ammunition. Between 1964 to 1997, pyrotechnic and illuminating devices were produced. The COCs at LHAAP-046 are VOCs in groundwater. The ROD was finalized in September 2010, and included MNA for groundwater and LUCs. The RD was finalized in 2011. The RAWP was finalized in 2013, and RIP was achieved in April 2013. The site is in the RA-O phase which will continue indefinitely and include MNA and LUCs.

- **LHAAP-050 (Former Waste Disposal Facility)**

LHAAP-050 is an approximately one-acre site that received wastewater from the sumps at Plant 2 and 3 from 1955 to the early-1970s. Washout of ammonium perchlorate was also performed at the site. COCs at LHAAP-050 are metals, perchlorate, and VOCs in soil and groundwater. In 2002, the RI was completed. The FS and ROD were finalized in 2010. The ROD includes soil removal, MNA for groundwater, and LUCs (groundwater restriction). In 2004, additional data gap sampling was completed. In February 2008, an additional shallow well was installed downgradient of the site. The RD was finalized in 2011. The RAWP was finalized in 2013, and RIP was achieved in September 2013. The site is in the RA-O phase which will continue indefinitely and include MNA and LUCs.

- **LHAAP-058 (Maintenance Complex)**

Site LHAAP-058 is also known as the shops area and provided plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical services. The COCs at LHAAP-058 are VOCs in groundwater. The ROD was finalized in 2010 and includes in-situ bioremediation for the eastern groundwater contamination plume, and MNA and LUCs (groundwater use restriction) for the eastern and western groundwater plumes. The site is in the RA-O phase. Five-Year Reviews for LHAAP-002, -003, -056, -059, -060, -065, -068, and -069 are captured under LHAAP-058, as these sites are located within the shops area. The RD was finalized in 2011. In 2013, the RAWP was finalized and RIP was achieved. The cleanup/exit strategy for LHAAP-058 includes in-situ bioremediation and MNA for groundwater. It is expected that the RA-O phase will continue indefinitely and will include MNA and LUCs.

- **LHAAP-067 (Above Ground Storage Tank)**

Site LHAAP-067 consisted of seven ASTs containing No. 2 fuel oil, kerosene, or solvents. The ASTs had earthen dikes sufficient to contain a potential spill. Motor fuel tanks registered with the state have been removed from the site. Central Creek runs to the south of the site. COCs at LHAAP-067 are VOCs in groundwater. VOCs were detected in groundwater at the site in 2001. In 2002, the RI was completed. In 2004, additional sampling was conducted and the final FS was completed in August 2005. The ROD was finalized in August 2010 and includes MNA and LUCs (groundwater use restriction). The site is in the RA-O phase. The RD was finalized in 2011. The RAWP was finalized in 2013 and RIP was achieved in April 2013. It is expected that RA-O will continue indefinitely and will include MNA and LUCs.

3.4 LHAAP-003 (Building 722-Paint Shop)

Site LHAAP-003 was an open-sided waste collection shed with a gravel pad floor outside of the Paint Shop (Building 711-P). The building was used for paint spraying and polyurethane spray coating of various items. Heavy metal-based primers, and other waste solvents and contaminated rags were collected in a 55-gallon drum in the shed. COCs at LHAAP-003 are metals in soil.

In August 2009, the Site Investigation Report identified soil contaminated with levels of metals exceeding medium-specific concentrations (MSC). An RI/FS was finalized to evaluate removal action alternatives for the contaminated soil. The site is located within the LHAAP-058 LUC boundary.

The cleanup/exit strategy for LHAAP-003 involves completion of the ROD and RD, at which point RIP will be accomplished. The remedy being considered includes excavation and off-site disposal. It is expected that LTM will include Five-Year Reviews documented under LHAAP-58.

3.5 LHAAP-004 (LHAAP Pilot Wastewater Treatment Plant)

The LHAAP Pilot Wastewater Plant was closed under RCRA guidelines in November 1997. A 2007 Installation-Wide Baseline Ecological Risk Assessment did not identify any potential risk to ecological receptors. Additional investigations completed after the risk assessment identified the presence of unacceptable levels of mercury and perchlorate in soil with the potential to migrate into groundwater. In a 2009 Engineering Evaluation/Cost Analysis (EE/CA), soil removal was recommended. Soil removal was completed and documented in the Non-Time Critical Removal Action Report. During soil removal, a small plume of groundwater contaminated with perchlorate was identified. The COC at the site is perchlorate in the groundwater.

In August 2012, a groundwater FS evaluating remedial alternatives was completed. RD is planned for 2017. RA-C is planned for 2018.

The cleanup/exit strategy for LHAAP-004 involves completion of the RD, accomplishment of RIP, and implementation of RA-O. The remedy includes in-situ bioremediation, long-term monitoring and LUCs. It is expected that RA-O will continue indefinitely, and will include long-term monitoring and LUCs.

3.6 LHAAP-016 (Old Landfill [SWMU 16])

The 22-acre site was used for disposal of products generated from the TNT wastewater treatment plant (WWTP) and potentially included burned rocket motor casings; substandard TNT; barrels of chemicals, oil, and paint; scrap iron; and wood. COCs at LHAAP-016 are perchlorate and VOCs in groundwater, soil, and surface water.

Samples collected at the site identified VOCs and metals exceeding action levels in soil, surface water, and groundwater; and low levels of explosive compounds in groundwater. Site inspections conducted in 1993 identified the need for an early IRA in the form of a landfill cap to reduce further contamination of groundwater at the site. Installation of the cap was completed in 1998, by using treated soils from LHAAP-18/24 as subgrade fill. In late-1997, as part of the treatability study, eight extraction wells were installed to prevent contaminated groundwater from impacting Harrison Bayou. The system is still in operation, but extracted water volume is low. The extracted water is piped to the LHAAP-18 groundwater treatment plant (GWTP). In 2002, the RI and a Five-Year Review were completed. The FS and PP were finalized in 2010. Quarterly samples collected from the surface water of Harrison Bayou have not detected significant contamination. The ROD was signed in 2016.

The cleanup/exit strategy for LHAAP-016 involves accomplishment of RIP and implementation of RA-O. The remedy includes maintenance of the existing cap, enhanced LUCs, in-situ bioremediation in a target area, biobarriers, and MNA. It is expected that RA-O will continue indefinitely and will include MNA, maintenance of the cap, and LUCs.

3.7 LHAAP-017 (No 2 Flashing Area Burning Ground [SWMU 17])

In 1959, demolished buildings from LHAAP-029 (former TNT production area) were burned at LHAAP-017. Between 1959 to 1980, the approximately 500 feet by 500 feet site was used to burn bulk TNT, photoflash powder, and rejected material from Universal Match Corporation's production processes. The site is located 400 to 500 feet southwest of Burning Ground No 3 (LHAAP-018). COCs at LHAAP-017 are explosives, perchlorate, and VOCs in groundwater and soil.

In 1984, waste residues were removed and the area was vegetated with grass. Samples collected at the site identified VOCs and explosive compounds in groundwater, and explosive compounds in soil. In 2002, the RI was completed and perchlorate was detected in the soil. The FS and PP were finalized in 2010. The ROD was signed in 2016.

The cleanup/exit strategy for LHAAP-017 involves the completion of pre-design investigation, RD and RA, at which point RIP will be accomplished. The remedy includes groundwater extraction followed by MNA for groundwater, and excavation and disposal for soil. It is expected that RA-O will continue indefinitely and will include MNA and LUCs.

3.8 LHAAP-018 (Burning Ground/Washout Pond [SWMU 18]) and LHAAP-024 (Former Unlined Evaporation Pond [SWMU 24])

Site LHAAP-018 is also known as Burning Ground No 3. Operations at the 34.5-acre site were initiated in 1955 and included treatment, storage, and disposal of solid and liquid explosives, pyrotechnics, and combustible solvent wastes by open burning, open detonation, and burial. In 1963, the three-acre unlined evaporation pond (UEP) (LHAAP-24) was constructed within the site. COCs at LHAAP-018 are metals, perchlorate, and VOCs in groundwater, soil, and surface water.

Samples collected at the site identified explosive compounds, VOCs, and metals in soil and groundwater. In 1986, sludge from the UEP was removed and the area was capped. Quarterly monitoring has been conducted since closure of the UEP. In May 1995, an IRA ROD was signed which addressed soil and groundwater contamination. In 1997, 30,000 cubic yards of soil were excavated and treated, and used for fill in LHAAP-012 and -016. A GWTP with approximately 5,000 feet of interception collection trenches was installed to control migration of contaminated groundwater. After treatment, the extracted groundwater is discharged into Harrison Bayou. Perchlorate was detected at the site in 1998 and 1999, and a fluidized bed reactor treatment system was installed in 1999. In 2002, the RI and a draft FS were completed. In September 2007, an optimization pilot study was initiated for the groundwater extraction system. The report was completed in February 2009. In 2013, a Post-Screening Investigation Work Plan was finalized to address site data gaps and support completion of the RI/FS. The post-screening investigation work continued until 2016, and a revised FS was completed in 2017.

The cleanup/exit strategy for LHAAP-018 involves completion of the PP, ROD, RD and RA-C, at which point RIP will be accomplished. The remedy being considered includes optimization of the groundwater extraction system, in-situ treatment, and MNA. It is expected that RA-O will continue indefinitely and will include groundwater extraction, MNA, and Five-Year Reviews.

3.9 LHAAP-029 (Former TNT Production Area [SWMU 29])

Site LHAAP-029, also known as the Former TNT Production Area, consists of approximately 85 acres. The site was in operation from April 1943 to August 1945, as a six-line plant with a supporting acid plant. The plant produced 180 million kilograms of TNT during its operation. A bulk toluene storage area was located adjacent to the production area. The TNT wastewater (red water) was sent through wooden pipelines to a storage tank and pump house, and then to the TNT WWTP (LHAAP-032). Cooling water (blue water) ran through main lines into an open ditch. In 1959, the structures (except for the foundations) were demolished and removed. During the late 1980s, approximately two acres of the northeastern portion of the site were used for the washout of Pershing 1 and 2 rocket motor casings using trichloroethylene (TCE) and methylene chloride. COCs at LHAAP-029 are MC, perchlorate, and VOCs in groundwater, sediment, soil, and surface water.

Samples collected at the site have identified explosive compounds in soil, surface water, sediment, and groundwater. High levels of VOCs have been identified in groundwater. Dense non-aqueous phase liquids are also suspected of being present. In 2000, perchlorate was detected in the soil. In 2002, the RI and a draft FS were completed. Additional soil and groundwater data were collected from fiscal year (FY)2005 to FY2006. A revised FS was finalized in 2010. Fieldwork to support an addendum to the RI/FS was completed in 2013, the RI Addendum was completed in 2016, and the FS Addendum is underway.

The cleanup/exit strategy for LHAAP-029 involves completion of the ROD, RD and RA-C, at which point RIP will be accomplished. The remedy being considered includes in-site groundwater remediation followed by MNA, flushing and plugging lines, and excavation and disposal of soil and sediments. It is expected that RA-O will continue indefinitely and will include MNA and LUCs.

3.10 LHAAP-047 (Plant 3 Area)

Site LHAAP-047 was used to produce rocket motors from 1954 to the early-1980s. Some of the rocket motor facilities were converted to produce pyrotechnic and illumination devices until 1997. COCs at LHAAP-047 are metals, perchlorate, and VOCs in the soil and groundwater.

Site investigations determined the COCs for the site, and determined a soil source for perchlorate contamination. The FS was finalized in July 2011.

The cleanup/exit strategy for LHAAP-047 involves a post-screening investigation to inform the ROD, ROD, RD and RA, at which point RIP will be accomplished. The remedy being considered includes bioaugmentation, biobarriers, and MNA. It is expected that RA-O will continue indefinitely and will include MNA and Five-Year Reviews.

Table 1. LHAAP Active IRP Sites and Schedule

Site ID	Site Name	Phase	FY17	FY18	FY19	FY20	FY21	FY22+
LHAAP-001	INERT BURNING GROUNDS (SWMU 1)	LTM						
LHAAP-002	VACUUM TRUCK OVERNITE PARKING LOT	LTM						
LHAAP-003	BUILDING 722-PAINT SHOP	RI/FS						
		RD						
		RA-C						
LHAAP-004	LHAAP PILOT WASTEWATER TREATMENT PLANT	RD						
		RA-C						
		RA-O						
LAHHP-006	BUILDING 54F SOLVENT	LTM						
LHAAP-007	BUILDING 50G DRUM PROCESSING	LTM						
LHAAP-008	SEWAGE TREATMENT PLANT	LTM						
LHAAP-011	SUS TNT BURIAL SITE AT AVE P&Q (SWMU11)	LTM						
LHAAP-012	ACTIVE LANDFILL (SWMU 12)	RA-O						
LHAAP-016	OLD LANDFILL (SWMU 16)	RD						
		RA-C						
		RA-O						
LHAAP-017	NO 2 FLASHING AREA BRN GROUND (SWMU 17)	RI/FS						
		RD						
		RA-C						
		RA-O						
LHAAP-018	BURNING GROUND/WASHOUT POND (SWMU 18)	RD						
		RA-C						
		RA-O						
LHAAP-019	CONSTRUCTION MATERIALS LANDFILL	LTM						
LHAAP-024	FORMER UNLINED EVAP POND (SWMU 24)	RD						
		RA-C						
		RA-O						
LHAAP-029	FORMER TNT PRODUCTION AREA (SWMU 29)	RI/FS						
		RD						
		RA-C						
		RA-O						

LHAAP-035	SUMPS (145) VARIOUS	LTM						
LHAAP-036	EXPLOSIVE WASTE PADS (27)	LTM						
LHAAP-037	CHEMICAL LABORATORY WASTE PAD	RA-O						
LHAAP-046	PLANT 2 AREA	RA-O						
LHAAP-047	PLANT 3 AREA	RI/FS						
		RD						
		RA-C						
		RA-O						
LHAAP-049	FORMER ACID STORAGE AREA	LTM						
LHAAP-050	FORMER WASTE DISPOSAL FACILITY	RA-O						
LHAAP-051	PHOTOGRAPHIC LABORATORY/BLD #60B	LTM						
LHAAP-052	MAGAZINE AREA WASHOUT	LTM						
LHAAP-055	SEPTIC TANK (10)	LTM						
LHAAP-056	VEHICLE WASH RACK AND OIL/WATER SEP	LTM						
LHAAP-058	MAINTENANCE COMPLEX	RA-O						
LHAAP-059	BUILDING 725	LTM						
LHAAP-060	FORMER STORAGE BUILDING #411 & #714	LTM						
LHAAP-063	BURIAL PITS	LTM						
LHAAP-064	TRANSFORMER STORAGE	LTM						
LHAAP-065	BUILDING 209	LTM						
LHAAP-066	TRANSFORMER AT BLDG 401	LTM						
LHAAP-067	ABOVE GROUND STORAGE TANK	RA-O						
LHAAP-068	MOBILE STORAGE TANK PARKING AREA	LTM						
LHAAP-069	SERVICE STATION UST'S	LTM						
LHAAP-070	LOADING DOCK-MAGAZINE AREA	LTM						
LHAAP-071	OIL SPILL, BLDG 813	LTM						

- phase underway

3.11 LHAAP-001-R-01 (South Test Area/ Bomb Test Area)

LHAAP-001-R-01 is an approximately 79-acre site that is also known as the environmental site LHAAP-027. The site is located southeast of Avenue P and the magazine area, at the end of 70th street, near the southern boundary of LHAAP. The site was constructed in 1954 and used by Universal Match Corporation to test 150-pound M120/M120A photoflash bombs filled with photoflash powder and black powder booster charge. Operations continued at the site until 1956. The bombs were tested by exploding them in the air over an elevated, semi-earthen test pad. Bombs waiting to be tested were stored in three earthen-covered bunkers. Due to its location, fragments from testing landed beyond the installation boundary. During the late-1950s, illuminating signal devices were demilitarized in pits at the site. During the early-1960s, leaking production items were demilitarized at the site. COPCs at LHAAP-001-R-01 are explosives in groundwater and soil.

The site was investigated in 1982, which included soil and groundwater sample collection. Results from the samples identified explosives, metals, chloride, and sulfate above background levels in the soil. The May 1997 final RI Report for Group I Sites determined that approximately 52,000 one-half pound and one-pound photoflash cartridges were demilitarized at the site. In January 1998, an NFA ROD was signed by USEPA based on the site-specific risk analysis for human and ecological exposure to the COPCs for the site.

In 2004, an Explosive Ordnance Division (EOD) unit at Fort Polk blew in place one 155mm white phosphorous round. In a 2005 Environmental Baseline Survey, it was identified that white phosphorous operations at LHAAP were assembly and packout operations only, and that no loading of materials was conducted at the site. The identification of the round as being live is therefore suspect. A reported demolition site was identified on the northwest perimeter of the site and was added to the investigation. In FY2008, an EE/CA was approved and signed. A final Explosive Safety Submission was completed in March 2008, and a munitions and explosives of concern (MEC) (UXO) removal action was completed in 2008. The ROD was signed in December 2016 and included limited groundwater monitoring for perchlorate and LUCs (restrictions against digging and residential use, and signage maintenance).

The cleanup/exit strategy for LHAAP-001-R-01 involves completion of the RD, RA-C and one more year of groundwater monitoring, at which point RIP will be accomplished. It is expected that LTM will continue indefinitely and will include LUC maintenance and Five-Year Reviews.

3.12 LHAAP-003-R-01 (Ground Signal Test Area)

LHAAP-003-R-01 is an approximately 80-acre site that is also known as the environmental site LHAAP-54. The site is located in the southeastern portion of LHAAP. From 1963, the site was intermittently used for aerial and on-ground testing; and destruction of a variety of devices such as: red phosphorous smoke wedges, infrared flares, illuminating 60mm and 81mm shells, illuminating 40mm to 155mm cartridges, button bombs, and various types of explosive simulators.

The site was also used intermittently during a 20-year period for testing and burnout of rocket motors. Around 1970, one of the rocket motors exploded in an excavated pit near the center of the site and debris was reportedly placed in the resulting crater and backfilled. From late-1988 to 1991, the site was used for the burnout of rocket motors in missiles destroyed in accordance with the Intermediate-Range Nuclear Force Treaty between the United States and the former Soviet Union. The site is currently undeveloped. COPCs at LHAAP-003-R-01 are explosives in soil and groundwater.

In January 1998, an NFA ROD for hazardous, toxic and radioactive waste (HTRW) under CERCLA was signed. In FY2008, an EE/CA was approved and signed. The final Explosive Safety Submission was completed in March 2008, and a MEC (UXO) removal action was completed in 2008. The ROD was signed in December 2016 and included limited groundwater monitoring for perchlorate and LUCs (restrictions against digging and residential use, and signage maintenance). No exceedances of groundwater standards have been detected and no further groundwater monitoring is required.

The cleanup/exit strategy for LHAAP-003-R-01 involves completion of RD and RA-C, at which point RIP will be accomplished. It is expected that LTM will continue indefinitely and will include LUC maintenance and Five-Year Reviews.

3.13 LHAAP-004-R-01 (Pistol Range)

The pistol range was established in the 1950s and was used intermittently by LHAAP security personnel for small arms target qualification and recertification until 2004. COCs at LHAAP-004-R-01 are metals in the soil.

Site investigation results identified areas where the surface and near surface soil was contaminated with lead levels that exceeded the TCEQ MSC for industrial use. A non-time critical removal action was completed and the IRA became the final remedial action (FRA). An NFA ROD was finalized in August 2010. A notification (not a remedy or LUC) has been filed in Harrison County, TX stating that the site is suitable for non-residential use in accordance with Texas Administrative Code Title 30 §335.566. The site is in the LTM phase which includes Five-Year Review reports in the form of a letter stating the use of the site remains non-residential. LTM is expected to continue indefinitely.

The cleanup/exit strategy for LHAAP-004-R-01 is continued LTM in the form of Five-Year Reviews.

Table 2. LHAAP Active MMRP Sites and Schedule

Site ID	Site Name	Phase	FY17	FY18	FY19	FY20	FY21	FY22+
LHAAP-001-R-01	SOUTH TEST AREA/BOMB TEST AREA	RI/FS						
		LTM						
LHAAP-003-R-01	GROUND SIGNAL TEST AREA	LTM						
LHAAP-004-R-01	PISTOL RANGE	LTM						

- phase underway

4.0 COMMUNITY PROFILE

The following subsections present an overview of the surrounding community and a general chronology of community participation and communications to date, as well as the results of the community interviews conducted for this CIP.

4.1 Harrison County

Harrison County is located in the northeastern portion of Texas along the Louisiana border. The county was created in 1839 and incorporated in 1842.

Census data from 2010 for Harrison County showed the following:

- 65,631 people
  - 49.1% male
  - 50.9% female
- 27,704 housing units

Harrison County Population by Race:

- 68.6% Caucasian
- 21.9% African American
- 0.5% Asian
- 0.7% American Indian/Alaska Native
- 8.3% Other

Harrison County Population by Age:

- 14.3% - 0 to 9 years
- 27% - 10 to 29 years
- 18.1% - 30 to 44 years
- 27.4% - 45 to 64 years
- 13.2% - 65+ years

4.1.1 City of Uncertain

The City of Uncertain is located within Harrison County. The city is located along the shores of Caddo Lake.

Census data from 2010 for the City of Uncertain showed the following:

- 94 people
    - 55.3% male
    - 44.7% female
- 146 housing units

City of Uncertain Population by Race:

- 78.7% Caucasian
- 21.3% African American
- 0% Asian
- 0% American Indian/Alaska Native
- 0% Other

City of Uncertain Population by Age:

- 1.1% - 0 to 9 years
- 6.4% - 10 to 29 years
- 8.5% - 30 to 44 years
- 44.7% - 45 to 64 years
- 39.3% - 65+ years

4.1.2 Karnack

Karnack is a rural unincorporated community on the northeastern portion of Harrison County. No census data is available for Karnack.

4.2 History of Community Involvement

In March 1992, a Technical Review Committee (TRC) was established for LHAAP in order to provide a close working relationship between the Army, the regulatory community, and the local public community. The formation of a Restoration Advisory Board (RAB) was attempted in 1996 and 1998; however, the community involvement in the TRC was deemed sufficient for community needs. A RAB is a partnership between the surrounding community, the installation, the State, and the USEPA that provides a forum for discussions to increase community understanding and support for cleanup efforts. It helps with improving the soundness of government decisions and ensuring cleanups are responsive to community needs. The TRC was dissolved by BRAC officials in 2004 when control of LHAAP was transferred to the BRAC division.

In September 2004, in response to public notices and private mailings, a RAB-interest meeting was held. The first RAB meeting was held in December 2004. The RAB meets quarterly and public meetings are held for each PP. The RAB consists of community members, Army representatives, and federal/state/local regulators.

The LHAAP Environmental Restoration Program also maintains a website, available at: www.longhornaap.com

4.3 Community Feedback

This section describes the methodology that LHAAP used to collect community input during the CIP process. This section also summarizes the communication preferences and concerns of the interviewees.

4.3.1 Interview Participants

In late October 2015, LHAAP sent out questionnaires by mail to over 1,500 addresses in the Karnack/Uncertain zip code. Results from responses to the 2015 questionnaire were used to prepare this CIP.

4.3.2 Issue Identification Approach and Findings

The primary purpose of collecting input from the community is to identify issues and concerns so that the Army can address them via community involvement efforts. The Army received 71 responses to the questionnaires that were sent to the Karnack/Uncertain zip code. The comments and insights from the responses provide information to help design the LHAAP community involvement programs. These findings are representative only of the individuals who participated in the community interviews and should not be construed as directly representative of the larger population. The interview questions and responses are provided in **Table 3**. A copy of the 2015 CIP questionnaire is included in **Appendix C**.

Table 3. Community Interview Responses

Question	Response
1.) a. How long have you lived in the community?	a. Less than 5 years = 10 5 to 10 years = 7 10 to 20 years = 24 20+ years = 29
b. What do you do for a living?	b. Answers included the following (several professions listed were used in multiple answers): Paralegal; Retired; Contract Laborer; Forestry/Wildlife Management; Real Estate; Property Manager; Carpenter; Antique Store Owner; Build and Remodel Houses; Self-Employed; Homemaker; Fish Camp Operator/Owner; Roofer; Park Ranger; Habitat and Wildlife Specialist; Correctional Officer; Farmer; Software Engineer; Manager; Deputy Sherriff; Mechanic; Contractor; School Teacher; Author; Pastor/Teacher; Pharmacist; Land Owner; Fireman; Social Worker; Small Business Owner; Sea Captain; Executive Director; Instructor; Machinist; Welder; Former Military; Insurance Agent; and College Administrator/Professor. Note: Some respondents did not provide an answer.
2.) How would you describe the current relationship between the community and the installation?	Positively = 17 Negatively = 11 Neutral = 10 Not Sure = 22 Note: Some respondents did not provide an answer.

Question	Response
3.) a. Are you familiar with the site/restoration program? b. If so, do you feel you have the opportunities you need to learn about it/have input regarding the program/site?	a. Yes = 23 No = 32 Somewhat = 13 b. Yes = 10 No = 17 Note: Some respondents did not provide an answer.
4.) Please explain why this site is important to you?	Answers included the following: historical and natural value; concerned about pollution of water supply/groundwater and site contamination and how it is affecting the area; important for environmental protection/ wildlife (preserve); previous and current employment; recreational, fishing, and hunting area; responsible use of land management; no interest; close to home/part of the community; concern about hazards in living close by; public lands; future use; not sure and may need to know more to evaluate importance; and concern that enough is not being done. Note: Some respondents did not provide an answer.
5.) a. What information do you want about the site/restoration program? b. What do you think the community knows?	Answers for both questions included the following: plans and timelines; how can I be involved; more information about program; hiring opportunities; what contamination is present (how bad is it or is it safe) and how is cleanup being addressed (treatment methods), is the area open to visit; everything; why are tax dollars being spent on this; health effects of on-site contamination; future plans; transfer of lands to USFWS; who is in charge; and that history and the site are being preserved. Note: Some respondents did not provide an answer.

Question	Response
6.) a. What are your biggest issues/concerns and or fears about the protection or development of the site? b. Are there any additional issues, concerns or fears you have heard voiced by others in the community?	Answers for both questions included the following: health concerns from previous activities; harmful effects to the community; that the land remains clean; unawareness/lack of information; dangers of the site/on-site contamination (safety risks); no concerns; that the site will not get cleaned up; spread of contamination (groundwater and surface water); infighting between various government agencies; what is in place to protect the ecology; property value; how can one be sure the site is being developed within acceptable standards; why are there so many off-limit areas; national gas line; and the timeline for cleanup is too slow. Note: Some respondents did not provide an answer.
7.) What is your current source of information about the restoration program/site?	Site visits = 5 Word of mouth = 15 E-mail = 2 RAB/community meetings = 4 No information = 17 Community groups = 2 Newspapers/Bulletins = 15 Business relations = 1 Former employees = 1 Do not know = 2 Park ranger/USFWS = 2 Longhorn AAP website = 2 Internet = 3 Local news = 1 Questionnaire/the Army = 3 Note: Several responses listed multiple answers. Some respondents did not provide an answer.

Question	Response
8.) a. Are there community or church bulletin boards, storefronts, or other places where people post notices or signs about local events or activities? b. Where are the best places to post signs or notices about site activities and events?	a. Yes = 6 No = 7 b. Local Stores/Restaurants/Gas Stations = 44 Karnack Post Office = 24 Media Sources = 17 Chamber of Commerce = 2 Church notices = 6 Karnack Community Center = 5 Caddo Lake State Park = 4 Mailed Notices = 6 Greater Caddo Lake Association = 1 Caddo Lake Institute = 1 Caddo Lake Website/Bulletin = 1 Caddo Lake Water Office = 1 Uncertain Volunteer Fire Department Board/Station = 1 Signage = 1 Note: Several responses listed multiple answers. Some respondents did not provide an answer.
9.) What are the most popular newspapers, TV stations, and radio stations in the area?	ABC Channel 3 KTBS-TV = 29 NBC Channel 6 KTAL-TV = 22 Channel 12 KSLA Shreveport = 24 KPXJ CW 21 = 4 LBP-KLTS Channel 24 = 1 KMSS-TV Fox 33 = 6 KSHV Channel 45 = 1 Marshall News Messenger = 43 Shreveport Times = 3 Jefferson Jimplecute = 1 Thrifty Nickel = 1 Longview News Journal = 1 Radio (93.7, 98.1FM, 98.9FM, 102.5FM, KMHT, KWKH) = 24 Facebook/Twitter/Internet = 5 Note: Several responses listed multiple answers. Some respondents did not provide an answer.

Question	Response
10.) Have you had any contact with local, state, or other officials regarding the installation's environmental restoration program? a. If so, what was the nature of the contact? b. What kind of response did you receive?	Yes = 10 No = 52 a./b. Met the gentleman that raises weevils for giant Salvinia and got information about operation and program (2 responses); talked to Friends of Refuge, but did not get a lot of information; talked to Preservation of Caddo Lake, but did not get much information; attended community meetings, but response was fair or poor; attended community meeting, but there was a lack of answers or solutions; attended Friends of UNWR meetings; was employed by USFWS and thought I received good intel, smart people (USGWS, DoD, AECOM); asked about squirrel hunting/no because of potential contamination; attended a RAB meeting; requested to fly R/C electrical airplane, but request was denied; went to meet a contact person. Note: Some respondents did not provide an answer.
11.) Are you aware that the Former Longhorn AAP conducts a Restoration Advisory Board meeting quarterly? a. Do you get information from RAB members? b. Do you feel they represent your interests regarding the program/site?	Yes = 12 No = 50 a. Yes = 7 No = 23 b. Yes = 4 No = 11 Don't know = 7 Note: Some respondents did not provide an answer.

Question	Response
12.) a. Any concerns or suggestions of other RAB meeting locations? b. What locations should meetings be held?	a. Send information to people who show interest, make sure to get the word out/ publish meeting times and locations (in advance), more local outreach. b. Specific locations mentioned included: Karnack Community Center (current location), Karnack Town Hall, Marshall Convention Center, Marshall High School, Wildlife Refuge, Uncertain City Hall, State Park Meeting Hall, and River Bend. Note: Some respondents did not provide an answer.
13.) Have you even observed public notices identifying the time and locations of these meetings?	Yes = 9 No = 55 Note: Some respondents did not provide an answer.
14.) Do you understand the information bulletins, fact sheets etc., being shared with the public about the site?	Yes/Somewhat = 12 No = 16 Have not seen any = 26 Note: Some respondents did not provide an answer.
15.) Have you visited the site webpage? It is located at http://www.longhornaap.com. a. What did you think of it? b. What information was helpful? c. What aspects need improvement?	Yes = 7 No = 53 Was not aware = 10 a. Excellent/useful/informative, easy to navigate, helpful, not informative b. Yes c. Need progress report, keep it current and alive, some out of date information (admin record and meeting minutes), needs more pictures of areas being worked on. Note: Some respondents did not provide an answer.

Question	Response
16.) Are you aware of the information repository that is available for public use? It is located at the Marshall Public Library as well as the Longhorn website.	Yes = 6 No = 54
a. Have you ever used or do you think you would use the information repository?	a. Yes = 27 (have or will use) No = 17 Maybe = 14
b. What would you like to see in the repository?	b. Progress reports, progress of weevil and spraying on giant Salvinia; hunting information; regular messages to protect historical value and culture of Caddo Lake; updated information and maps of the area; status, goals, and timeframe of cleanup and transfer; park/trail riding; wildlife; detailed information; everything; plans for cleanup; some usage for the community as a whole; address health concerns; bomb removed; genuine data; artifacts; risks and responses to the risks; information on what there is to do on the property; reports on toxins; information on environment and safety risks; as much information as possible; historical data; pictures
c. Is the current location of the information repository convenient for you? If no, where would be convenient for you?	c. Yes = 24 (on-site or online) No = 18; Karnack Post Office, more public place (less isolated); Karnack; mailings to individuals, public service announcements; Uncertain City Hall; Community Center; Waskom
d. Have you ever used the administrative record on the web page?	d. Yes = 3 No = 51 Note: Some respondents did not provide an answer.

Question	Response
17.) Do you know anyone that would like to be added to the site mailing list? If so, would it be ok to get their contact information?	Yes = 12 No = 24 Note: Some respondents did not provide an answer.
18.) Do you have any other comments, questions, or concerns about the installation?	See Section 4.5. Note: Some respondents did not provide an answer.

4.4 Responses to Concerns

Based on the results of the interview process, the surrounding community is moderately unaware of the restoration program and its process. Though awareness of the program is low, a majority of respondents indicated that they would at least be interested in receiving more information about restoration activities. The overall consensus regarding the installation/community relationship was mixed. While many respondents expressed trust in the Army's handling of environmental restoration activities, they also indicated a desire for more open and honest communication. There was some distrust/skepticism expressed, and many respondents stated they were unaware of any relationship between the installation and the community.

A majority of the respondents were not aware of or only somewhat familiar with the environmental restoration program. Most did not respond as to whether they felt they have opportunities to learn about the program or have input regarding the program. Of the responses provided, most did not feel they have opportunities to learn or to provide input; however, several respondents stated they were interested in receiving information. Respondents stated that the area is important to them due to its historical and ecological value to the community as a preserve and natural area; and as a recreational, fishing, and hunting area. A portion of respondents stated that they were concerned with the potential contamination of the site and how it is affecting the site and the surrounding area, specifically groundwater and surface water in Caddo Lake. Some stated they did not have any interest or particular connection to the site; two respondents stated that they would need to know more about restoration activities to determine the importance of the site and evaluate whether enough is being done. Respondents wanted more information and were concerned about the presence of contamination (especially groundwater) and how it affects the area. A need to provide plans, timelines, and simple outlines of remedy techniques was expressed. The respondents were also interested in the future use of the site. Respondents generally seemed interested in receiving more information about restoration efforts. There seems to be a general consensus that the public is unaware of specifics regarding restoration efforts, but they are interested in knowing more. When asked about individual and community fears/concerns, respondents reported that they were worried about whether they were safe from contamination. Fear of the spread of contamination and its potential health effects (cancer was mentioned in several responses) and effects on the ecology of the surrounding area were mentioned. Overall, respondents expressed desire for a clean site, with some respondents expressing concern over the slow timeline for cleanup.

A majority of respondents had not visited the restoration website and most were unaware of its existence. Several respondents indicated that they do not have access to a computer or the internet, but would like to receive information. For those respondents who had visited the website, they felt the website was excellent/useful/informational, easy to navigate, and helpful. They would prefer that the website be kept up to date and contain more pictures. One respondent stated they did not find the website helpful.

A majority of the respondents stated that they were not aware of the information repository and have not used it, but will use it now that they are aware it exists. Responses to whether the information repository is located in a convenient place were mixed; some said it was convenient (especially due to online access), but others suggested alternative locations (or alternative access methods) that were more convenient, such as Karnack Post Office, a more public place (less isolated), the town of Karnack, mailings to individuals, public service announcements, Uncertain City Hall, Karnack Community Center, and Waskom. The following were suggestions on what the respondents would like to see in the information repository: progress reports; progress of the weevil program and spraying of giant Salvinia; hunting information; regular messages to protect the historical value and culture of Caddo Lake; updated information and maps of the area; status, goals, and timeframe of cleanup and transfer; park/trail riding; wildlife; detailed information; everything; plans for cleanup; some usage for the community as a whole; address health concerns; bomb removal; genuine data; artifacts; risks and responses to the risks; information on what there is to do on the property; reports on toxins; information on environment and safety risks; as much information as possible; historical data; and pictures. Overall it seems that few respondents were aware of the repository or its role, and what it contains.

4.5 Summary of Communication Needs

A majority of the respondents listed that they receive information about the restoration program/site through word of mouth or the newspaper; however, several respondents indicated that they had not received any information. A majority of respondents have not had contact with local, state, or other officials regarding the installation's restoration program. Most respondents were not aware of the quarterly RAB meetings, and thus did not receive information from RAB members or feel that RAB members represent their interests. Most respondents stated they have not observed public notices identifying time and location of RAB meetings. A majority of respondents stated that they have not seen information bulletins, fact sheets or the like that have been shared with the public. Respondents felt that the Army needed to send information to people who show interest, make sure to get the word out/ publish meeting times and locations in advance, and conduct more local outreach.

A majority of respondents stated they would like to see posted notices about site activities and events at local stores/restaurants/gas stations (the following were specifically named: Caddo Grocery, Circle S, Shady Glade, River Bend, Grub Shack, Jonesville General Store, County Store, Johnson Ranch, Fyffes, The Run In, and the Family Dollar Store), the Karnack Post Office, and through local media sources. The most popular local media preference appeared to be the local newspaper, followed by television and radio, and finally social media.

Respondents listed the following as the most popular newspapers in the area: Marshall News Messenger, Shreveport Times, Jefferson Jimplecute, Thrifty Nickel and Longview News. The following TV stations were listed as the most popular: Channel 3 (KTBS), Channel 6 (KTAL), Channel 12 (KSLA), Channel 21, 24, 33, 45, and Fox News. The following radio stations were listed as the most popular in the area: 93.7, 98.1FM, 98.9FM, 102.5FM, KMHT, KWKH. Facebook, Twitter, and the internet were listed as social media outlets

Respondents were also interested in seeing notices through community groups (Marshall and Uncertain Chamber of Commerce), local churches, Karnack Community Center, Caddo Lake State Park, Greater Caddo Lake Association, Caddo Lake Institute, Caddo Lake Website/Bulletin, Caddo Lake Water Office, and Uncertain Volunteer Fire Department Bulletin Board. Some respondents stated they preferred mailed or e-mailed notices, or posted signage. Respondents interested in being added to the site mailing list provided contact information on the questionnaire.

The following locations were mentioned by respondents as possible locations for RAB meetings: Karnack Community Center (current location), Karnack Town Hall, Marshall Convention Center, Marshall High School, Wildlife Refuge, Uncertain City Hall, State Park Meeting Hall, and River Bend. Suggested meeting locations are listed in **Appendix E**.

As a result of the 2015 community questionnaire, LHAAP expanded its outreach to beyond the e-mail distribution list and the display ad and media release in the Marshall News Messenger to include those additional outlets provided in **Appendix D**. LHAAP continues its website where RAB materials and RAB meeting announcements are made available to the public.

5.0 COMMUNITY INVOLVEMENT ACTIVITIES

The community involvement activities presented in this section are based on regulatory guidance outlined in the USEPA's *Superfund Community Involvement Handbook* (USEPA, 2016) and the *RCRA Public Participation Manual* (USEPA, 2017). The activities are presented below in the order of those required to occur at particular milestones throughout the program followed by those that are appropriate for the program based on community interest or project circumstances.

5.1 Point of Contact (POC)

For questions related to the environmental cleanup actions at LHAAP, community members should contact the following representative.

Longhorn Army Ammunition Plant Environmental Division
BRAC Field:
Rose M. Zeiler, PhD
Longhorn Army Trailer
Groundwater Treatment Plant Compound
Highway 134 and Spur 449
Karnack, Texas 75661
rose.m.zeiler.civ@mail.mil
479-635-0110

Additional contact information including media, citizens groups, regulatory and federal, state and local elected officials are provided in **Appendix D.**

5.2 Information Repository/Administrative Record

The Information Repository for LHAAP is established and maintained at the Marshall Texas Library. A public Information Repository is required under CERCLA to provide interested parties with background and technical information about the environmental cleanup program at LHAAP. The Information Repository includes work plans, technical reports, summary documents, and other information of public interest (e.g., fact sheets and news releases). Examples of items currently contained in the Information Repository include:

- The Installation Action Plan;
- Facility Assessments;
- Facility Investigation Reports;
- Cleanup Work Plans and Reports;
- Site Closure Documentation;
- Correspondence with the regulatory community; and
- Collections of press releases, community notices, public meeting minutes, and fact sheets.

The Administrative Record for LHAAP is located and maintained at the Marshall Texas Library, at the Longhorn Army Trailer Groundwater Treatment Plant Compound, and at www.longhornaap.com/admin-record. For sites undergoing CERCLA investigations, the NCP requires that an Administrative Record be established at or near the facility under investigation.

The Administrative Record includes information that may form the basis for selecting a response or RA. It includes all documents leading to the selection of any response action at the installation and contains documents similar to those located in the Information Repository.

The addresses and phone numbers for the locations of the Information Repository and Administrative Record are presented in **Appendix B**.

5.3 Fact Sheets

Fact sheets will be prepared, as appropriate, to support LHAAP's community outreach program. Fact sheets are designed to provide information about planned technical activities. Fact sheets will be distributed by e-mail and at meeting, and maintained in the Information Repository.

5.4 Public Notices, Meetings, and Comment Periods

The installation will comply with the requirements for public notification, the review of PPs and public comment periods. Public notices will be placed in local newspapers to serve as official notification to the local community of plans for environmental activities, upcoming public involvement opportunities, and the availability of documents in the Information Repository.

Public meetings, both informal and formal, are intended to inform the community about ongoing site activities and to discuss and receive feedback from the public on proposed courses of action. All meetings will be announced through public notices, news releases, e-mail or direct mailings, or a combination of the three. Meetings will be held at a location that is easily accessible to the general public. Fact sheets, including contact information for additional information, will be prepared to support all PPs and, as necessary, to support other meetings and presentations. Current and suggested meeting locations are provided in **Appendix E**.

Public comment periods will be made available at specific phases or milestones in the cleanup process depending on the regulation that is guiding the cleanup at a particular site. A public comment period lasts for at least thirty (30) calendar days under CERCLA guidance, allowing time for review and comment on the proposed action. Public comments will be recorded at these meetings and will be responded to through a responsiveness summary.

5.5 Responsiveness Summaries

A responsiveness summary will be prepared and issued to address comments received from the public. At the conclusion of public comment periods, the Army will prepare, a responsiveness summary or minutes that summarize and respond to the comments received during the public comment period, including those comments given at the public meeting. The responsiveness summary is issued as part of the document under comment and made available in the Information Repository listed in **Appendix B**.

5.6 Mailing List Update

Mailing lists are an important component of effective community outreach which ensure that interested community members, as well as other stakeholders and communities impacted by or interested in response activities, are kept informed of activities and opportunities for community involvement. An email mailing list is used to distribute information for meetings.

The installation will add individuals upon request to the mailing list, and will update the list as necessary and appropriate. A mailing list can be developed upon request for those community members and stakeholders who prefer to receive project information via the U.S. postal service.

5.7 Speaker Bureaus/Open House

As program milestones are achieved, project representatives notify and meet with stakeholders (including regulatory agency representatives and the public, as needed) to discuss project status and field questions about proposed restoration actions. Additionally, speakers from the installation may be available upon request to meet with and discuss restoration program activities with civic and/or environmental organizations. Interested organizations should contact the Army POC; see Section 5.1.

5.8 CIP Updates

The CIP will be updated at least every five years or earlier if there are significant program changes. This CIP is a working document to guide the project staff. All or part of this plan may require revision due to new information or changes in community concerns and needs. The plan will be re-evaluated at these times to ensure that the schedule of community participation activities is appropriate.

5.9 Activity Schedule

The public will be notified of any PPs and actions through public meetings and comment periods. Exact dates of the cleanup activities are not provided for two reasons. First, the exact date that each phase in the Army cleanup process will be completed is not known. Second, different sites can be in different phases in the process depending on when each site was discovered, the relative risk or cleanup priority of the site, and funding available for cleanup. The community involvement activities are summarized in **Table 4**.

5.10 Community Grant Opportunities

The Technical Assistance for Public Participation (TAPP) is a funding opportunity available only to community members of an established RAB who need technical assistance in interpreting scientific or engineering issues connected with proposed cleanup activities. If an Army installation does not have an established RAB, community members are not eligible for TAPP. Previously, two TAPPs were established at LHAAP; September 1999 and March 2003. Community members of an established RAB who are interested in applying for TAPP must contact their applicable Army POC (see Section 5.1) to confirm eligibility and request Army funding.

The Technical Assistance Services for Communities (TASC) program, which is partially funded by grants from the USEPA, helps communities understand the environmental cleanup and site reuse process. This program provides communities with independent educational and technical information needed to actively participate in solving environmental problems. While TASC primarily supports the Superfund program, support may also be provided to communities impacted by the RCRA or federal facilities or dealing with air or water environmental problems. Specific information regarding the TASC program is available at the following website: http://www.epa.gov/superfund/community/tasc. A Technical Assistance Grant (TAG) program is currently in place at LHAAP.

Table 4. Community Involvement Activities During Restoration

Public Participation Activities	Environmental Restoration Program Steps								
	Preliminary Assessment	Site Inspection	Pre-Remedial Investigation	Remedial Investigation	Feasibility Study	Proposed Plan	Pre-Record of Decision	Record of Decision	RD, RA, & LTM/LTO
Contact State/Local Officials	D	D		D	D			D	D
News Release	D	D		D	D	D			D
Workshops		D		D	D				
Community Interviews			R (5)						
Community Involvement Plan			R						
Establish Information Repository and Inform Public			R						
Discuss Technical Assistance for Public Participation (TAPP) with RAB			R (1)						
Fact Sheet				D	D	R (2)			R
Public Notice				R		R		R	
Public Meeting (3)						R			
Public Comment Period						R			
Responsiveness Summary							R		
Revise Proposed Plan (4)							R		
Second Comment Period (4)							R		
Revise CIP								R	

R = Required D = Desired

(1) = Applicable only to installations that have an active RAB. If site is listed on NPL after the RI begins, then the availability of TAPP is publicized at that time.

(2) = Either a fact sheet summarizing the PP, or the complete PP document, must be made available to the public for review (USEPA, 2005).

(3) = The opportunity for a public meeting is required. If such a meeting is held, then a transcript must be kept and made available to the public.

(4) = Revise PP and provide second comment period if significant changes regarding proposed selected remedy are made prior to the ROD and those changes could not have been reasonably anticipated by the public.

(5) = Community Interviews are done for the Longhorn Army Ammunition Plant as a whole with CIP development and not for each site.

6.0 REFERENCES

DoD Manual 4715.20, *Defense Environmental Restoration Program Management*, March 2012.

DoD *Relative Risk Site Evaluation Primer*, 1996.

Office of the Secretary of Defense, *Restoration Advisory Board Handbook*, February 2007.

PB&A, Inc., *Community Involvement Plan for Longhorn Army Ammunition Plant, TX*, November 2013.

U.S. Army, Army Regulation (AR) 200-1, *Environmental Protection and Enhancement*, 2007.

U.S. Army, Army Regulation (AR) 360–1, *The Army Public Affairs Program*, October 15, 2000.

USAEC, *Longhorn Army Ammunition Plant Installation Action Plan*, September 2016.

USAEC, *Restoration Advisory Board and Technical Assistance for Public Participation Guidance*, 2005.

USEPA, *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, July 1999.

USEPA, *National Oil and Hazardous Substances Pollution Contingency Plan (The NCP),* January 1992.

USEPA, *Resource Conservation and Recovery Act (RCRA) Public Participation Manual*, 2017.

USEPA, *Superfund Community Involvement Handbook*, January 2016.

factfinder.census.gov

www.cityofuncertain.com

www.epa.gov

www.harrisoncountytexas.org

www.longhornaap.com

FIGURE

00863681

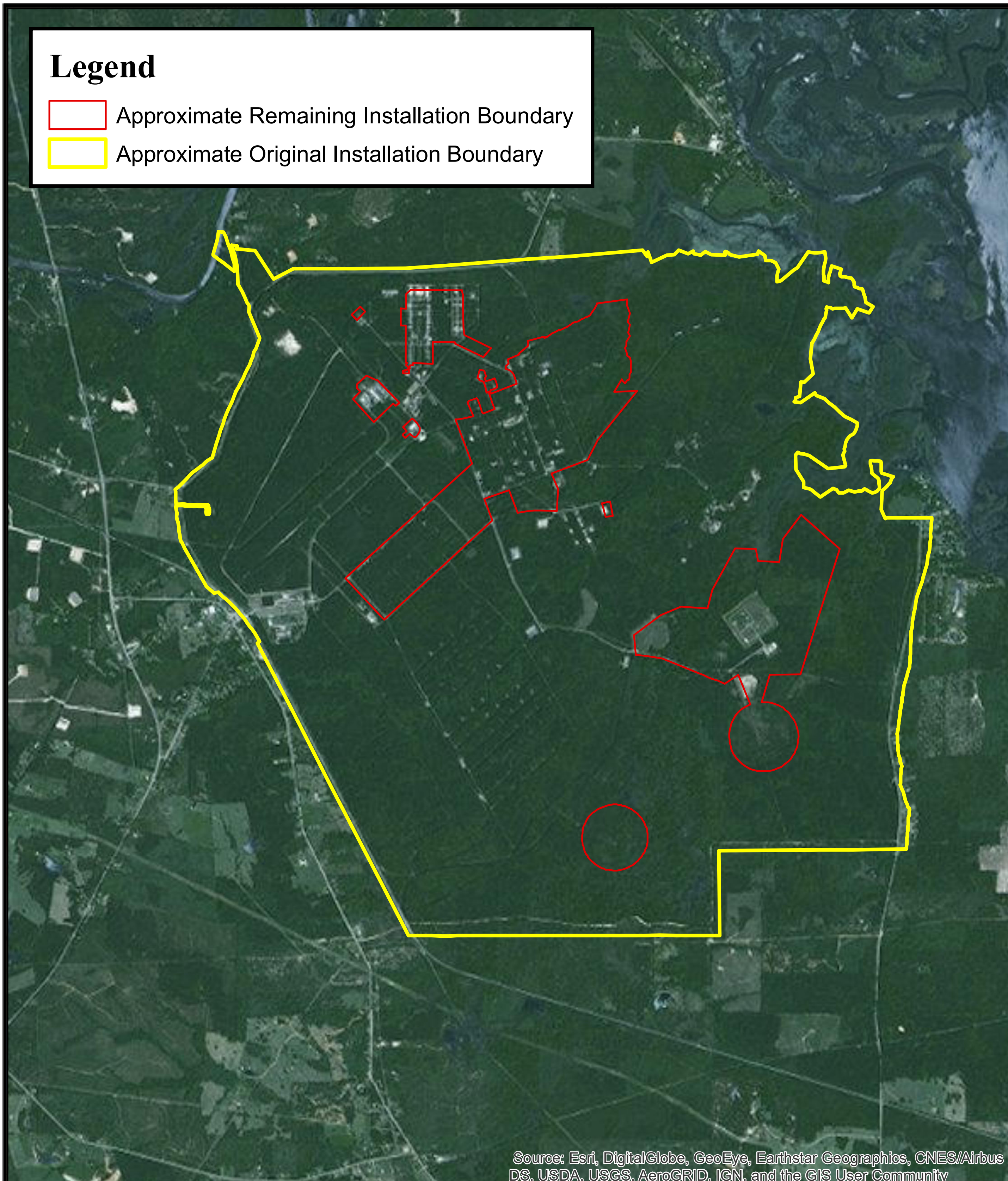


FIGURE 1. INSTALLATION LOCATION MAP

DAWSON	COMMUNITY INVOLVEMENT PLAN LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS	1 inch = 5,000 feet Feet 0 2,500 5,000 7,500

APPENDIX A

CERCLA/RCRA Equivalents

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CERCLA	RCRA
Preliminary Assessment (PA)	RCRA Facility Assessment (RFA)
Site Inspection (SI)	Confirmation Sampling (CS)
Remedial Investigation/Feasibility Study (RI/FS)	RCRA Facility Investigation/Corrective Measures Study (RFI/CMS)
Proposed Plan (PP)/ Record of Decision (ROD)	Statement of Basis
Remedial Design (RD)	Design (DES)
Remedial Action (Construction) (RA-C)	Corrective Measures Implementation (Construction) (CMI-C)
Remedial Action (Operation) (RA-O)	Corrective Measures Implementation (Operation) (CMI-O)
Long-term Management (LTM)	Long-term Management (LTM)
Interim Remedial Action (IRA)	Interim Measure (IM)

CERCLA	RCRA UNDERGROUND STORAGE TANK (UST) TERMS
Preliminary Assessment (PA)	Initial Site Characterization (ISC)
Remedial Investigation (RI)	Investigation (INV)
Feasibility Study (FS)	Corrective Action Plan (CAP)
Remedial Design (RD)	Design (DES)
Remedial Action (Construction) (RA-C)	Implementation (Construction) (IMP-C)
Remedial Action (Operation) (RA-O)	Implementation (Operations) (IMP-O)
Long-term Management (LTM)	Long-term Management (LTM)
Interim Remedial Action (IRA)	Interim Remedial Action (IRA)

APPENDIX B

Information Repository and Administrative Record Locations

Information Repository:
Marshall Texas Library
300 South Alamo
Marshall, Texas 75670

Administrative Record:
Longhorn Army Trailer
Groundwater Treatment Plant Compound
Highway 134 and Spur 449
Karnack, Texas 75661

And

www.longhornaap.com/admin-record

APPENDIX C

2015 CIP Questionnaire

LHAAP Updated CIP Questions:

1. How long have you lived in this community? What do you do for a living?
2. How would you describe the current relationship between the community and the installation?
3. Are you familiar with the site/restoration program? If so, do you feel you have the opportunities you need to learn about it/have input regarding the program/site?
4. Please explain why this site is important to you?
5. What information do you want about the site/restoration program? What do you think the community wants to know?
6. What are your biggest issues/concerns and or fears about the protection or development of the site? Are there any additional issues, concerns or fears you have heard voiced by others in the community?
7. What is your current source of information about the restoration program/site?
8. Are there community or church bulletin boards, storefronts, or other places where people post notices or signs about local events or activities? Where are the best places to post signs or notices about site activities and events?
9. What are the most popular newspapers, TV stations, and radio stations in the area?
10. Have you had any contact with local, state, or other officials regarding the installation's environmental restoration program?
    a. If so, what was the nature of the contact?
    b. What kind of response did you receive?
11. Are you aware that the Former Longhorn AAP conducts a Restoration Advisory Board meeting quarterly? Do you get information from RAB members? Do you feel they represent your interests regarding the program/site?
12. Any concerns or suggestions of other RAB meeting locations? What locations should meetings be held?
13. Have you observed public notices identifying the time and location of these meetings?
14. Do you understand the information bulletins, fact sheets etc., being shared with the public about the site?
15. Have you visited the site webpage? It is located at http://www.longhornaap.com/. What did you think of it? What information was helpful? What aspects need improvement?

16. Are you aware of the information repository that is available for public use? It is located at the Marshall Public Library as well as the Longhorn website.

    a. Have you used or do you think you would use the information repository?

    b. What would you like to see in the repository?

    c. Is the current location of the information repository convenient for you? If no, where would be convenient for you?

    d. Have you used the administrative record on the web page?

17. Do you know anyone that would like to be added to the site mailing list? If so, would it be ok to get their contact information?

18. Do you have any other comments, questions, or concerns about the installation?

APPENDIX D

Additional Contact Information

RAB Announcement Outlets:

- Longhorn Army Ammunition Plan Environmental Restoration Program
  www.longhornaap.com

Newspaper
LHAAP publishes RAB meeting notices in the following newspaper:

- The Marshall News Messenger
  309 East Austin Street
  Marshall, Texas 75670
  903-925-7914
  www.marshallnewsmessenger.com

Radio
LHAAP airs RAB meeting public service announcements on the following radio stations:

- KMHT Radio 103.9FM (1450AM)
  2323 Jefferson
  Marshall, Texas 75670
  903-923-8000
  info@kmhtradio.com
  www.easttexastoday.com/kmht.php

- KISS Country 93.7FM
  6342 Westport Avenue
  Shreveport, LA 71129
  318-320-5477
  mykisscountry937.com

- Alpha Media Shreveport / 98.1FM
  208 North Thomas Drive
  Shreveport, Louisiana 71107
  318-223-3122
  www.alphamediausa.com

- Townsquare Media Shreveport / 98.9FM
  6341 Westport Avenue
  Shreveport, Louisiana 71129
  318-688-1130
  www.townsquaremedia.com

Television

LHAAP places RAB meeting public service announcements on the Community/Local Events Calendars on the following television station websites:

- ABC Channel 3-1 KTBS-TV
  www.ktbs.com
- NBC Channel 6-1 KTAL-TV
  www.arklatexhomepage.com
- KSLA News 12 Shreveport
  www.ksla.com

Churches

LHAAP sends out RAB notice via mail to the following churches:

- Karnack Baptist Church
  902 TJ Taylor Avenue
  Karnack, Texas 75661
- Old Border Baptist Church
  680 Lotta Road
  Karnack, Texas 75661
- Antioch Baptist Church
  410 FM 1999
  Karnack, Texas 75661
- Church of Uncertain
  2936 Dorough Road
  Karnack, Texas 75661
- Karnack Methodist Church
  925 TJ Taylor Avenue
  Karnack, Texas 75661

Community Locations

LHAAP posts RAB meeting fliers on Community Boards at the following locations:

Shady Glade Café, Circle S Grocery, Caddo Grocery, Run In Grocery, Fyffes Corner Store, Caddo Lake State Park, Family Dollar Store, Convenience Stores at FM9 and FM199, and the Karnack Post Office.

Local Groups:

- Caddo Lake Area Chamber of Commerce and Tourism
  P.O. Box 228
  Karnack, Texas 75661
  info@caddolake.org

- Marshall Texas Chamber of Commerce
  208 East Burleson Street
  Marshall, Texas 75670
  903-935-7868
  contactus@mashalltexas.com

Regulatory Contacts:

- U.S. Environmental Protection Agency, Region VI
  1445 Ross Avenue, Suite 1200
  Dallas, Texas 75202
  1-800-887-6063
  https://www.epa.gov/aboutepa/contact-epas-region-6-south-central-office

- Texas Commission on Environmental Quality
  (TCEQ)
  12100 Park 35 Circle
  Austin, Texas 78753
  512-239-1000
  ac@tceq.texas.gov

  Mailing address:
  TCEQ
  P.O. Box 13087
  Austin, Texas 78753

Federal Elected Officials:

- Senator John Cornyn (R-TX)
  - Washington, DC Office
    517 Hart Senate Office Building
    Washington, DC 20510
    202-224-2934

- East Texas Office
  Regions Bank Building
  100 East Ferguson Street, Suite 1004
  Tyler, Texas 75702
  903-593-0902

- Senator Ted Cruz (R-TX)
  - Washington, DC Office
    Russell Senate Office, Building 404
    Washington, DC 20510
    202-224-5922

  - East Texas Office
    305 South Broadway, Suite 501
    Tyler, Texas 75702
    903-593-5130

- Congressman Louie Gohmert (R-TX, 1st District)
  - Washington, DC Office
    2243 Rayburn HOB
    Washington, DC 20515
    202-225-3035

  - Tyler Office
    1121 ESE Loop 323, Suite 206
    Tyler, Texas 75701
    903-561-6349

<u>State Elected Officials:</u>

- Governor Greg Abbott
  Office of the Governor
  P.O. Box 12428
  Austin, Texas 78711
  512-463-2000

- Lieutenant Governor Dan Patrick
  Statehouse Address
  P.O. Box 12068
  Austin, Texas 78711
  512-463-0001

- Senator Bryan Hughes (R, Senate District 1)
    - Capitol Office
      P.O. Box 12068
      Capitol Station
      Austin, Texas 78711
      512-463-0101
      www.senate.texas.gove/member.php?d=1#Office

    - District Address
      100 Independence Place, Suite 301
      Tyler, Texas 75703
      903-581-1776

- Representative Chris Paddie (R, House District 9)
    - Capitol Office
      Room E2.502
      P.O. Box 2910
      Austin, Texas 78768
      512-463-0556
      http://www.house.state.tx.us/members/member-page/?district=9

    - District Address
      102 West Houston Street
      Marshall, Texas 75670
      903-935-1141

Local Elected Officials:

Harrison County

- County Commissioner Zephaniah Timmins (Precinct 2)
  #1 Peter Whetstone Square, Room 307
  Marshall, Texas 75670
  903-935-8402 x-1012

Mayors/City Council:

- **City of Uncertain**
  Mike Fox
  199 Cypress Drive
  P.O. Box 277
  Uncertain, Texas 75661
  405-821-0076
  info@cityofuncertain.com

APPENDIX E

Meeting Locations

Current Meeting Location:

Karnak Community Center
Kay Street and Highway 134
Karnack, Texas 75661

(Designated RAB meeting location).

Suggested Meeting Locations:

The following locations were recommended by (three or more) respondents:

- Karnack Town Hall
- Marshall Convention Center
- Marshall High School
- USFWS Wildlife Refuge
- Uncertain City Hall
- Caddo Lake State Park Meeting Hall
- River Bend

Subject:	**Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**
Location of Meeting:	**Teleconference; Call-In 515-603-3155 with Code 1063533#**
Date of Meeting:	**October 19, 2017 – 11:00 AM CDT**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
AEC:	Cathy Kropp (CK); Andy Maly (on phone)
EPA:	Dorelle Harrison (DH), Rich Mayer (RM), Barry Forsythe (on phone)-USGS Liaison
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW); Rick Smith (RS)
Bhate:	Kim Nemmers (KN)
APTIM:	Susan Watson (SW)
USFWS:	Eric Duerkop (ED); Paul Bruckwicki (PB)

Welcome **RMZ**

Action Items

- Groundwater Treatment Plant (GWTP) Discharge Protocol included in 2017 Second Quarterly GWTP Report. *Completed. The Discharge Protocol was included in the report.*
- The LHAAP website has been updated regarding dispute resolution. *Completed.*

EPA

- Planning to complete surface water sampling for only perchlorate using event samplers in the drainage ditch near the perchlorate grinding building. Schedule is not set for field work. RM explained that the samplers are triggered by a precipitation event, and if there is enough rain to raise the creek elevation, the sampler will pull a sample. A PowerPoint presentation is available that explains the sampler, and RM will resend the presentation so it can be circulated.

TCEQ

- No outstanding action items.

AEC

- The Community Relations Plan (CRP)/Community Involvement Plan (CIP) is in Draft Final and is awaiting approvals. RM stated that Janetta Coats, EPA, had some questions. RM will send these questions onto RMZ.
- Four Technical Assistance Grant (TAG) comments on the CRP/CIP were received and responses were prepared. AP concurred with the responses. RM verified that EPA did not have any comments to the responses. With approval to comment responses, a copy will be provided at the Restoration Advisory Board (RAB) meeting in the evening.
- To distribute the CRP/CIP to the community once finalized, CK suggested asking the public/RAB members to indicate if they would like to receive a copy electronically when they signed in.

- Project to establish real-time on-site perchlorate analyses is still ongoing at the Army Engineer Research and Development Center.

USFWS

- No outstanding action items.

Schedule Review **RMZ**

- Discussed geographic information system (GIS) request by Jessie Scroggins (JS), EPA. RM was not aware of the request. RMZ will send the email request from JS to RM. KN asked if the information could be provided on November 15, 2017.
- RMZ discussed that the separation of sites by contractors is important to understand. Sites 29, 47, and 18/24 do not have Records of Decision (RODs) or planned remedies. Work at these sites will be conducted by another contractor. This will be a new award. AW and RS indicated that the Request for Proposal has not been released, but the contract will be a non-compete (sole source) award. USACE expects to have the new contract awarded by December 8, 2017. RODs for LHAAP- 18/24 and LHAAP-29 will be prepared by the contractor. However, implementation of the RODs will require a new contract since the remedy selection is not known. LHAAP-47 will require additional data collection via implementation of a Post-Screening Investigation (PSI). AP indicated if this contractor wants to use the project Installation Wide Work Plan (IWWP), they will need to provide an addendum for lab package and any exceptions.
- Bhate will be conducting work at other sites with planned remedies or in the remedial action-operations (RA-O) stage. Under the contract, they will also be responsible for RAB support, MMM, RA-O sampling, Administrative Record (AR)/website/Smart map updates and maintenance, GWTP operations and the two Military Munitions Response Program (MMRP) sites.
- A new schedule will be provided by Bhate with the contractually required Project Management Plan (PMP). Contract was awarded to Bhate on September 29, 2017. Until the PMP is approved, the Army cannot release an enforceable schedule.
- AP discussed concern that some AR files were lost when going from one contract to another. AW assured AP that USACE had planned for this and will not allow it to happen again.

Defense Environmental Restoration Program (DERP) PBR Update **Bhate**

KN asked everyone to refer to the Document and Issue Tracking Table dated October 19, 2017.

- Task 1 (Installation Wide Work Plan [IWWP])
    - Initially, sampling by Bhate will be conducted under the existing IWWP during preparation of the IWWP under their contract. AP asked if the same lab was going to be used. KN indicated that a different accredited laboratory would be used. AP requested a letter from the lab that indicates they can meet the standards in the existing IWWP. Bhate will provide letter from ALS indicating that the laboratory can meet the requirements of the existing IWWP.
    - Standard Operating Procedures (SOPs) were discussed for soil sampling. AP and RM want to ensure that a closed container system such as an Encore will be used. Another concern is regarding the process used to collect volatile organic compound (VOC) readings using a photo ionization detector (PID). When soil screening, the soil cores may be left exposed to the elements, which can volatilize the contaminants

  from the soil. So, if the soil is screened and then a sample is collected, VOCs may have been volatilized in part. AP suggested collecting the sample and then screen the soil, but this process doesn't allow for biased sampling. This input needs to be considered in development of the IWWP SOPs. Further discussion of the selected method can be discussed at upcoming MMMs.
  - USGS has some comments about the definition of a Major Storm Event and re-measurement requirements. USGS (Kent Becher) to provide the definition of a Major Storm Event.
- Task 2 (LHAAP-02 Semi-Annual Groundwater Monitoring Report) - Final groundwater sampling event is being completed in the Fall for metals. Second event will be in the Spring of 2018 with the Annual Report prepared by late summer 2018.
- Task 3 (LHAAP-03 Record of Decision [ROD] and Explanation of Significant Difference [ESD]) – The ROD for LHAAP-03 is being revised for soil only. An ESD is also being prepared to transfer the groundwater from Site LHAAP-03 to site LHAAP-58. The ESD will be issued for review just ahead of or concurrently with the ROD.
- Task 4 (LHAAP-04 Remedial Design [RD]/Remedial Action Work Plan [RAWP]) - SW discussed the new well locations at LHAAP-04. SW reviewed the locations for one intermediate and two shallow wells. Regulators confirmed the locations were still acceptable. Well installation is tentatively scheduled for November.
- Task 5 (LHAAP-12 Annual Remedial Action – Operation [RA-O] Report) – Groundwater sampling is scheduled for December 2017.
- Task 6 (LHAAP-16 RAWP) – The RAWP for in situ enhanced bioremediation is being prepared.
- Task 7 (LHAAP-17 Pre-Design Investigation [PDI] Report)
  - SW discussed the PDI at LHAAP-17 and handed out figures from the PDI Work Plan. SW discussed the shallow/shallow intermediate groundwater sampling. SW indicated that additional monitoring wells may be needed based upon the PDI data to obtain a full picture of the plumes. Proposed monitoring wells are not on the figures and will be determined after the groundwater data is collected. SW discussed evaluating the groundwater flow and previously observed mounding from LHAAP-18/24 with LHAAP-17. Groundwater level measurements are collected during the third week of the month from LHAAP-18/24 and will be used as part of the evaluation. A pump test will also be completed at LHAAP-17. Soil sampling as indicated in the PDI Work Plan will be conducted. Soil excavation is anticipated following the PDI based upon the soil sampling results. The pump and treat system installation for the groundwater will be coordinated with the soil excavation as there may be some overlap of areas.
  - ED discussed hunting in the area. ED recommended that vest be worn and to coordinate field activities with ED and PB. USFWS can put a comment by the check-in station regarding the sampling. Gun hunts should not be in these areas because there are specific locations for gun hunts. Archery hunts should not be occurring from October 21 to November 21.
- Task 11 (LHAAP-50 RA-O Reports) – The Year 3 RA-O Report is being prepared. Groundwater sampling at LHAAP-50 is planned for November 2017.
- Task 12 (LHAAP-58 ESD and RA-O Report) – Groundwater sampling is planned for the fall. The Year 3 RA-O Report is being prepared. In November 2017, the response to regulatory comments on the Explanation of Significant Differences (ESD) for LHAAP-58 contingency remedy implementation will be submitted to the regulators.

- Task 14 and 15 (MMRP Sites' RD) – The Land Use Control (LUC) Remedial Designs for LHAAP-001-R-01 and LHAAP-003-R-01 will be submitted this December. The data collected in November 2017 at LHAAP-001-R-01 will be submitted next year in an Annual Report.
- Task 16 (Groundwater Treatment Plant)
    - AP asked who the engineer responsible for the groundwater treatment plant was going to be for the contract. AP discussed concerns regarding the fluidized bed reactor due to the perchlorate issues. KN stated that she heard the concerns and would ensure the proper person was identified.
    - The regulatory comments received on the GWTP quarterly reports will be incorporated into the next report. The comments submitted by the regulators on the 2nd quarterly report will be addressed by AECOM Technical Services, Inc. in the 3rd quarterly report. Bhate will prepare the 4th quarterly report.
- Task 18 (Surface Water) – Currently, surface water could not be sampled due to drought conditions. The next surface water sampling event is scheduled for December 2017.
- Task 19 (LUC Management) – The Draft LUC Management Plan Update is being tentatively scheduled to be submitted to the Regulators in early December 2017.
- According the Federal Facility Agreement after submitting the Draft Final document to the regulators, it will become Final in 30 days unless the regulators do not concur with the responses to comments within the 30 days.
- The website will continue to be updated quarterly.
- The RAB meeting is typically the third Thursday of each quarter. The next RAB date will fall on January 18, 2018. Everyone was asked to check their calendars as this date was to be presented at the RAB later in the evening.

MMRP Update **Army**

- RMZ discussed MMRP transfer of land in December 2017. The LUC RD is under preparation and will use the specific dispute language. AP pointed out that the exact dispute language must be used even if the sentence makes no sense such as placement of commas. There is no operating remedy, and RMZ wanted to confirm that no Operating Properly and Successfully (OPS) was required. There will be continuation of LUCs (no dig signage, etc.). RM is going to verify that no OPS determination is required. RMZ stressed that there is no regulatory requirement for an OPS for a fed-to-fed transfer and that it was added to the 2004 Transfer Memorandum of Agreement (MOA) as a measure of comfort to USFWS when accepting property with an operating remedy. An Environmental Condition of Property (ECP) to transfer the property is being prepared. Recordation language will be an attachment to the ECP.

USFWS Update **RMZ/PB/ED**

- Reuse article is being prepared by EPA and PB asked if RMZ had seen the document. RM to provide draft article to RMZ.
- USFWS (ED and PB) had several reminders about operations/activities on the refuge
    - Inform ED and PB about field activities conducted by personnel coming onsite (does not include standard GWTP operations and maintenance (O&M) and sampling conducted by GWTP crew)
    - Notify Army and USFWS if any trees must be removed for field work
    - Abide by refuge speed limit

- Watch for visitors walking or riding bikes and for logging trucks
- Coordinate trucks entering/exiting during activities such as soil removal
- Provide a 3-week look ahead for specific areas in which Bhate will be entering. There are hunts scheduled at the refuge, and hunters should not be in our work area. Workers may want to wear blaze orange vests during the hunt season.
- No control burns are scheduled.

- Scott Beesinger, the GWTP Operator, should be completing a safety tailgate meeting before sampling and discuss hunters.

Schedule Next Managers' Meeting

- November 2017 MMM will be held November 16, 2017 via teleconference at 10 AM CDT.

Adjourn

Attachments:

- LHAAP-04 Figure
- LHAAP-17 Figure

ACRONYM LIST

AEC	United States Army Environmental Command
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BRAC	Base Realignment and Closure
CH	Craig Holloway
CIP	Community Involvement Plan
CK	Cathy Kropp
CRP	Community Relations Plan
CDT	Central Daylight Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
ECP	Environmental Condition of Property
ED	Eric Derkoff
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
GIS	Geographic information system
GWTP	Ground Water Treatment Plant
IWWP	Installation Wide Work Plan
JS	Jessie Scroggins
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MMM	Monthly Managers' Meeting
MMRP	Military Munitions Response Program
MOA	Memorandum of Agreement
O&M	Operation and Maintenance
OPS	Operating Properly and Successfully
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation
PID	Photo-ionization Detector
PMP	Project Management Plan
PSI	preliminary site investigation
RAB	Restoration Advisory Board
RA-O	remedial action – operation
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
RS	Rick Smith
SOP	Standard Operating Procedure
SW	Susan Watson
TAG	Technical Assistance Grant
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound

Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant (LHAAP)
Location of Meeting: Karnack Community Center, Karnack, Texas
Date of Meeting: October 19, 2017, 6:00 – 7:00 PM

Meeting Participants:

LHAAP/BRAC:	Rose M. Zeiler
USACE:	Aaron Williams, Richard Smith
USAEC:	Cathy Kropp
Bhate:	Kim Nemmers
APTIM:	Susan Watson
USEPA Region 6:	Rich Mayer, Janetta Coats
TCEQ:	April Palmie
USFWS:	Paul Bruckwicki
RAB:	**Present:** Carol Fortune; Paul Fortune; Judy VanDeventer; Richard Le Tourneau; John Pollard, Jr.; Tom Walker; Nigel R. Shivers **Absent:** Ken Burkhalter, Lee Guice, Ted Kurz, Terry Britt, Charles Dixon, James Lambright
Public:	Dan Murphy, Laura-Ashley Overdyke, Wendy Ledbetter, Richard Dunn, John Fortune

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An agenda for the RAB meeting, a color copy of the Bhate Environmental Associates, Inc. (Bhate) slide presentation, and handouts (see list at end of meeting minutes) were provided for meeting attendees. Additionally, RAB application forms were available at the sign-in table.

Welcome and Introduction

Mr. Paul Fortune, RAB Co-Chair, called the meeting to order. Mr. Paul Fortune noted a new person present, and Ms. Wendy Ledbetter introduced herself as a Program Manager for the Texas Nature Conservancy.

Open Items

July 2017 RAB Meeting minutes were approved by Ms. Carol Fortune first, and then two RAB members (Mr. Paul Fortune and Mr. Nigel Shivers) provided a second motion. Dr. Rose Zeiler then stated that the sign-in sheet would be passed around again for each person to mark “yes” if they want to receive emails regarding website updates. Dr. Rose Zeiler also asked about the website and what improvements could be made to make it easier to use. Ms. Carol Fortune stated that she was surprised how easy it was to use. Dr. Rose Zeiler discussed recruiting or interest in the RAB by the public, and reminded everyone that the RAB membership application form is on the website.

Community Relations Plan (CRP)/Community Involvement Plan (CIP)

Ms. Cathy Kropp discussed the survey that was released to assess and improve the public information and RAB. Based upon this survey, the CRP is being revised. Ms. Cathy Kropp said that they had hoped to have a draft CRP available to share but all comments were not received.

However, the comments by the U.S. Environmental Protection Agency (USEPA) Technical Assistance Grant (TAG) and responses were provided at tonight's meeting. Dr. Rose Zeiler asked who wanted a hard copy of the RAB presentation in addition to the emailed copies. Ms. Janetta Coats and Mr. John Pollard, Jr. indicated they would like to see hard copies.

Ms. Cathy Kropp discussed the ongoing outreach activities listed on Slide 3 Ms. Laura-Ashely Overdyke stated that she ran into a Bhate employee who was putting up the flyers the other day and was told that the Family Dollar Store was no longer allowing the fliers to be posted. The question was raised whether the post office would allow posting. Ms. Susan Watson stated that Bhate would check to see if posting fliers at the post office would now be allowed though it has not been allowed in the past. Ms. Judy VanDeventer also indicated the U.S. Post Office would not allow postings. Also, Ms. Judy VanDeventer indicated that the slide incorrectly listed the convenience store location as there is a "9" missing from FM199. It should read "FM1999".

Ms. Judy VanDeventer stated that she had a correction to the TAG comment/response handed out for the Mayor of Uncertain. Mayor Greg Jones was pro-tem mayor. Mr. Mike Fox is the new Mayor of Uncertain. The change will be made to the CRP/CIP but was not included in the response to comments handed out.

Defense Environmental Restoration

Mr. Aaron Williams discussed an overview of the environmental work to be performed under the new contract awarded to Bhate. Dr. Rose Zeiler discussed a second contract to be awarded for sites that do not have decision documents. Ms. Judy VanDeventer asked about the two contracts and whether the next RAB will have the other contractor present.

Overview of Sites

Ms. Kim Nemmers presented the sites under the contract awarded to Bhate and general approaches for each site. Ms. Kim Nemmers stated that Bhate was implementing existing approaches or remedies to advance the sites towards closure. The performance objectives presented were established by the Army within the contract. Ms. Susan Watson pointed out the sites on a map as Ms. Kim Nemmers discussed each site. Ms. Kim Nemmers gave LHAAP-02 as an example of a site that will be able to move quickly to closure following additional groundwater sampling. LHAAP-03 will be advanced by completing an excavation for the soils and then moving the groundwater impacts to be addressed under the LHAAP-58 groundwater remediation. LHAAP-04 was discussed as having had a prior excavation and in-situ bioremediation is planned to be implemented for perchlorate in the groundwater.

LHAAP-12 and LHAAP-16 will continue to have groundwater monitoring. Dr. Rose Zeiler explained that Bhate will develop a remedial action work plan for LHAAP-16as one of their first actions. The work plan will allow for the completion of in-situ bioremediation and eventually phase-out of the existing pump and treat system. Ms. Kim Nemmers pointed out that LHAAP-16 was presented in detail in the previous July 2017 RAB slides. Ms. Kim Nemmers skipped discussion on LHAAP-17 and stated that Ms. Susan Watson would be discussing it in detail shortly. LHAAP-19 will continue post closure care to confirm that site closure is reasonable.

Scope for LHAAP-37 and LHAAP-67 includes remedial action-operation (RA-O). Sites LHAAP-46, LHAAP-50 and LHAAP-58 will have groundwater remediation in addition to RA-O. LHAAP-58 will involve implementation of additional in-situ bioremediation which requires finalization of the Explanation of Significant Difference (ESD). Dr. Rose Zeiler mentioned that LHAAP-58 is an example where monitored natural attenuation (MNA) was selected in the Record of Decision (ROD), and a contingency remedy was included in the ROD as a plan if MNA was not working. Based on the groundwater monitoring data, the plume may be migrating, and MNA is not considered to be working effectively. The LHAAP-58 ROD allows for implementation of a contingent remedy, and the ESD is being prepared for the implementation of the contingent remedy. The two Military Munitions Response Program (MMRP) sites, LHAAP-001-R-01 and LHAAP-003-R-01, will have land use control (LUC) remedial designs to advance the sites to closure.

Ms. Kim Nemmers explained that the groundwater treatment plant and Site LHAAP-18/24 work together as the operating interim remedial action. Operations of the plant will continue without interruption or changes. Bhate has hired the existing groundwater treatment plant operators. Ms. Kim Nemmers stated that Bhate was working to get out in the field quickly.

Ms. Kim Nemmers presented the slide of the map with the sites included in Bhate's contract. Ms. Kim Nemmers discussed the documents that will be prepared and the field work that is planned over the next 3 months and how that tied to the site objectives previously discussed.

LHAAP-17

Ms. Susan Watson presented the LHAAP-17 Pre-Design Investigation (PDI) plans. A remedy has been selected to address both soil and groundwater contamination at this site for both ecological and human receptors. The remedy for soil is excavation. There will be an interim remedy of groundwater extraction to reduce the high perchlorate concentrations to allow for MNA of the chlorinated solvents and perchlorate in groundwater to occur. To complete the remedy design, additional data will be gathered. A pre-approved PDI Work Plan is in place and will be implemented which includes soil sampling, groundwater sampling, and water level measurements to assess groundwater flow. Groundwater level data will also include data from LHAAP-18/24 due to proximity. Current cleanup standards will be used to determine the plume extent which may require installation of additional wells. A pump test will also be completed to develop the design of the interim pump and treat groundwater remedy.

Ms. Susan Watson directed the RAB participants to the LHAAP-17 PDI handouts as she discussed the soil sampling plan as well as the monitoring wells to be sampled. Ms. Judy VanDeventer asked why we are having to do so much more sampling. Dr. Rose Zeiler explained that the previous analytical results are older, and the detection limits are no longer low enough to ensure that the soil and groundwater meets the current cleanup levels. Ms. Susan Watson also indicated that the soil will be excavated and the data will allow for determination of the amount of soil to be removed. Mr. Richard Le Tourneau asked if the laboratory methods had changed to allow for this improved resolution. Dr. Rose Zeiler explained that the methods had not changed but the resolution had improved over time as driven by the regulatory requirements for the lower detection limits. Mr. Paul Fortune asked what the worse-case scenario volume of soil removal at LHAAP-17. Dr. Rose Zeiler referenced the LHAAP-17 figure and indicated the maximum area could be almost the entire site. The excavated quantity would be to a certain depths over a specific area, that would then be multiplied by the "fluff" factor to determine the volume. Ms. Susan Watson also pointed out that the depth and extent of excavation could vary across the site depending upon if ecological receptor criteria apply. Mr. Tom Walker asked where the soil would be disposed. Dr. Rose Zeiler stated that the soil would be disposed of at a licensed landfill based on the waste characterization. The question was asked where the soil would come from for backfilling. Dr. Rose Zeiler indicated it would likely come from off site and that the backfill material must be tested prior to acceptance as backfill material. Mr. Paul Fortune asked how deep is the deepest well at LHAAP-17. Ms. Susan Watson indicated she was not sure exactly but generally wells in the deep zone should be screened deeper than 50 feet below ground surface.

Ms. Susan Watson then presented the proposed extraction system at LHAAP-17 that may include three extraction wells piped to a holding tank. From the holding tank, the extracted groundwater will be pumped to the existing groundwater treatment plant by tying into existing piping. The exact location and configuration of wells will depend on the groundwater results. Dr. Rose Zeiler stated that additional data might be presented on the LHAAP-17 PDI at the next RAB. Ms. Susan Watson stated that potentially groundwater analytical results and a potentiometric map (groundwater flow) might be available. However, soil data will not likely be available for the January 2018 RAB meeting.

Groundwater Treatment Plant

Ms. Kim Nemmers then discussed the groundwater treatment plant operations. The August 2017 dip in the groundwater treated was explained by Ms. Kim Nemmers as a transformer issue. A faulty circuit was identified in the transformer, which was hit by lightning during the hurricane event (Hurricane Harvey). However, the system was put back online and is running. Ms. Kim Nemmers discussed improvements to the groundwater system to minimize downtime, including a new Programmable Logic Controller (PLC) and transformer.

Surface Water Sampling

Ms. Kim Nemmers presented the surface water sample locations and perchlorate sample result slides. Many of the surface water sample locations are dry currently due to drought conditions. Ms. Susan Watson pointed out that handouts are available for the groundwater treatment plant and the surface water sampling.

LHAAP-18/24, -29, and -47

Dr. Rose Zeiler discussed that information presented during the RAB are primarily sites that are towards the end of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) processes. However, Sites LHAAP-18/24, -29, and -47 are lagging behind because no Final RODs are in-place. Draft RODs were prepared for Site LHAAP-29 and -47 but additional data is being collected. LHAAP-29 has had recent work that was previously discussed with the RAB. Dr. Rose Zeiler explained that these sites will be in the new contract to be awarded. LHAAP-

18/24 is in the Feasibility Study phase. These sites will move through the ROD phase and then a different contract will be awarded to implement the selected remedy since the remedy has not been finalized for them yet.

Next RAB Meeting Schedule and Closing Remarks
The next RAB meeting will be held on **January 18, 2018,** at the same time (**6:00 – 7:00 p.m.**) at the Karnack Community Center.

Questions were asked about Bhate and the relationship between Bhate and APTIM Federal Services, LLC (APTIM). Mr. Aaron Williams explained that Bhate was the prime contractor on the contract and that APTIM was their subcontractor. Ms. Kim Nemmers provided a brief synopsis of Bhate, a company based in Birmingham, AL. Bhate is named for Mr. Sam Bhate, who is one of the owners along with Mr. Johnny Roberts. Bhate does several types of work including performance-based remediation projects for the Air Force in nearby southern states. Ms. Kim Nemmers explained that APTIM is part of the contract support to Bhate. Ms. Susan Watson explained that APTIM is a new company that was recently formed by a private equity firm that purchased a portion of Chicago Bridge and Iron (CB&I).

Adjourn
Motion to adjourn was made by Ms. Carol Fortune and seconded by Ms. Judy VanDeventer.

October 2017 Meeting Attachments and Handouts:

- Meeting Agenda
- Color Copy of Bhate Presentation Slides
- Groundwater Treatment Plant (GWTP) – Processed Groundwater Volumes Handout
- Harrison Bayou and Goose Prairie Creek – Surface Water Perchlorate Data Handout
- Longhorn Army Ammunition Plant Creek Sampling Locations Map
- Response to September 25, 2017, TAG Comments on Draft Final Community Involvement Plan
- Figure 3-1 Proposed Soil Sample Locations Pre-Design Investigation Work Plan LHAAP-17
- Figure 3-2 Wells Proposed Pumping Test Pre-Design Investigation Work Plan LHAAP-17
- Restoration Advisory Board Membership Application

LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD
Karnack, Texas
(479) 635-0110

AGENDA

DATE:	Thursday, October 19, 2017
TIME:	6:00 – 7:00 PM
PLACE:	Karnack Community Center, Karnack, Texas

06:00 Welcome and Introduction

06:05 Open Items {RMZ}

- RAB Administrative Issues
- Minutes (July 2017 RAB Meeting)
- Ongoing Outreach/Website (2017 Volumes 1-6 loaded)

06:15 Community Relations Plan/Community Involvement Plan Update {Cathy Kropp (AEC PAO)}

06:25 Sitewide Environmental Restoration Issues {RMZ}

- New Environmental contract awarded September 29, 2017
- Surface Water Sampling Update

06:35 Defense Environmental Restoration Program (DERP) Update {Bhate}

- Introduction of Team
- Work at LHAAP under the new contract
- Synopsis of first three month activities
- Groundwater Treatment Plant (GWTP) Update

Next RAB Meeting Schedule and Closing Remarks

07:00 Adjourn {RMZ}

Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting

Karnack Community Center
October 19, 2017
6:00 PM CDT

00863711

Restoration Advisory Board (RAB) Meeting

Agenda

06:00 Welcome and Introduction

06:05 Open Items {RMZ}

- RAB Administrative Issues
- Minutes (July 2017 RAB Meeting)
- Ongoing Outreach/Website (2017 Volumes 1-6 loaded)

06:15 Community Relations Plan/Community Involvement Plan Update -Cathy Kropp (AEC PAO)}

06:25 Sitewide Environmental Restoration Issues {RMZ}

- New Environmental contract awarded September 29, 2017
- Surface Water Sampling Update

06:35 Defense Environmental Restoration Program (DERP) Update {Bhate}

- Introduction of Team
- Work at LHAAP under the new contract
- Synopsis of first three month activities
- Groundwater Treatment Plant (GWTP) Update

Next RAB Meeting Schedule and Closing Remarks

07:00 Adjourn {RMZ}

bhate ENVIRONMENT INFRASTRUCTURE

Ongoing Outreach – Notification for October RAB Meeting

- Published RAB announcements in Marshall News Messenger on October 12, 2017
- Requested the following radio stations to air October 2017 RAB Meeting Public Service Announcement (PSA):
  - KMHT Radio 103.9 (Karnack)
  - 98 Rocks (Alpha Media, Shreveport) and
  - Kiss Country 93.7 (Town Square Media, Shreveport)
- Requested PSA to be placed on KTBS Channel 3, KTAL Channel 6 TV, KSLA Channel 12 Community/Local Events Calendar
- Sent RAB announcement/agenda by email and United States Postal Service (USPS) to individual RAB members and other interested parties
- Mailed RAB announcement to churches in Karnack on October 10, 2017
- Posted RAB meeting fliers at multiple locations in the community:
  - Shady Glade Café, Caddo Grocery, Fyffes Corner Store, Circle S Grocery, Run In Grocery, Family Dollar Store, Convenience Store at FM9 and FM199

Minutes from Past RAB Meetings

Discussion of July 2017 RAB Meeting minutes/motion to accept

The Army Wants You to be Informed

- The Army is committed to protecting human health and the environment; key to that commitment is engaging the community and increasing public participation in environmental restoration at LHAAP

- You are encouraged to:
  - Attend RAB Meetings and/or become a member of the RAB
  - Visit the Longhorn environmental website at www.longhornaap.com
  - Make suggestions for improving communication – the Army welcomes and appreciates community feedback

New Environmental Contract

Awarded on September 29, 2017 to Bhate Environmental Associates Inc. (Bhate), with APTIM Federal Services (APTIM) as subcontractor

- **Fixed Price Performance Based Remediation contract**
- **Period of Performance – September 29, 2017 to September 30, 2022**
- **Scope includes:**
  - Remedial Action and Remedial Action - Operation (RA-O) at 14 sites
  - GWTP Operations and Maintenance (O&M)
  - LHAAP-18/24 Compliance Sampling/Reporting
  - Surface water sampling
  - Administrative Record management
  - RAB and Monthly Managers Meeting support
  - Website and SmartMap management
  - Land Use Control Management Plan
  - Well Plugging/Abandonment

Restoration Advisory Board Meeting

New Environmental Contract

Task	Site Identification (ID)/Name	Performance Objective
2	LHAAP-02: Vacuum Truck Overnight Parking Lot	Groundwater Sampling; Response Complete (RC)
3	LHAAP-03: Building 722 Paint Shop	Remedial Action; RC
4	LHAAP-04: Pilot Wastewater Treatment Plant	Remedial Action Remedial Action - Operation (RA-O)
5	LHAAP-12: Landfill 12 (SWMU 12)	RA-O
6	LHAAP-16: Old Landfill (SWMU 16)	Remedial Action; RA-O
7	LHAAP-17: No. 2 Flashing Area/Burning Ground (SWMU 17)	Remedial Action; RA-O
8	LHAAP-19: Construction Materials Landfill	Landfill O&M; RC

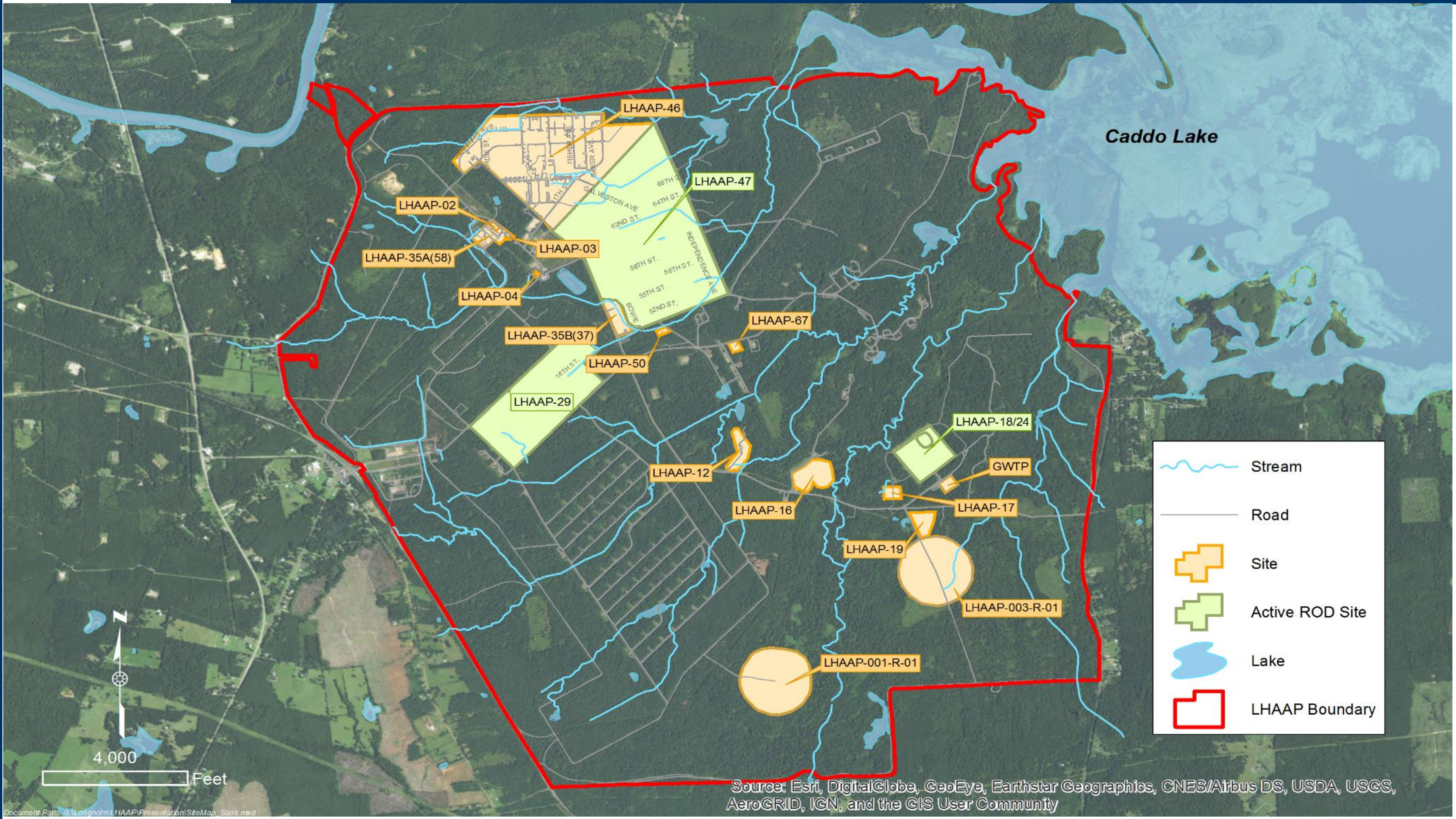
New Environmental Contract

Task	Site Identification (ID)/Name	Performance Objective
9	LHAAP-37: Chemical Laboratory Waste Pad	RA-O
10	LHAAP-46: Plant 2/Pyrotechnic Operation	RA-O
11	LHAAP-50: Former Waste Disposal Facility	RA-O
12	LHAAP-58: Maintenance Complex	RA-O
13	LHAAP-67: Above Ground Storage Tank	RA-O
14	LHAAP-001-R-01: South Test Area/Bomb Test Area	Long Term Monitoring (LTM)
15	LHAAP-003-R-01; Ground Signal Test Area	LTM
16	Groundwater Treatment Plant (GWTP)	RA-O and O&M
17	LHAAP-18/24: Burning Ground/Washout Pad/UEP	Continue Interim RA-O

00863718

Restoration Advisory Board Meeting

Site Map



bhate ENVIRONMENT INFRASTRUCTURE

Restoration Advisory Board Meeting

FIRST 3 MONTHS' ACTIVITIES - Documents

Site	Document
LHAAP-03	Response to Comment (RTC) – Draft Final (DF) Record of Decision (ROD)
LHAAP-03	Explanation of Significant Difference (ESD)
LHAAP-04	Remedial Design (RD)
LHAAP-16	Remedial Action Work Plan (RAWP)
LHAAP-50	Year 3 RA-O Report
LHAAP-58	RTC - Draft ESD
LHAAP001-R-01	Land Use Control (LUC) RD
LHAAP003-R-01	LUC RD
GWTP	O&M Plan
Base wide	LUC Management Plan

bhate ENVIRONMENT INFRASTRUCTURE

FIRST 3 MONTHS' ACTIVITIES-Field Work

Site	Activity
LHAAP-02	Groundwater Sampling
LHAAP-04	Install wells/sample
LHAAP-12	RA-O Sampling
LHAAP-17	Pre-Design Investigation (PDI) – Sample Soil & Groundwater, install wells, conduct pump tests
LHAAP-37	RA-O Sampling
LHAAP-50	RA-O Sampling
LHAAP-58	RA-O Sampling
LHAAP-67	RA-O Sampling
LHAAP001-R-01	2nd Annual monitoring
Surface Water	Collect Surface Water samples

LHAAP-17: No. 2 Flashing Area/Burning Ground

Constituents of Concern (COCs)

- Soil: Explosives (2,4-DNT, 2,6-DNT, and 2,4,6-TNT), barium, and dioxins
- Groundwater: Perchlorate, chlorinated solvents (TCE, 1,2-DCE, VC)

Proposed Remedy:

- Soil excavation
- Groundwater extraction to reduce perchlorate concentrations to less than 20,000 micrograms per liter (µg/L), an interim cleanup level. Once level is reached, the remedial action will transition from extraction to monitored natural attenuation (MNA).

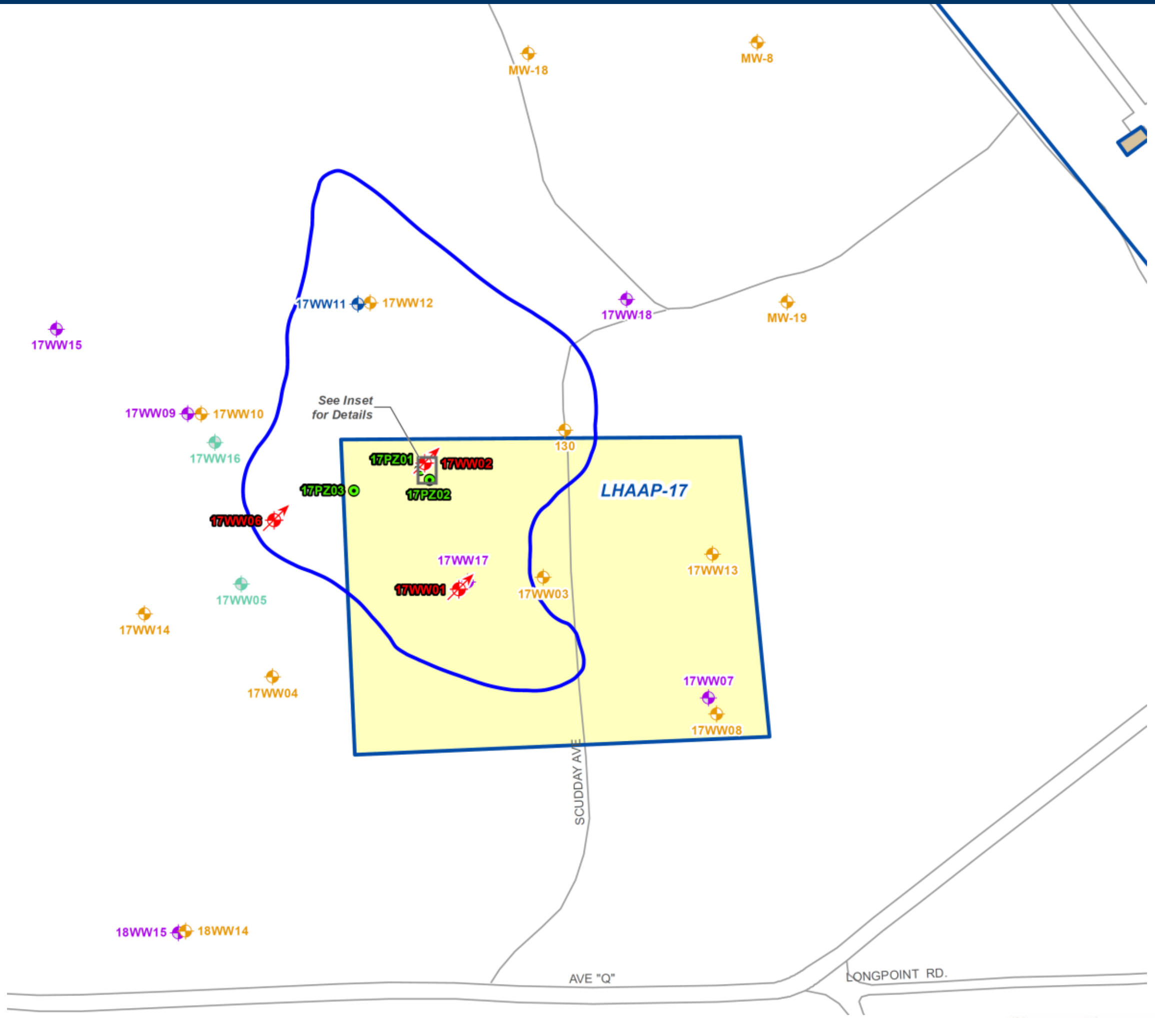
Scope of PDI:

- Conduct groundwater gauging and sampling and install up to 3 monitoring wells to define current groundwater plumes
- Conduct soil sampling to define soil contamination to design excavation
- Conduct aquifer pumping tests to collect data to design the extraction system

00863722

Restoration Advisory Board Meeting

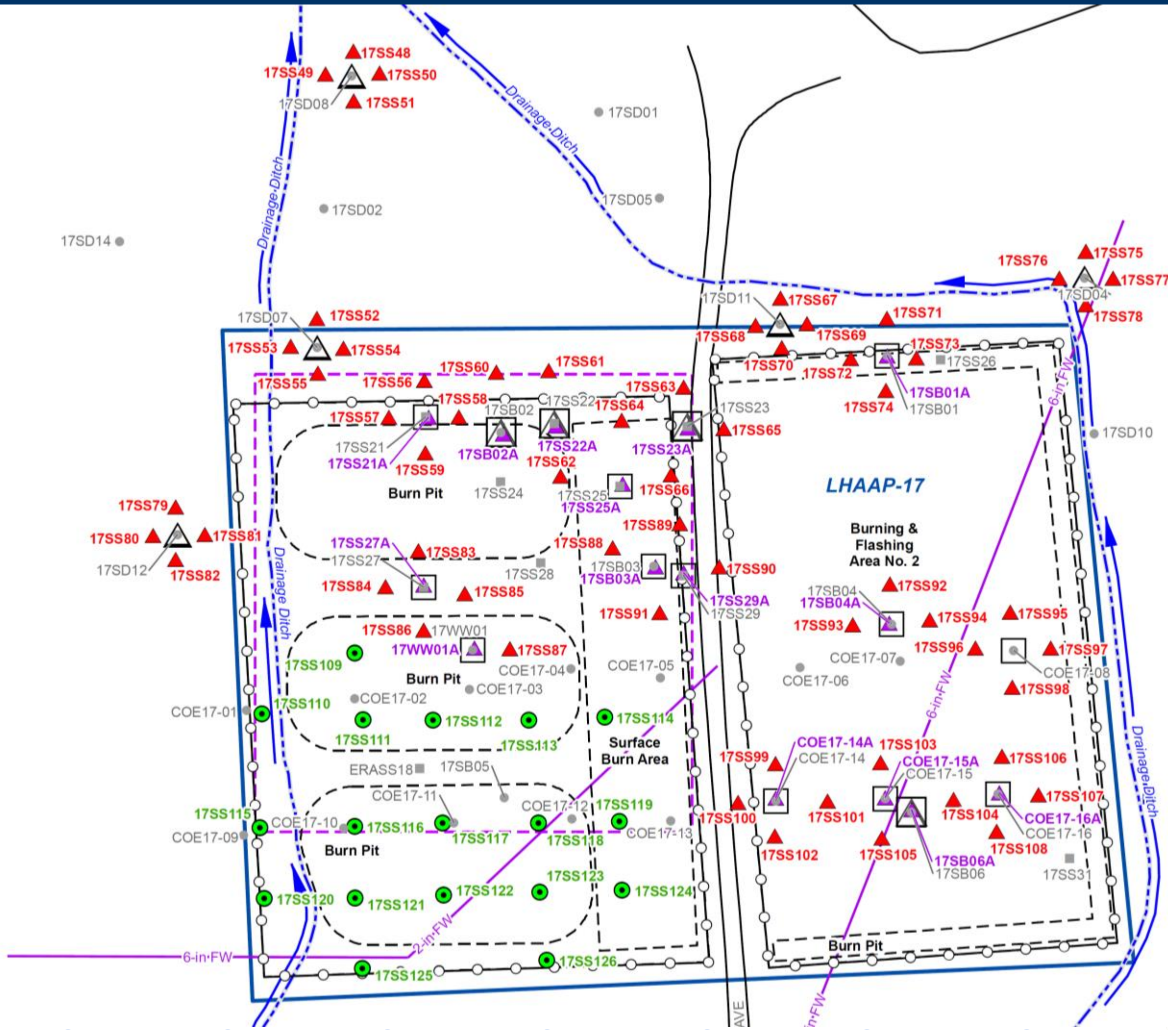
LHAAP-17: Site Map (Groundwater Wells)



bhate ENVIRONMENT INFRASTRUCTURE

Restoration Advisory Board Meeting

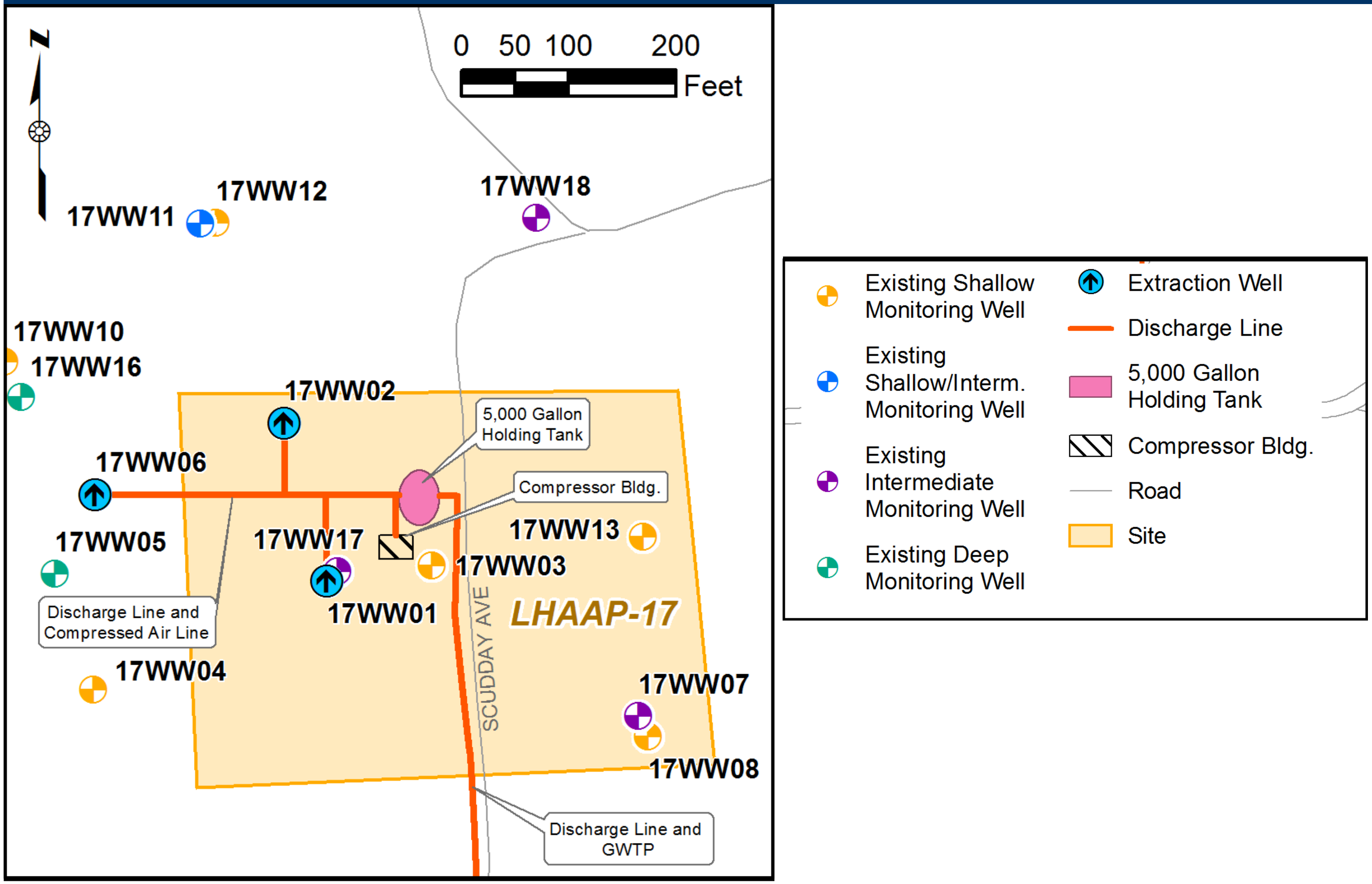
LHAAP-17: Soil Sampling



bhate ENVIRONMENT INFRASTRUCTURE

Restoration Advisory Board Meeting

LHAAP-17: Proposed Extraction System



bhate ENVIRONMENT INFRASTRUCTURE

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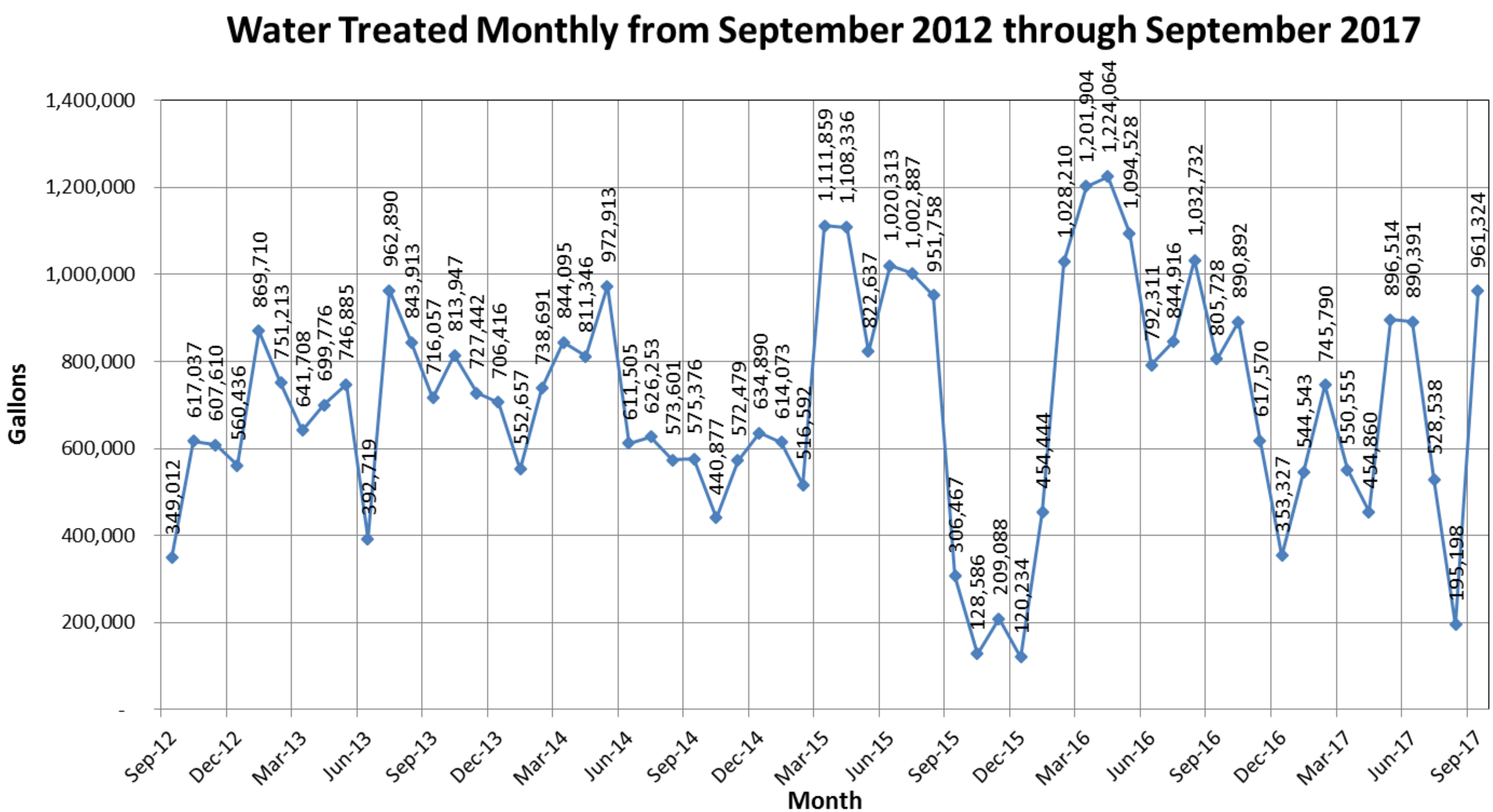
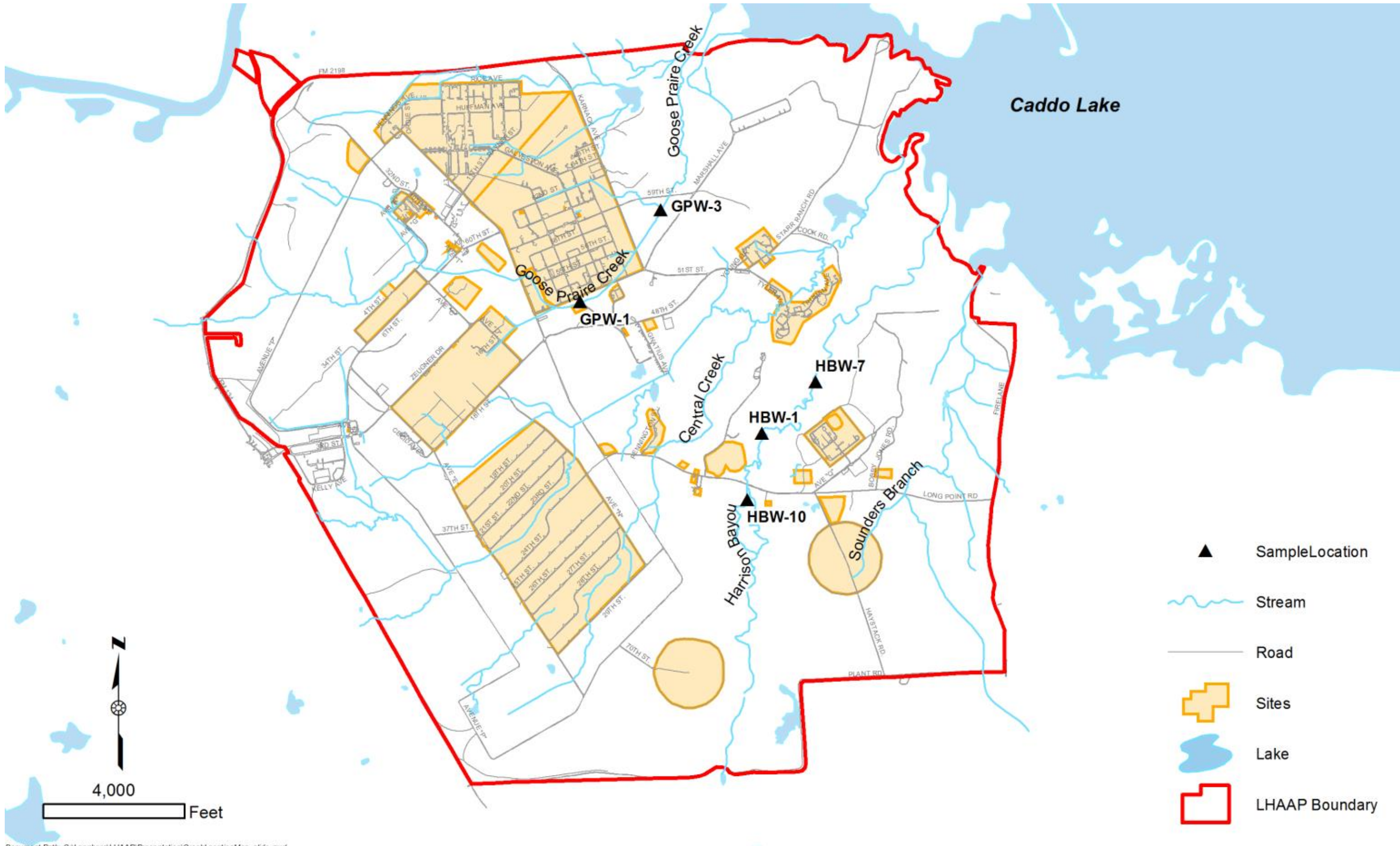
Restoration Advisory Board Meeting

GWTP UPDATE



Restoration Advisory Board Meeting

Surface Water Sample Locations



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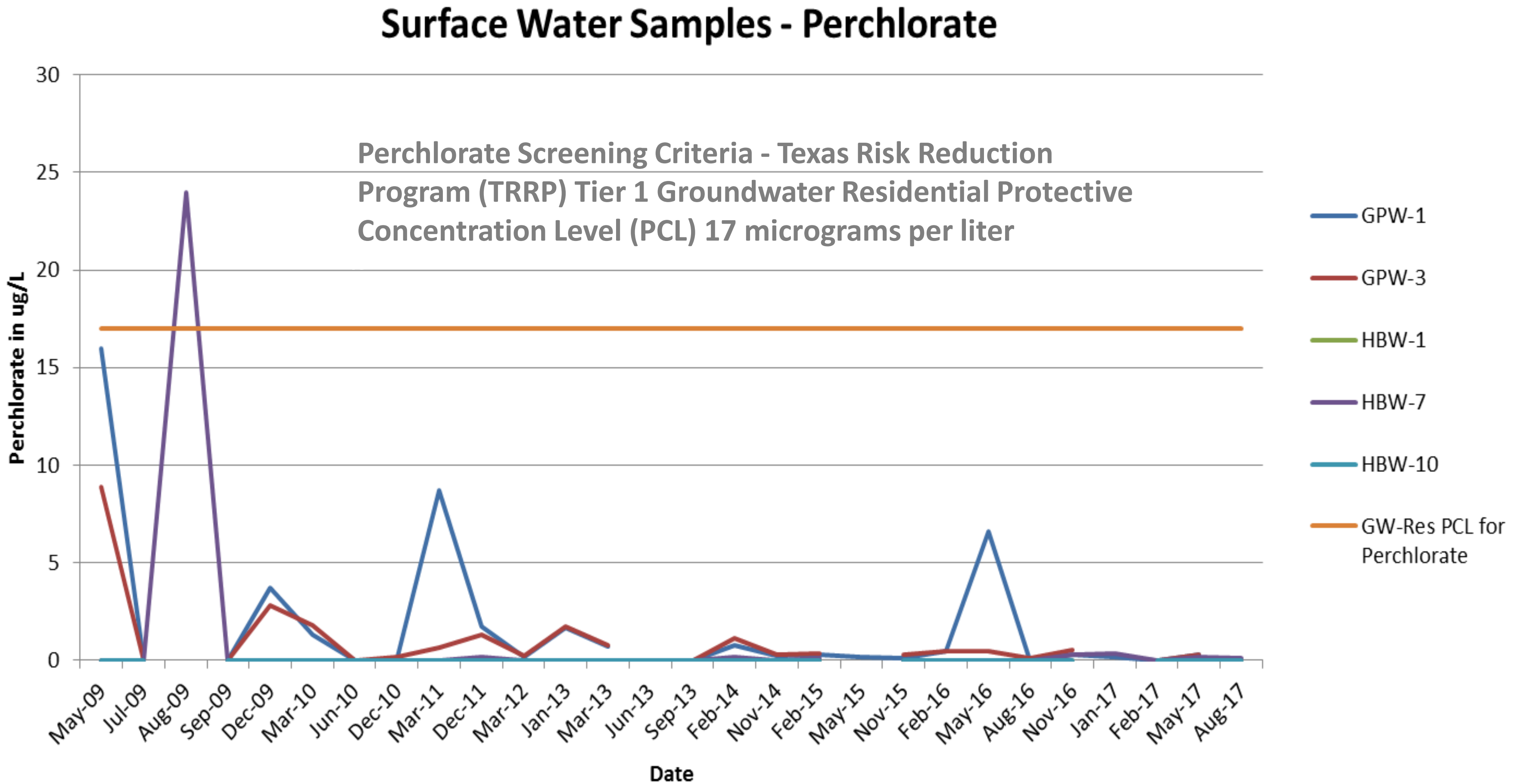
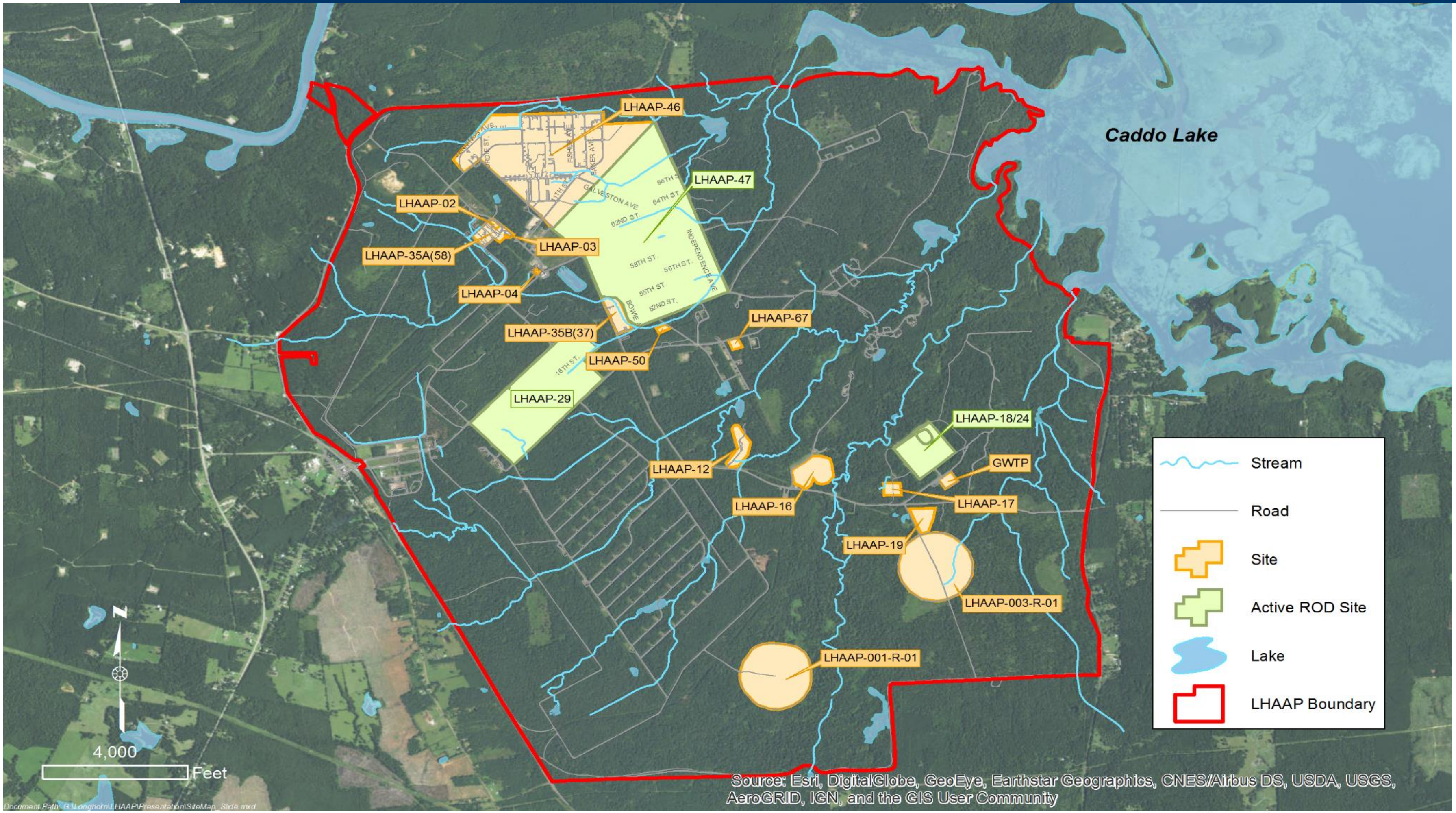
bhate ENVIRONMENT INFRASTRUCTURE

Surface Water Sample Results



bhate ENVIRONMENT INFRASTRUCTURE

Environmental Sites Under Separate Contract



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Abbreviations and Acronyms

µg/L	micrograms per liter
AEC	Army Environmental Command
CDT	central daylight time
COC	constituents of concern
DCE	dichloroethene
DERP	Defense Environmental Restoration Program
DNT	dinitrotoluene
DF	Draft Final
ESD	explanation of significant difference
GW	groundwater
GWTP	groundwater treatment plant
LHAAP	Longhorn Army Ammunition Plant
LTM	long term monitoring
LUC	land use controls
MNA	monitored natural attenuation
MW	monitoring well
O&M	Operation and Maintenance

PAO	public affairs officer
PDI	pre-design investigation
PSA	public service announcement
RAB	Restoration Advisory Board
RA-O	Remedial Action - Operation
RAWP	Remedial Action Work Plan
RD	remedial design
ROD	Record of Decision
RTC	response to comment
RC	Response complete
SW	surface water
SWMU	solid waste management unit
TCE	trichloroethene
TNT	trinitrotoluene
UEP	unlined evaporation pond
USPS	U.S. Postal Service
VC	vinyl chloride

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Next RAB Meeting Schedule & Closing Remarks

- Schedule January 2018 RAB Meeting
- Other Issues/Remarks

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Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water.

Processed Water Data

(in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199

Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716

Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547

Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456

Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012

Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057

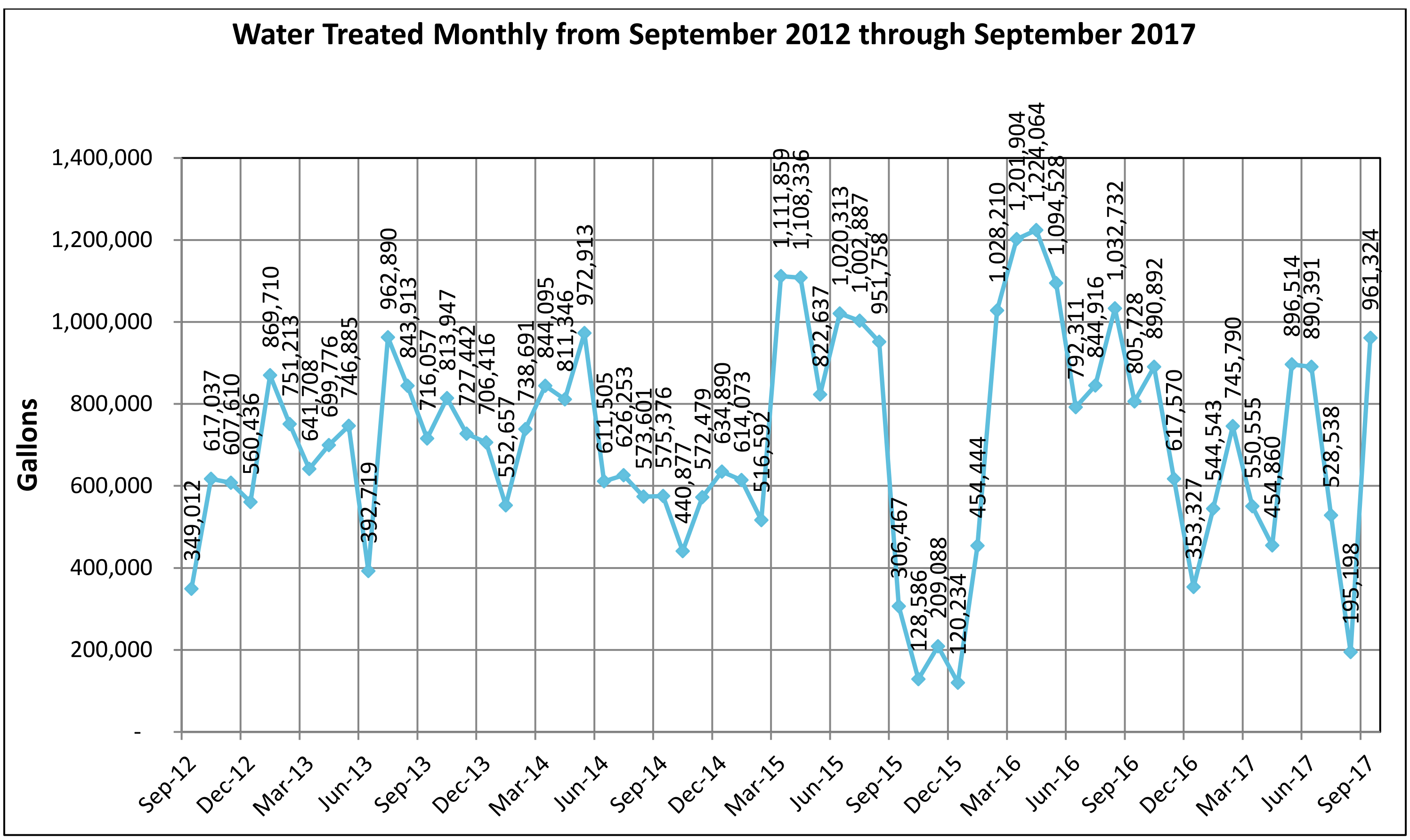
Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376

Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467

Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728

Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324

*Indicates Estimate



Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Oct-16	0	642,876	0	0	0
Nov-16	0	576,898	0	0	0
Dec-16	0	236,688	0	0	0
Jan-17	0	0	0	0	0
Feb-17	0	0	0	0	14,355
Mar-17	127,242	0	0	0	14,400
Apr-17	113,038	0	236,821	0	0
May-17	205,665	0	534,155	0	0
Jun-17	467,830	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	0	0	309,980	651,434	0

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Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

Quarter	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**
Creek Sample ID	**Jul 1999**	**Sep 1999**	**Feb 2000**	**Apr 2000**	**Aug 2000**	**Dec 2000**	**Feb 2001**	**Apr 2001**	**July 2001**	**Oct 2001**	**Jan 2002**
GPW-1	<1.0U	-	4	<4.0 U	<4.0 U	<4.0 U	-	2.65	<4.0 U	<4.0 U	<4.0 U
GPW-3	<1.0U	<4.0 U	17	8	<4.0 U	<4.0 U	-	2.28	<4.0 U	<4.0 U	<4.0 U
HBW-1	-	<80.0 U	310	23	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-7	-	<8.0 U	370	110	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-10	-	<8.0 U	905	650	<4.0 U	-	<4.0 U	-	<4.0 U	-	-

Quarter	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**3rd**	**4th**	**2nd**	**3rd**	**4th**
Creek Sample ID	**June 2002**	**Sept 2002**	**Dec 2002**	**Feb 2003**	**June 2003**	**Aug 2003**	**July 2004**	**Dec 2006**	**May 2007**	**Aug 2007**	**Dec 2007**
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 U	<1.0 U	7.48
HBW-1	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	99.3	<0.2U	<1.0 U	<1.0 U	122	<1.0 U
HBW-7	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	<4.0 U	<0.2U	<1.0 U	<1.0 U	1.02	<1.0 U
HBW-10	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	-	<0.2U	<1.0 U	<1.0 U	<1.0 U	<1.0 U

Quarter	**1st**	**2nd**	**3rd**	**4th**	**2nd**	**3rd**	**3rd**	**3rd**	**4th**	**1st**	**2nd**
Creek Sample ID	**Mar 2008**	**Jun 2008**	**Sep 2008**	**Dec 2008**	**May 2009**	**Jul 2009**	**Aug 2009**	**Sep 2009**	**Dec 2009**	**Mar 2010**	**Jun 2010**
GPW-1	27	<0.5U	<0.5U	<0.22U	16	<4U	NS	<1.2U	3.7	1.3J	<0.6U
GPW-3	21.9	9.42	1.1	<0.22U	8.9	<4U	NS	<0.6U	2.8	1.8J	<0.6U
HBW-1	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.5U	<0.6U
HBW-7	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	24	<1.2U	<0.275U	1.5U	<0.6U
HBW-10	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.2U	<0.6U

Quarter	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**	**4th**	**1st**
Creek Sample ID	**Sep 2010**	**Dec 2010**	**Mar 2011**	**Jun 2011**	**Sep 2011**	**Dec 2011**	**Mar 2012**	**Jun 2012**	**Not Applicable**	**Jan & Feb 2013**	**Mar 2013**
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	NS	1.74	0.754
HBW-1	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U
HBW-7	dry	<0.1U	<0.2U	dry	dry	0.171J	0.1U	dry	NS	<0.2U	<0.2U
HBW-10	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U

Quarter	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3nd**	**4th**	**1st**	**2nd**	**3rd**	**4th**
Creek Sample ID	**Jun 2013**	**Sept 2013**	**Dec 2013**	**Feb 2014**	**May 2014**	**Aug 2014**	**Nov 2014**	**Feb 2015**	**May 2015**	**Aug 2015**	**Nov 2015**
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry	dry	0.311 J
HBW-1	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U
HBW-7	<0.2U	<0.2 U	dry	0.201 J	dry	dry	<0.2 U	0.124 J	dry	dry	<0.2 U
HBW-10	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U

Quarter	**1st**	**2nd**	**3rd**	**4th**	**1st**	**2nd**	**3rd**
Creek Sample ID	**Feb 2016**	**May 2016**	**Aug 2016**	**Nov 2016**	**Feb 2017**	**May 2017**	**Aug 2017**
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263	dry
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	dry
HBW-1	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	<0.2 U
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J	<1 U	0.155	<0.2 U
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	0.111J

NS – not sampled U – non-detect J – Estimated Dry – no surface water

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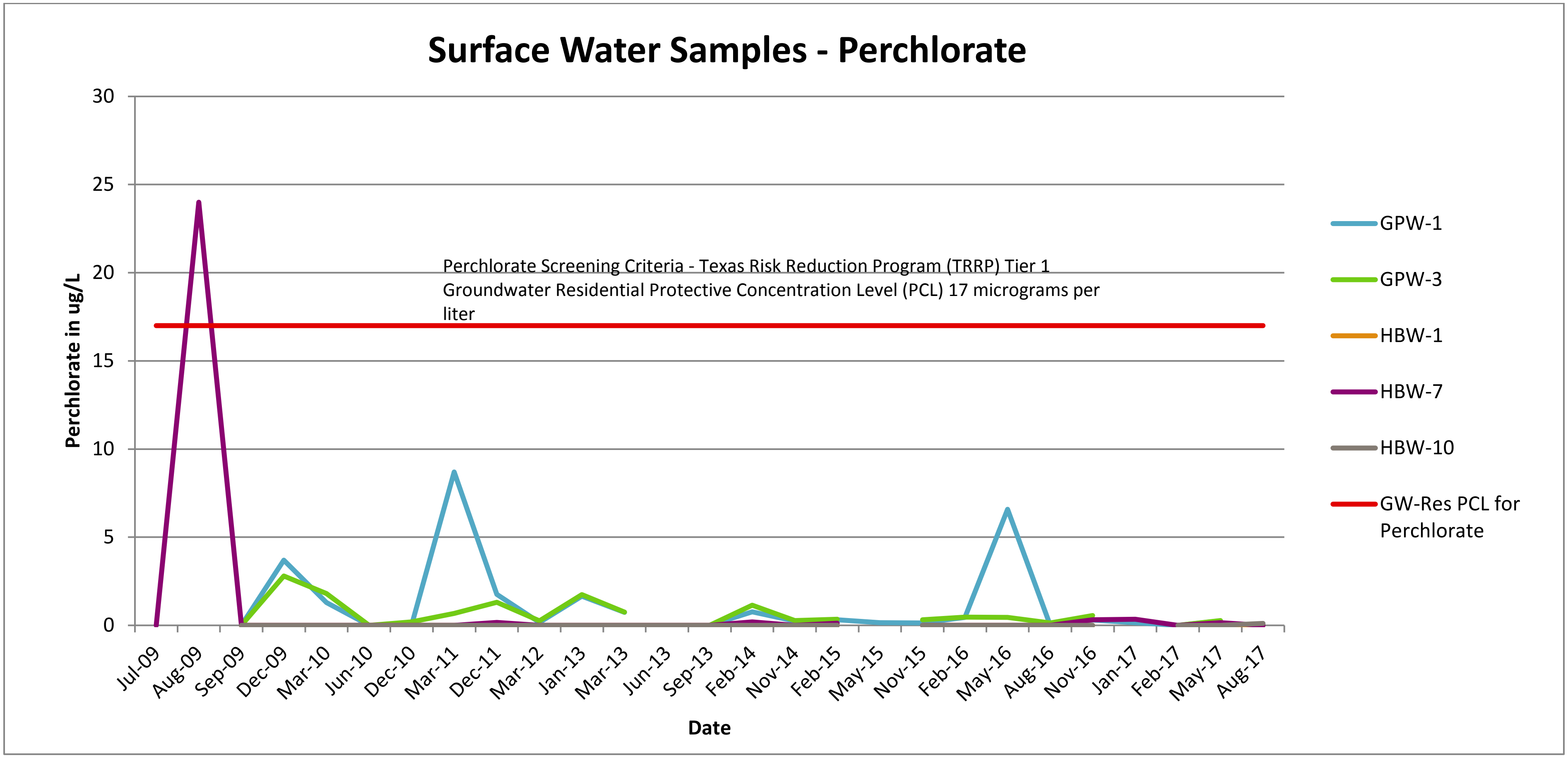
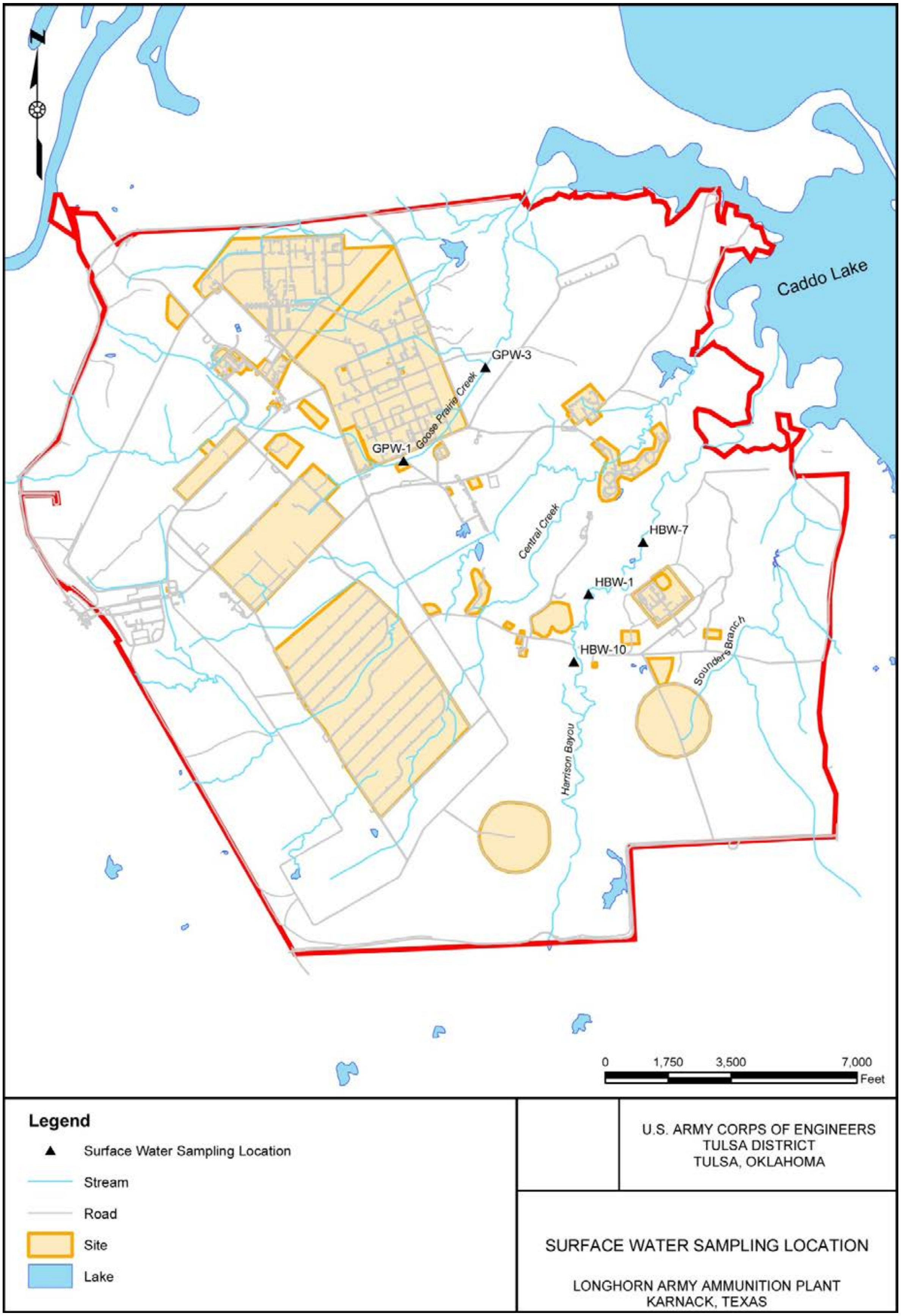


Surface Water Samples - Perchlorate
Perchlorate in ug/L
30
25
20
15
10
5
0
Perchlorate Screening Criteria - Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level (PCL) 17 micrograms per liter
Jul-09
Aug-09
Sep-09
Dec-09
Mar-10
Jun-10
Dec-10
Mar-11
Dec-11
Mar-12
Jan-13
Mar-13
Jun-13
Sep-13
Feb-14
Nov-14
Feb-15
May-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Jan-17
Feb-17
May-17
Aug-17
Date
GPW-1
GPW-3
HBW-1
HBW-7
HBW-10
GW-Res PCL for Perchlorate

Longhorn Army Ammuntion Plant Creek Sampling Locations



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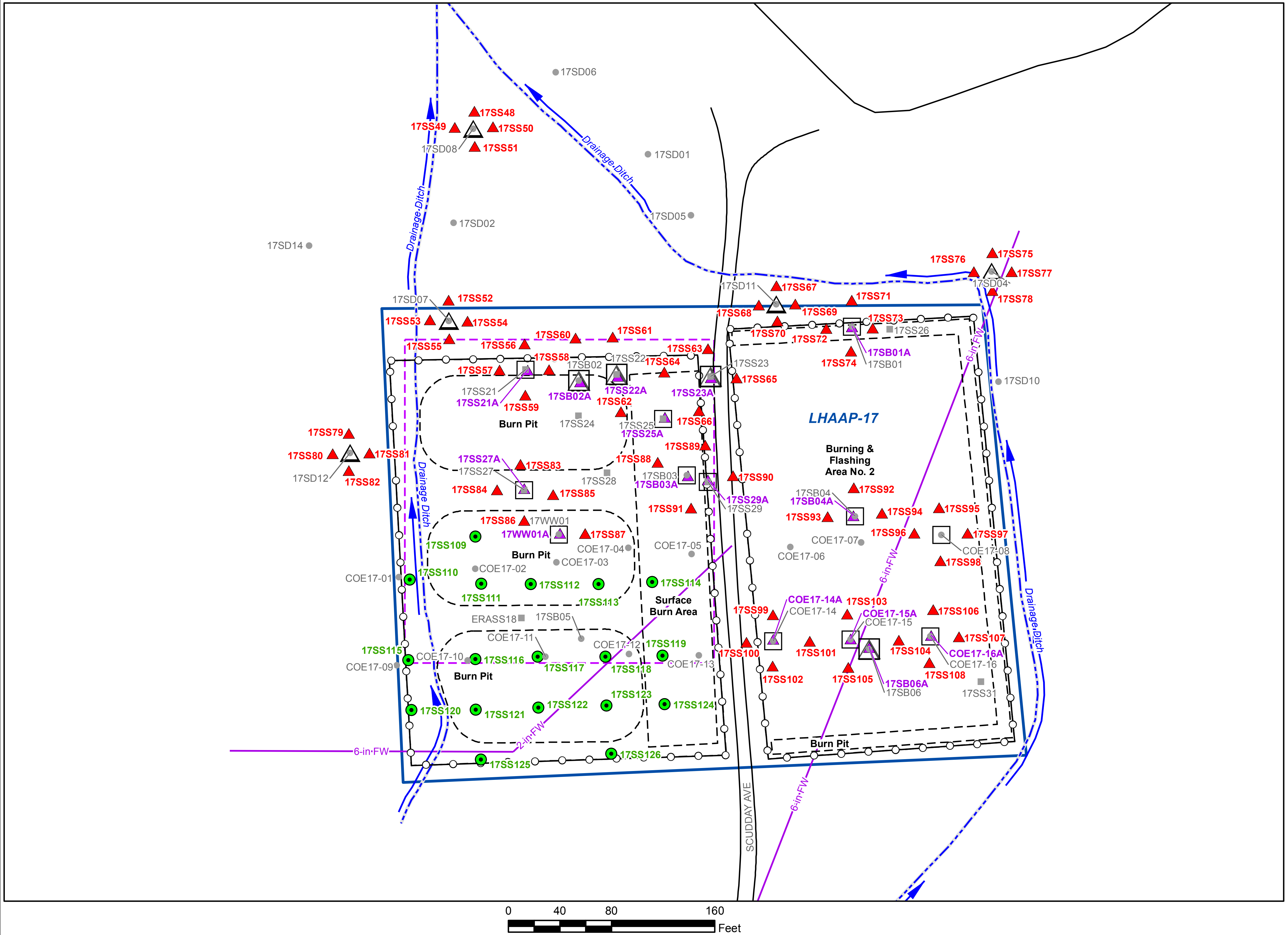

Legend

- Proposed Soil Sample Location
- Re-Sample Previous Location at Deeper Interval
- Proposed Shallow Soil Sample Location in Area Lacking Historical Data
- Existing Sample location with contamination that poses Ecological Risk.
- Existing Sample location with contamination that poses Human Health Risk (for soil to groundwater).
- Existing Soil Sample Location
- Existing Surface Soil/Sediment Location
- Fence Line
- 2 inch (in) and 6 inch Diameter Fire Water (FW) Line (Respectively)
- Drainage Ditch
- Surface Water Flow Direction
- LHAAP-17 Site Boundary
- Approximate Boundary of Treatability Demonstraiton Study (PEC, 2004)

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Figure 3-1
Proposed Soil Sample Locations
Pre-Design Investigation Work Plan
LHAAP-17
Longhorn Army Ammunition Plant
Karnack, Texas

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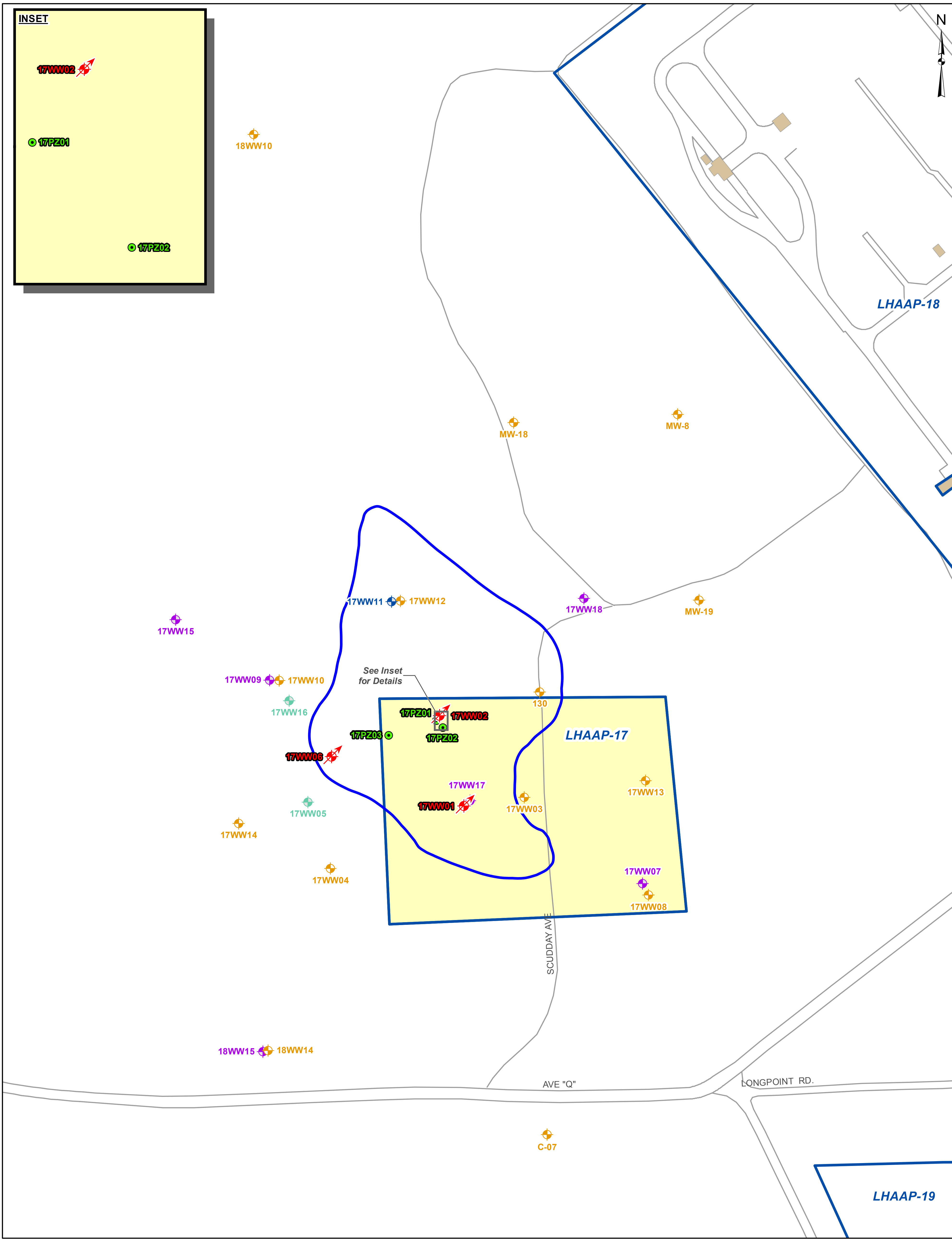
November 2016

Document Path: L:\AGE\GIS\AUS GIS\GIS_Projects\Longhorn_AAP\01_Reports\LHAAP-17\PreDesign_Work_Plan\Fig 3-2 LHAAP17 Prop WLs for Pumping Test.mxd



Legend

- Existing Shallow Monitoring Well
- Existing Shallow/Intermediate Monitoring Well
- Existing Intermediate Monitoring Well
- Existing Deep Monitoring Well
- Existing Shallow Monitoring Well for Proposed Pumping Test
- Proposed Piezometer Location
- Perchlorate Plume (PCL = 17 μg/L)
- LHAAP-17 Site Boundary
- Other Site Boundary

Note:
PCL - Protective Concentration Level for residential groundwater

0 75 150 300 Feet

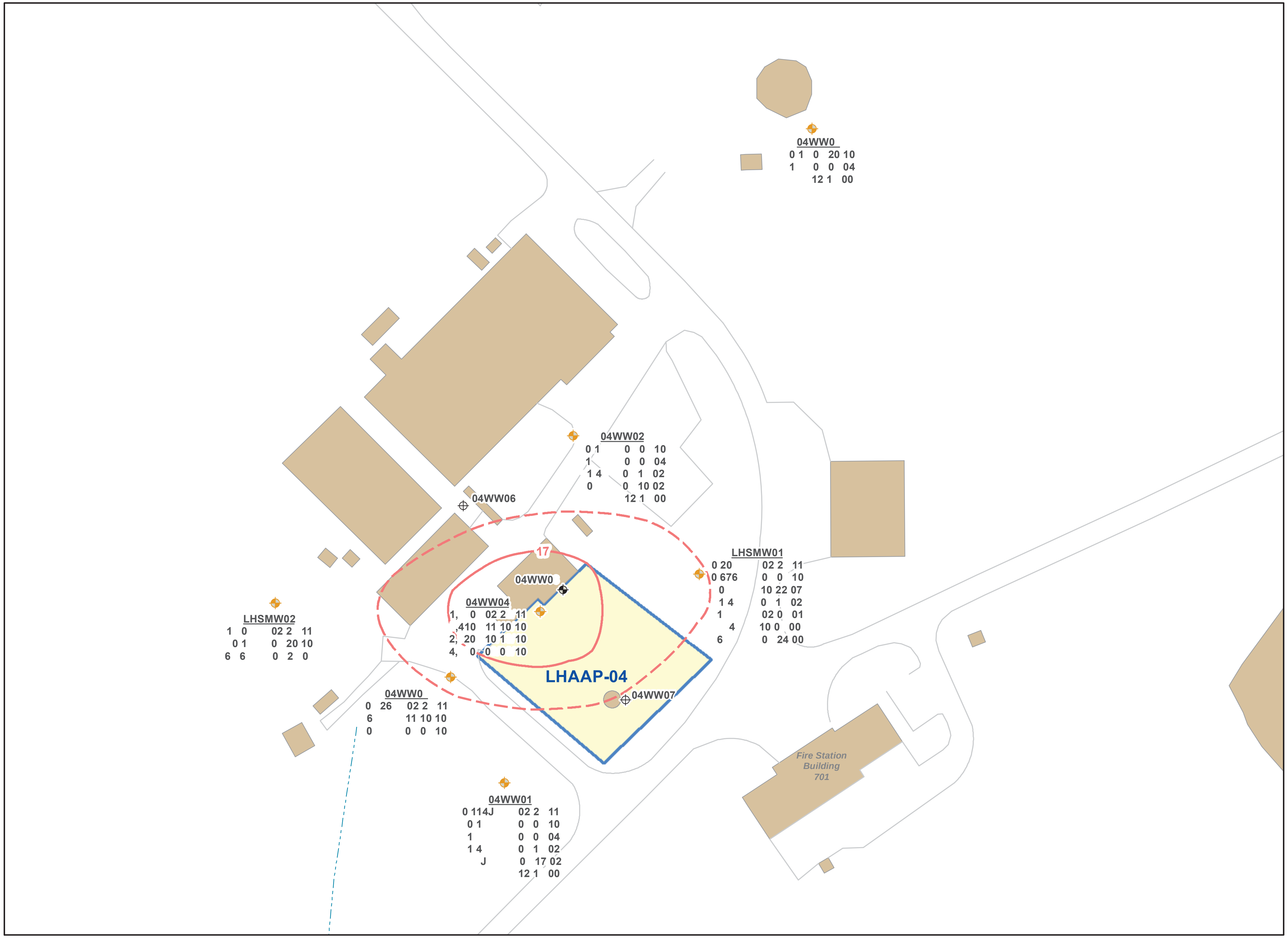
AECOM

Figure 3-2
Wells for Proposed Pumping Test
Pre-Design Investigation Work Plan
LHAAP-17

60256135

Longhorn Army Ammunition Plant
Karnack, Texas

August 2016



Legend

- Proposed Shallow Monitoring Well
- Proposed Intermediate Monitoring Well
- Shallow Monitoring Well
- Perchlorate Plume Extent (PCL - 17 µg/L)
- Possible Past Extent of Perchlorate
- Stream
- Road
- Building
- LHAAP-04 Site Boundary

Source: Modified from Shaw 2012, LHAAP-04 Feasibility Study Report

0 50 100 200 Feet

Notes:
1. Perchlorate concentrations reported in micrograms per liter (µg/L).
2. Plume boundaries based on most recent results available at each well (2011).
3. The wells 04WW06, 04WW07, and 04WW08 are proposed and will be installed as part of the Remedial Design activities. Locations shown are approximate and will be adjusted in the field based on site conditions and any additional data that may be available at that time.
4. PCL - Texas Risk Reduction Program Protective Concentration Level for Residential Groundwater.

AECOM

Figure 2-6
Perchlorate Concentrations in Groundwater
LHAAP-04 Record of Decision
Longhorn Army Ammunition Plant
Karnack, Texas

60274185 October 2016

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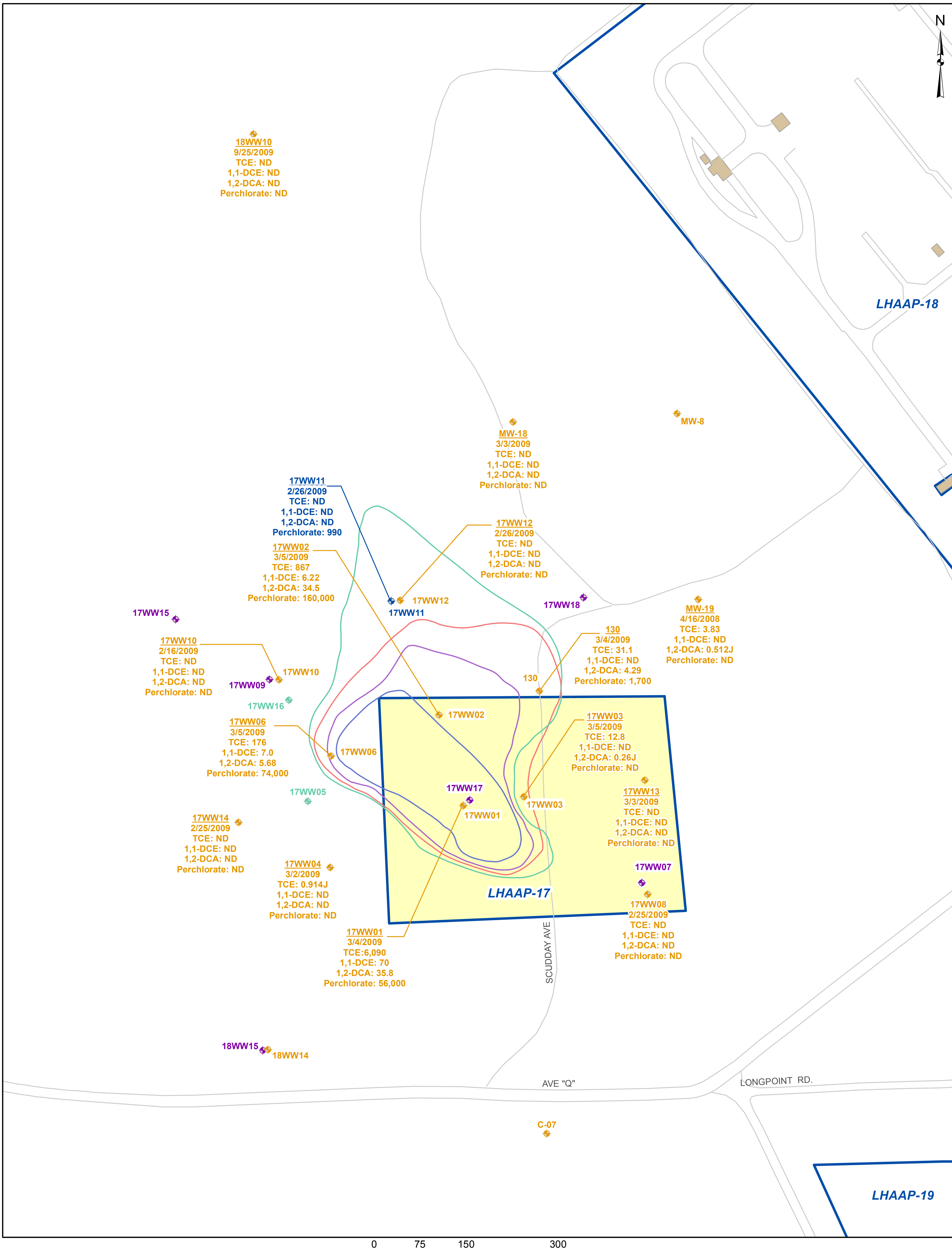
Path: L:\AGE\GIS\AUS GIS\GIS_Projects\Longhorn_AAP\01_Reports\LHAAP-17\PreDesign_Work_Plan\Fig 2-2 LHAAP17 COC Plumes in Shallow GW.mxd



Legend

- Shallow Monitoring Well
- Shallow/Intermediate Monitoring Well
- Intermediate Monitoring Well
- Deep Monitoring Well
- TCE Plume (MCL = 5 µg/L)
- 1,1-DCE Plume (MCL = 7 µg/L)
- 1,2-DCA Plume (MCL = 5 µg/L)
- Perchlorate Plume (PCL = 17 µg/L)
- Road
- LHAAP-17 Site Boundary
- Other Site Boundary

Notes:
1. All concentrations are reported in microgram per liter (µg/L).
2. ND - non detect
3. GW-Ind - groundwater TCEQ MSC for industrial use
4. MCL - Maximum Contaminant Level
5. PCL - Protective Concentration Level for residential groundwater
6. TCE - trichloroethene
7. 1,1-DCE - 1,1-dichloroethene
8. 1,2-DCA - 1,2-dichloroethane

AECOM

Figure 2-2
COC Plumes in Shallow Groundwater
Data Gap Investigation Work Plan
LHAAP-17
Longhorn Army Ammunition Plant
Karnack, Texas

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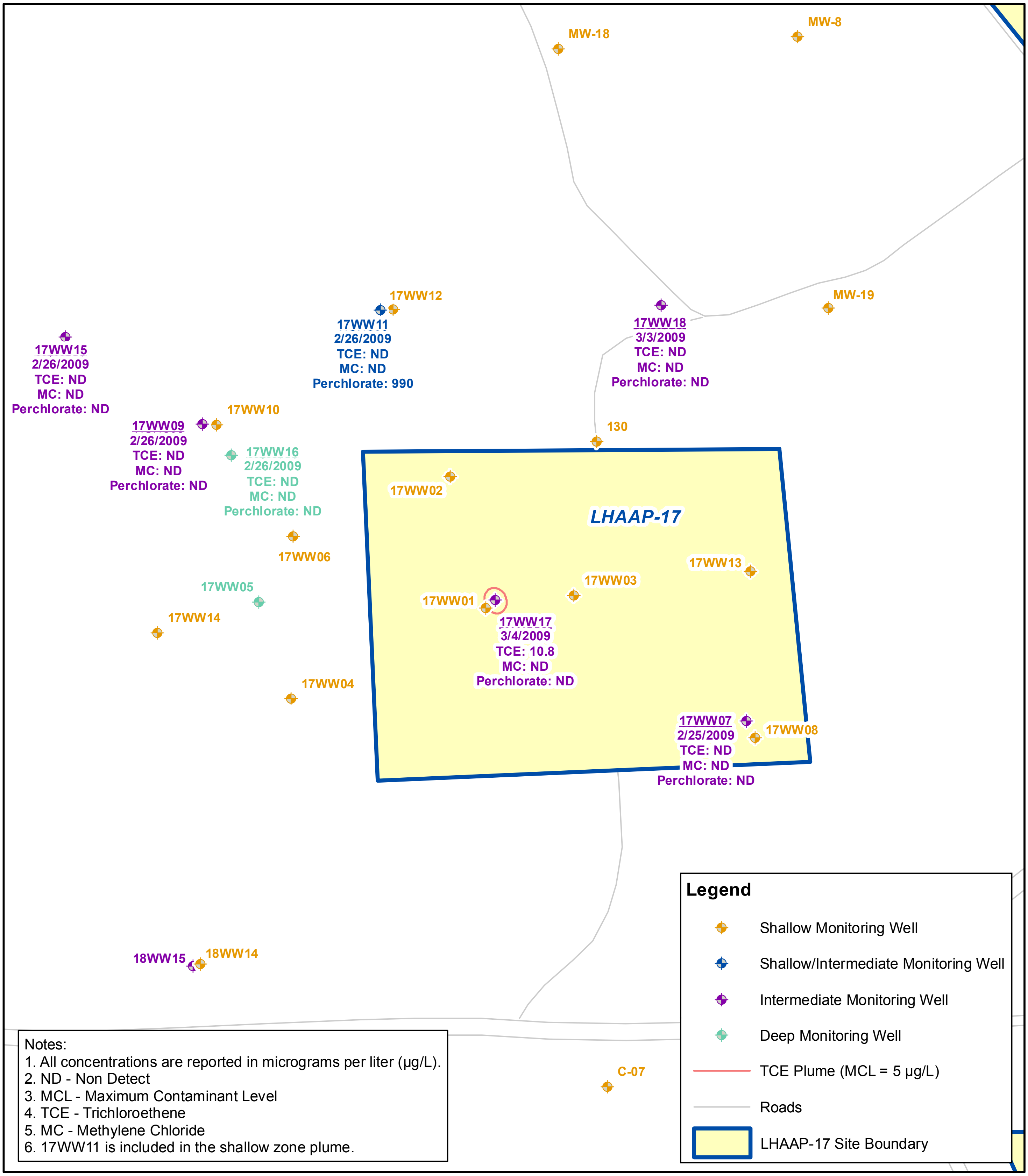
August 2016



Notes:
1. All concentrations are reported in micrograms per liter (µg/L).
2. ND - Non Detect
3. MCL - Maximum Contaminant Level
4. TCE - Trichloroethene
5. MC - Methylene Chloride
6. 17WW11 is included in the shallow zone plume.

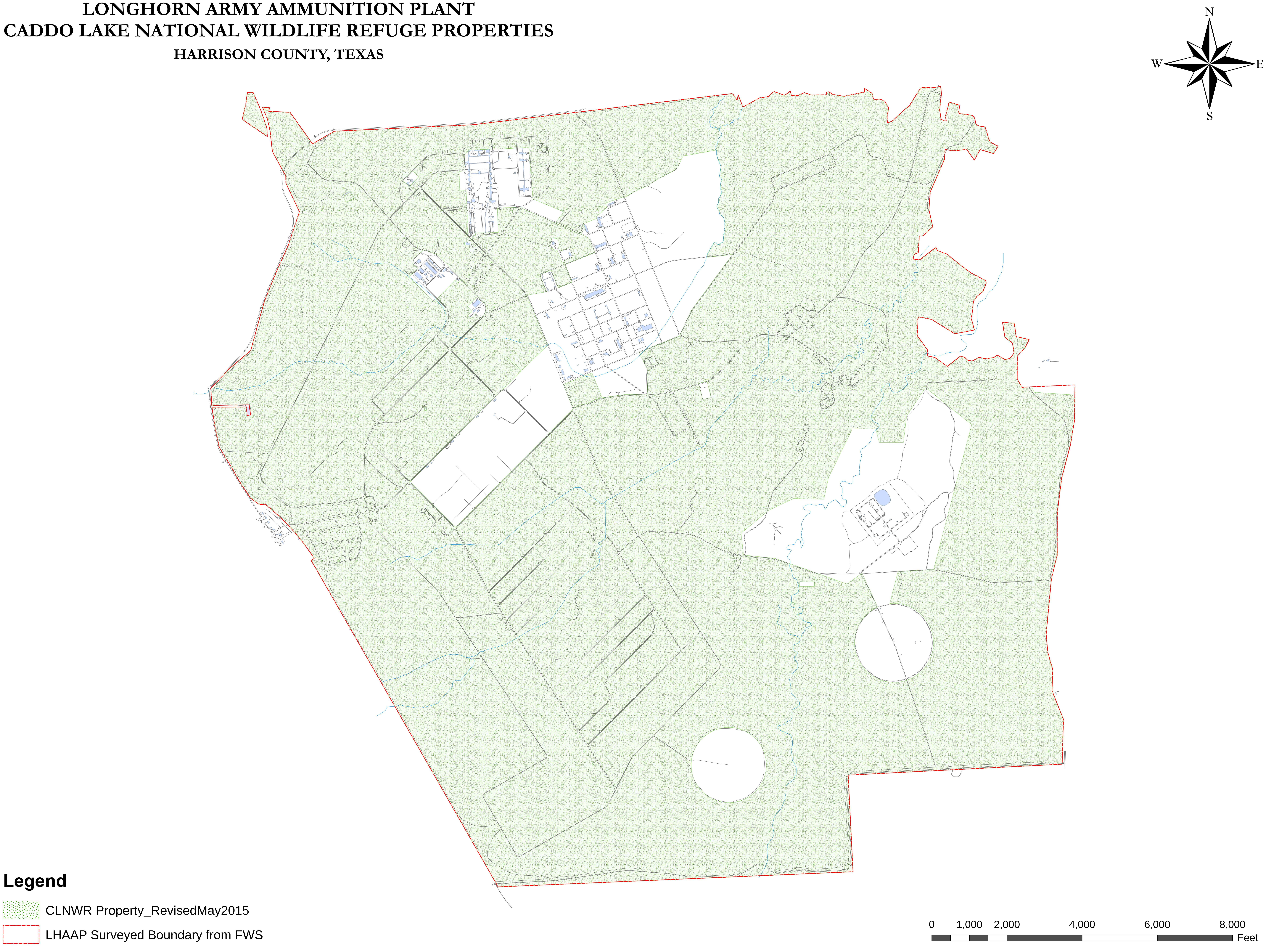
0 75 150 300
Feet

AECOM

Figure 2-3
COC Plumes in Intermediate Groundwater
LHAAP-17
Longhorn Army Ammunition Plant
Karnack, Texas

60256135 October 2012

LONGHORN ARMY AMMUNITION PLANT
CADDO LAKE NATIONAL WILDLIFE REFUGE PROPERTIES
HARRISON COUNTY, TEXAS



Subject: **Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **Teleconference; Call-In 515-603-3155 with Code 1063533#**
Date of Meeting: **November 16, 2017 – 11:00 AM CDT**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
AEC:	Nick Smith (NS)
EPA:	Rich Mayer (RM), Kent Becher (KB)-USGS Liaison
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW)
Bhate:	Kim Nemmers (KN)
APTIM:	Praveen Srivastav (PS); Susan Watson (SW)
USFWS:	Not present

Welcome **RMZ**

Action Items

- Army will provide a schedule of primary document draft submittals following approval of the Project Management Plan. **Ongoing.**
- EPA to provide comments on Standard Operating Procedures (SOPs) previously presented prior to Bhate coming on-board. **Ongoing.**
- PS to provide detailed schedule for LHAAP-17 Pre-Design Investigation (PDI). **Ongoing**
- Bhate provided the GIS requested data to USEPA. *Completed.*

EPA

- Surface water samplers will be deployed on December 11 and 12, 2017 in the drainage ditch off of LHAAP-47 near Building 25-C and downgradient below the bridge in Goose Prairie Creek (located to differentiate Site 47 contribution to the creek). A third will be placed in Harrison Bayou near the GWTP. The precipitation event needs to be approximately 3 to 4 inches in rainfall to allow for the flushing to occur.

TCEQ

- Discussed Standard Operating Procedures (SOPs) and prior comments from EPA (KB). AP suggested that the comments be provided now to minimize future review time. KN concurred indicating that comments verbally provided had been incorporated to the extent understood.

AEC

- The Army Engineer Research and Development Center (ERDC) is nearing completion of the protocol for perchlorate analysis. NS said he would know more after his call next week with ERDC as far as timing. NS indicate that the sampling protocol takes a few hours to implement and receive results.

USFWS

- Did not join the call.

Defense Environmental Restoration Program (DERP) PBR Update **Bhate**

KN asked everyone to refer to the Document and Issue Tracking Table dated November 16, 2017.

- **Task 1** (Project Management)
  - October 2017 MMM Minutes – LP and RM stated that they had provided their concurrence on the revisions to the MMM minutes earlier in the week.
  - RAB Meeting Minutes- KN stated that she had received Regulator concurrence on the minutes.
  - Installation Wide Work Plan [IWWP]) - KN asked if the entire document needed to be in hard copy as it was very large and included the Quality Assurance Project Plan (QAPP) and the Health and Safety Plan (HASP). AP and RM agreed that the HASP could be provided electronically on CD but the QAPP needed to be in hard copy format.
- **Task 2** (LHAAP-02 Semi-Annual Groundwater Monitoring Report) - A groundwater sampling event is being completed the week of November 20, 2017. Second event will be in the Spring 2018 with the Annual Report prepared by late summer 2018.
- **Task 3** (LHAAP-03 Record of Decision [ROD] and Explanation of Significant Difference [ESD]) – PS stated that a redlined version of the draft final ROD is being prepared to accompany the response to comments. The ESD is also being prepared. However, the dates on the tracker issued are not correct as the Environment, Safety and Occupational Health (ESOH) Team review times are not included. RMZ discussed the new review procedures that requires the ESOH Team, which includes legal, to review certain documents before release to the Regulators. NS stated that the time varies but typically is completed within 6 weeks. RMZ explained that adding a synopsis to assist ESOH in determining if a review is necessary can reduce time. RM asked if the ROD will be final in 2018. RZ stated that the ROD for LHAAP-03 will be completed in 2018.
- **Task 4** (LHAAP-04 Remedial Design [RD]/Remedial Action Work Plan [RAWP]) – PS explained that three monitoring wells are being installed in early December 2017 at previously approved locations. PS asked if it was acceptable to combine the RD and RAWP. RMZ, AP and RM concurred that this was acceptable. PS asked if the data from the three new monitoring wells could be provided in the MMM. AP and RM concurred but requested more information to be provided along with the data other than just validation (e.g. figure, table).
- **Task 5** (LHAAP-12 Annual Remedial Action – Operation [RA-O] Report) – Groundwater sampling is scheduled for December 2017, and then a report will be prepared.
- **Task 6** (LHAAP-16 RAWP) – The RAWP for in situ enhanced bioremediation is being prepared.
- **Task 7** (LHAAP-17 Pre-Design Investigation [PDI] Report) The PDI will commence in late November or early December 2017. AP and RM requested the dates be provided once available as each regulator would like to be present. Specifically, AP and RM would like to be able to observe the pumping test and soil sampling. PS agreed to provide a detailed schedule once available.
- **Task 11** (LHAAP-50 RA-O Reports) – The Year 3 RA-O Report is being prepared. Groundwater sampling at LHAAP-50 was just completed in November 2017.

- **Task 12** (LHAAP-58 ESD and RA-O Report) – Groundwater sampling is underway and will be completed by November 17, 2017. The Year 3 RA-O Report is being prepared. The ESD was issued for Regulatory review.
    - KN asked about optimizing the RAWP/RD by changing the carbon substrate from sodium lactate to emulsified vegetable oil (EVO) and adding four more injection points based upon the 2016 groundwater data. AP requested that the revisions be documented in an addendum with the section called out that were changed. Further discussion determined that change pages for the Final RAWP along with an updated figure was more appropriate. AP asked how the change in the RAWP will affect the ESD. RZ explained that since the guidance allows for implementation of the RAWP ahead of finalizing the ESD there should be no problem.
- **Tasks 14 and 15** (MMRP Sites' RD) – The Land Use Control (LUC) Remedial Designs for LHAAP-001-R-01 and LHAAP-003-R-01 are under Army review. Groundwater sampling is being completed the short week of November 20, 2017.
- Task 16 (Groundwater Treatment Plant [GWTP])
    - KN explained that the GWTP is currently on recycle because the pump that comes after the sand filter and before the air stripper seized up. The pump is being refurbished due to build-up. The GWTP will operate next week.
    - Due to no or little precipitation, there has not been any discharge to the Harrison Bayou. KN stated that there is still freeboard at INF Pond and that notification would be made if the freeboard becomes an issue.
- **Task 18** (Surface Water) – Currently, surface water could not be sampled due to drought conditions. The next surface water sampling event is scheduled for December 2017.
- **Task 19** (LUC Management) – The Draft LUC Management Plan Update was provided to the Regulators this week. RMZ asked RM and AP if they could sign electronically again this year. RM and AP agreed.
- RM asked if the website was still down. KN stated that the website went down on November 1st and that PS had been working to get the website back up and was very close. PS stated that the domain had been transferred and that the files are currently being loaded. The website will continue to be updated quarterly.
- RM asked about the transfer status of the MMRP sites. RMZ stated that an Environmental Condition of Property (ECP) for four sites – the pistol range, LHAAP-19 and the two MMRP sites is being prepared. The ECP will be issued after the LUC RD is completed and implemented for the MMRP sites. Whether an OPS is required or simply a letter from EPA to USFWS stating the remedy is in place is being discussed among the parties.

Community Relations Plan (CRP) **Army**

- The Community Relations Plan (CRP) will be distributed to the RAB and regulators in electronic form with the exceptions of Janetta Coats, April Palmie, and John Pollard who received hard copies. A copy of the CRP will be placed in the administrative record.

Schedule Next Managers' Meeting

- December 2017 MMM will be held December 13, 2017 via teleconference at 10 AM CDT.

Adjourned

ACRONYM LIST

AEC	United States Army Environmental Command
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BRAC	Base Realignment and Closure
CH	Craig Holloway
CIP	Community Involvement Plan
CK	Cathy Kropp
CRP	Community Relations Plan
CDT	Central Daylight Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
ECP	Environmental Condition of Property
ED	Eric Derkoff
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
GIS	Geographic information system
GWTP	Ground Water Treatment Plant
IWWP	Installation Wide Work Plan
JS	Jessie Scroggins
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MMM	Monthly Managers' Meeting
MMRP	Military Munitions Response Program
MOA	Memorandum of Agreement
O&M	Operation and Maintenance
OPS	Operating Properly and Successfully
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation
PID	Photo-ionization Detector
PMP	Project Management Plan
PSI	preliminary site investigation
RAB	Restoration Advisory Board
RA-O	remedial action – operation
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
RS	Rick Smith
SOP	Standard Operating Procedure
SW	Susan Watson
TAG	Technical Assistance Grant
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers

USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound

00863748

Comprehensive Land Use Control (LUC) Management Plan

Former Longhorn Army Ammunition Plant (LHAAP)
Karnack, Texas

November 28, 2017

COMPREHENSIVE LUC & NOTIFICATION MANAGEMENT PLAN
REVISION LOG

Fiscal Year	Date	Reason for Revision	Approved*		
			Army	EPA	TCEQ
Original	9-13-07	N/A			
2008		None Required			
2009		None Required			
2010		None Required			
2011		None Required			
2012	2-4-13	Add LHAAP-06,-07,-08,-35/36,-35B (37)/67, -46, -49, -50,-51,-55,-35A (58),-59,-60,-66,-68, Pistol Range, LHAAP-001-R-01 and LHAAP-003-R-01			
2013	10-1-13	None Required			
2014	12-17-14	Add LHAAP-02, -03, -19, -56, -65, -68, -69 and Notices for LHAAP-46, and -67			
2015	9-14-15	Add Notices for LHAAP-35B(37), -50 and -35A(58) (LHAAP-02, -03, -56, -59, -60, -65, -68, and -69 are contained within the LHAAP-58 LUC boundary)			
2016	10-20-16	None Required			
2017	10-30-17	Add LUCs for LHAAP-16	ZEILER.ROSE.M .1230811551 Digitally signed by ZEILER.ROSE.M.1230811551 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=ZEILER.ROSE.M.1230811551 Date: 2017.11.28 09:44:25 -06'00'	RICHARD MAYER Digitally signed by RICHARD MAYER DN: c=US, o=U.S. Government, ou=USEPA, ou=Staff, cn=RICHARD MAYER, dnQualifier=0000008252 Date: 2017.11.29 12:52:10 -06'00'	April Palmie Digitally signed by April Palmie Date: 2017.11.28 09:32:31 -06'00'

* Approval by all three parties required during the first quarter of each fiscal year.

00863750

TABLE OF CONTENTS

List of Sites

LHAAP-16 Old Landfill (LHAAP-16)	
	16-1 Draft LUC Inspection and Maintenance Log
	16-2 LUCs from Draft-Final Remedial Design
	16-3 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-16 Filed in Public Records of Harrison County, Texas (including survey plat) (Pending)
	16-4 Land Use Control Compliance Inspection Form
LHAAP-19 Construction Materials Landfill (LHAAP-19)	
	Notice of Land Use Controls and Nonresidential Land Use at LHAAP-19, Filed in the Public Records of Harrison County, Texas (including survey plat)
LHAAP-35/36 Sumps and Waste Rack Sumps (LHAAP-35/36)	
	Notice of Nonresidential Land Use at Sumps/Waste Rack Sump locations (LHAAP-35/36) Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-37 Chemical Laboratory (LHAAP-35B (37))	
	37-1 LUCs from Final Remedial Design
	37-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-35B (37) Filed in Public Records of Harrison County, Texas (including survey plat)
	37-3 Land Use Control Compliance Inspection Form
LHAAP-46 Plant 2 Area (LHAAP-46)	
	46-1 LUCs from Final Remedial Design
	46-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-46 Filed in Public Records of Harrison County, Texas (including survey plat)
	46-3 Land Use Control Compliance Inspection Form
LHAAP-49 Former Acid Storage Area (LHAAP-49)	
	Notice of Nonresidential Land Use for LHAAP-49 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-50 Sump Water Storage Tank (LHAAP-50)	
	50-1 LUCs from Final Remedial Design

	50-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-50 Filed in Public Records of Harrison County, Texas (including survey plat)
	50-3 Land Use Control Compliance Inspection Form
LHAAP-51 Building 60-B Photo Lab (LHAAP-51)	
	Notice of Nonresidential Land Use at LHAAP-51 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-55 Septic Tanks (LHAAP-55)	
	Notice of Nonresidential Land Use at Septic Tank locations Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-56 Grease Rack (LHAAP-56)	
	Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-58 Shops Area (LHAAP-35A (58))	
	58-1 LUCs from Final Remedial Design
	58-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-35A (58) Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-59 Former Pesticide Storage Building 725 (LHAAP-59)	
	Notice of Nonresidential Land Use for LHAAP-59 Filed in Public Records of Harrison County, Texas (including survey plat)
	Site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-60 Former Storage Building 411 & 714 (LHAAP-60)	
	Notice of Nonresidential Land Use at LHAAP-60 Filed in Public Records of Harrison County, Texas (including survey plat)
	Building 714 included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-64 Transformer Storage (LHAAP-64)	
	Notice of Nonresidential Land Use at LHAAP-64 Filed in Public Records of Harrison County, Texas (including survey plat)

LHAAP-65 Flammable Materials Storehouse Building 209 (LHAAP-65)

Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)

LHAAP-66 405-L Transformer Yard (LHAAP-66)

Notice of Nonresidential Land Use at LHAAP-66 Filed in Public Records of Harrison County, Texas (including survey plat)

LHAAP-67 Aboveground Storage Tank Farm (LHAAP-67)

67-1 LUCs from Final Remedial Design

67-2 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-67 Filed in Public Records of Harrison County, Texas (including survey plat)

67-3 Land Use Control Compliance Inspection Form

LHAAP-68 Transformer Storage (LHAAP-68)

Notice of Nonresidential Land Use at LHAAP-68 Filed in Public Records of Harrison County, Texas (including survey plat)

Site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)

LHAAP-69 Service Station Underground Storage Tank (LHAAP-69)

Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)

Pistol Range

Notice of Nonresidential Land Use at Pistol Range Filed in Public Records of Harrison County, Texas (including survey plat)

LHAAP-001-R-01/LHAAP-003-R-01
South Test Area (LHAAP-001-R-01) and Ground Signal Test Area (LHAAP-003-R-01)

MMRP-1 Draft LUC Inspection and Maintenance Log

MMRP-2 LUCs from Final Remedial Design Pending

MMRP-3 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-001-R-01 and LHAAP-003-R-01 Filed in Public Records of Harrison County, Texas (including survey plat) Pending

List of Appendices

Comprehensive Land Use Control (LUC) & Notification Management Plan, Former Longhorn Army Ammunition Plant (LHAAP), Texas

The purpose of this management plan is to ensure that all site-specific LUCs are compiled into one comprehensive location for both pre-transfer and post-transfer use. Additionally, all nonresidential use notifications required under 30 TAC §335.560(b) are included. This management plan shall be accessible to the property owner, regulators, local government, and the public and will accompany LHAAP's Administrative Record. This plan will be updated as LUC and notification requirements for additional environmental sites are identified; the revision number, date, reason for revision, and author will be documented in the Revision Log. As a document control measure, an annual approval by the three FFA parties, Army, EPA and TCEQ within the first quarter of the fiscal year will confirm the effective date. This approval is required whether or not a revision took place.

Land Use Controls

Land use controls (LUCs) include any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, real property. LUCs may be a component of an interim or final remedy selected under CERCLA and used to protect human health, the environment, and/or the integrity of an engineered remedy. The LUC performance objectives are established in the site-specific Record of Decision (ROD). The specific LUCs and implementation details are outlined in the corresponding site-specific Remedial Design (RD), a primary document of the Federal Facilities Agreement.

The land use control area is depicted on Figure 1, the site-specific performance objectives and LUCs are presented in Table 1, and the site-specific section contains a LUC Inspection and Maintenance Log, a copy of an approved LUC Remedial Design, Notice of Land Use Controls (including a survey plat) filed in Harrison County public records, and LUC compliance inspection form. Upon USEPA and TCEQ approval of each LUC RD, the LUC requirements will be effective immediately and this management plan will be updated. Once property is transferred, the plan will be amended to include a copy of the transfer letter describing specific LUC obligations assigned to the transferee.

LUCs will remain in place until applicable or relevant and appropriate requirements (ARARs) as established in accordance with the NCP (40 CFR 300) are met; or in the case of a landfill remedy it will remain in place for perpetuity unless otherwise removed by the U.S. Army per agreement with the USEPA and TCEQ. The continued effectiveness of the selected remedy, including LUCs, will be evaluated with the CERCLA 121(c) five-year review process.

Notifications

The future anticipated use of LHAAP is industrial/refuge and is, therefore, consistent with a nonresidential/industrial reuse under the Risk Reduction Rules. As required by 30 TAC §335.560(b) and in accordance with 30 TAC §335.566, a notification must be filed in the Harrison County records stating that the land is considered suitable for future non-residential use. Limited monitoring will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of the sites is consistent with the non-residential use. The non-residential use notification will remain in place until it is demonstrated that the levels of COCs in soil and groundwater allow for unlimited use and unrestricted exposure.

Table 1 –Summary of Land Use Controls and Notifications

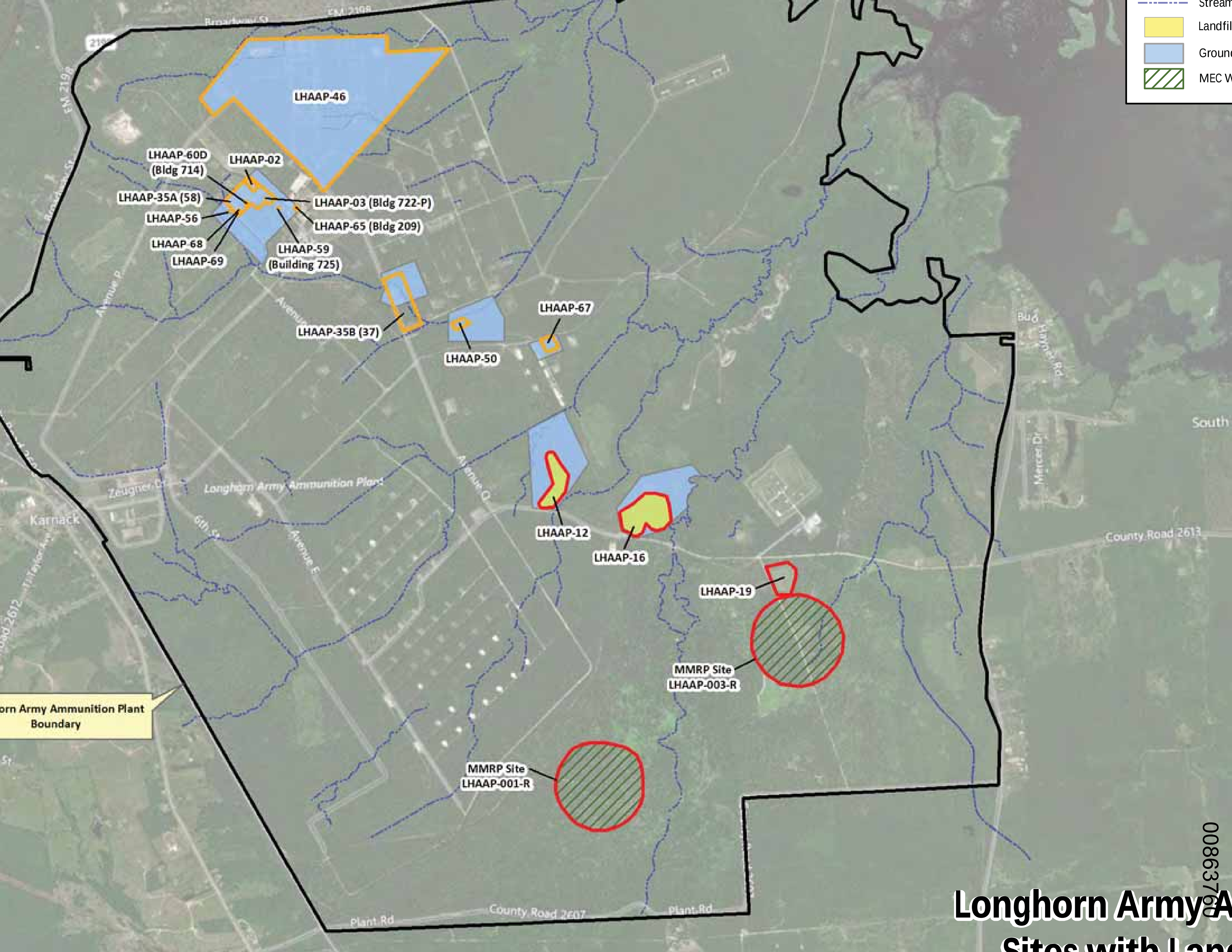
Site Name	**Transfer Documents**		**Decision Documents**		**Land Use Controls**					**Notifications**
IRP MMRP* LHAAP-	GSA Transfer To USFWS	ECP/ ECOP	ROD	DD	Groundwater Use Restriction	Nonresidential Land Use Restriction	Intrusive Activities Prohibition	MEC Warning	Landfill Cap Maintenance	Nonresidential Use Notification
2					**					**
3					**					**
6				2008						√
7				2008						√
8	2015	VI		2008						√
12	2014	V	2007		√	Cap Only	Cap Only		√	√
16			2016		√	Cap Only	Cap Only		√	√
19		VII		2014		Cap Only	Cap Only			√
35/36	2015	VI		2010						√
37			2010		√					√
46			2010		√					√
49	2015	VI	2010							√
50			2010		√					√
51				2008						√
55	2015	VI		2008						√
56				2014	**					**
58			2010		√					√
59				2008	**					√
60				2008	**					√
64				2008						√
65				2014	**					**
66				2008						√

Site Name	Transfer Documents		Decision Documents		Land Use Controls					Notifications
IRP MMRP* LHAAP-	GSA Transfer To USFWS	ECP/ ECOP	ROD	DD	Groundwater Use Restriction	Nonresidential Land Use Restriction	Intrusive Activities Prohibition	MEC Warning	Landfill Cap Maintenance	Nonresidential Use Notification
67			2010							√
68				2008	**					√
69				2014	**					**
Pistol Range		VII	2010							√
001-R-01/003-R-01		VII	2016			√	√	√		√

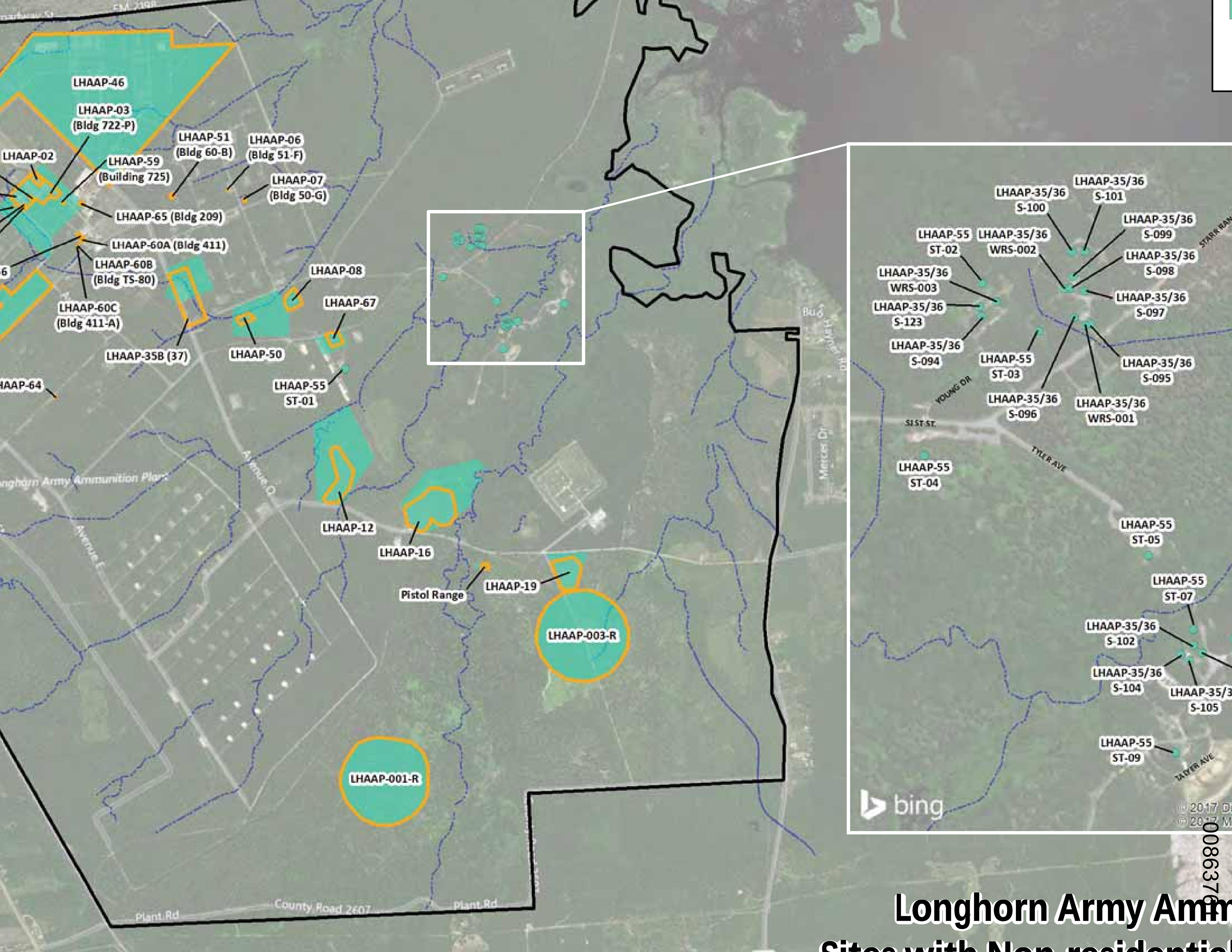
Pending- not final

** Nonresidential Land Use site included within the groundwater use restriction LUC boundary for LHAAP-35A(58)-see LHAAP-35A(58)

FIGURES



Longhorn Army A
LHAAP-46
LHAAP-60D (Bldg 714)
LHAAP-02
LHAAP-35A (58)
LHAAP-03 (Bldg 722-P)
LHAAP-56
LHAAP-65 (Bldg 209)
LHAAP-68
LHAAP-69
LHAAP-59 (Building 725)
LHAAP-35B (37)
LHAAP-50
LHAAP-67
LHAAP-12
LHAAP-16
LHAAP-19
MMRP Site LHAAP-003-R
MMRP Site LHAAP-001-R
orn Army Ammunition Plant Boundary
Longhorn Army Ammunition Plant
Karnack
Zeugner Dr
Avenue Q
Avenue E
Avenue P
6th St
County Road 2613
County Road 2607
Plant Rd
Broadway St
FM 2198
Mercer Dr
South
Landfil
Ground
MEC W



00863760

Longhorn Army Amm

LHAAP - 06

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-06 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00863763

2010-000005555

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	**CLERKS NOTES**
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005555	
Receipt No: 1006195	
Amount: $ 36.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-06, is the area of a demolished building location known as Building 51-F located within the Plant 3 production area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-06 is not itself considered an NPL site. Environmental activities at LHAAP-06 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-06 (Building 51-F) was a collection point for waste acids and solvents. Its three-sided shed contained a rack that held a single 55-gallon drum set on a 50-square foot pie-shaped concrete pad. Beginning in 1985, the drum was used to collect waste acids and solvents from bench-scale manufacture of the explosive cyclotetramethylenetetranitramine. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to

5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-06 parcel is 119 square foot, more or less, or 0.00273 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-06 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-06. Contaminants in soil samples from LHAAP-06 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-06 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-06 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
Or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Angela Humphries

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-06" TRACT
(REMAINS OF DEMOLISHED BUILDING 51-F)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-06" being defined by the four external corners of the three concrete walls remaining at demolished Building 51-F (wall defining the West edge of said building is either gone or never existed) in the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-06" being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.70 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation E.C.C.W. indicates External Corner of Concrete Wall,

Commencing at monument "HORSE" referenced above,

THENCE N 59deg52'55"W 597.03' to an E.C.C.W. found for the S.E.C. of this tract and this POINT OF BEGINNING,

THENCE S 67deg37'19"W 10.93' along the S.B.L. of this tract to an E.C.C.W. found for this tract's S.W.C. ,

THENCE N 22deg14'24"W 10.92' along the W.B.L. of this tract to an E.C.C.W. found for this tract's N.W.C. , THENCE N 67deg37'19"E 10.93' along the N.B.L. of this tract to an E.C.C.W. found for this tract's N.E.C.,

THENCE S 22deg14'24"E 10.92' along the E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 119 square feet, more or less.

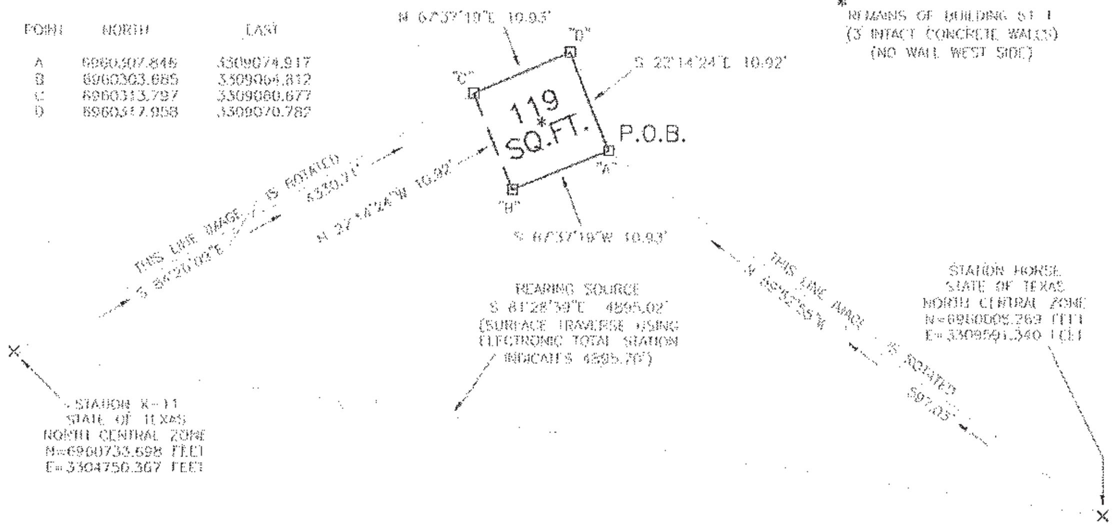
I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

COORDINATE TABLE

POINT	NORTH	EAST
A	6960307.846	3309074.917
B	6960303.685	3309064.812
C	6960313.797	3309060.677
D	6960317.958	3309070.782



I, Tom A. Fisher, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fisher, Registered Professional Land Surveyor, No. 3940

STATE OF TEXAS REGISTERED TOM A. FISHER 3940 PROFESSIONAL LAND SURVEYOR

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & HORSE. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTES:

X INDICATES TYPE "B" CORPS OF ENGINEERS MONUMENT (FOUND)
☐ INDICATES EXTERNAL CORNER OF CONCRETE BUILDING WALL

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-06
(119 SQUARE FEET)
(REMAINS OF BUILDING 51-F)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXA

JOB #0407088	0407088.CRD	C.PTS C.LEB
AUG. 13, 2009	0908074C.DWG	DRAWN BY JTJ

00863769

LHAAP-07

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-07 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005556

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM **Document Number:** 2010-000005556 **Receipt No:** 1006195 **Amount:** $ 36.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

00863772

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-07, is the area of a demolished building location known as Building 50-G located within the Plant 3 production area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-07 is not itself considered an NPL site. Environmental activities at LHAAP-07 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-07 (Building 50-G) was the former drum processing building which consisted of a wooden frame building 30 feet by 100 feet in size set on a concrete pad located within the boundary of LHAAP-47. Beginning in 1985, Building 50-G had a separate bay (20 by 30 feet in size) used as a washdown area for empty drums and casting equipment used in ammunition production. The washdown area was an above-grade concrete vault where empty drums were rinsed with hot water and spent sulfuric acid neutralized with limestone. The wastes handled included solvents, oils, and organic liquids. The site ceased operation in 1995. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-07 parcel is 3,078 square foot, more or less, or 0.07066 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-07 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-07. Contaminants in soil samples from LHAAP-07 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-07 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-07 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-07" TRACT
(REMAINS OF DEMOLISHED BUILDING 50-G)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-07" being defined by the four external corners of the concrete foundation stem wall of demolished Building 50-G in the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-07" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.70 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation E.C.C.F.S.W. indicates External Corner of Concrete Foundation Stem Wall,

Commencing at monument "HORSE" referenced above,

THENCE N 87deg11'48"W 103.14' to an E.C.C.F.S.W. found for the S.E.C. of this tract and this POINT OF BEGINNING,

THENCE S 69deg02'55"W 30.36' along the S.B.L. of this tract to an E.C.C.F.S.W. found for this tract's S.W.C. ,

THENCE N 21deg59'26"W 101.90' along the W.B.L. of this tract to an E.C.C.F.S.W. found for this tract's N.W.C. , and being S 82deg14'17"E 4714.65' from monument "X-11" referenced above, THENCE N 71deg43'04"E 30.53' along the N.B.L. of this tract to an E.C.C.F.S.W. found for this tract's N.E.C. ,

THENCE S 21deg55'35"E 100.48' along the E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 3,078 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

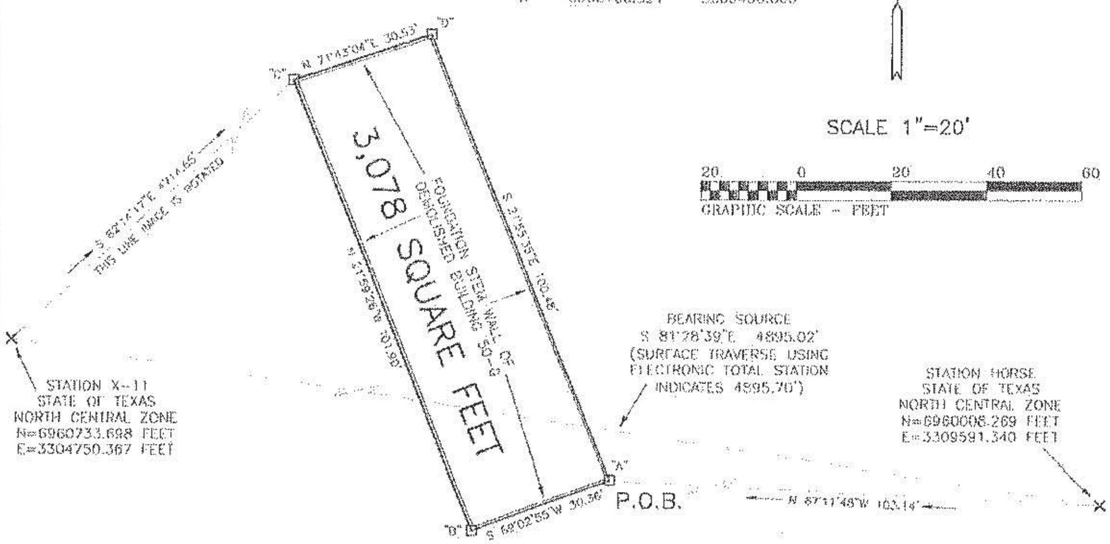
00863777

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
☐ INDICATES EXTERNAL CORNER OF FOUNDATION STEM WALL

COORDINATE TABLE

POINT	NORTH	EAST
A	6960013.313	3309488.323
B	6960002.458	3309459.972
C	6960096.944	3309421.815
D	6960106.521	3309450.803



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & HORSE. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-07
(3,078 SQUARE FEET)
(REMAINS OF BUILDING 50-G)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	B.PTS B.LEG
AUG. 13, 2009	0908074B.DWG	DRAWN BY JTJ

LHAAP-08

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-08 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2011-000003377

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/24/2011 03:52 PM	
Document Number: 2011-000003377	
Receipt No: 1103745	
Amount: $ 32.00	
By: Lauren Boyd, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AARON WILLIAMS EC-ER
1645 SOUTH 101ST EAST AVENUE

TULSA, OK 74128

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remedial investigation of the land described herein. The site, LHAAP-08, the former Sewage Treatment Plant, operated from 1942 to 1997. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-08 is not itself considered an NPL site. Environmental activities at LHAAP-08 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-08 included stabilization ponds, Dunbar filters, sludge drying beds, and an Imhoff tank. The plant received storm water, boiler blow down, laundry waste, vehicle wash rack waste, and effluent from film development at the X-ray facility. Treated effluent was discharged into Goose Prairie Creek and Caddo Lake. Soil and groundwater investigations in 2000, 2001, and 2005 included sampling for explosives compounds, metals, semivolatile organic compounds, volatile organic compounds, dioxins and furans, pesticides and PCBs. Soil results included detections of low levels of metals, perchlorate and dioxin. Low levels of metals, dioxin and furan compounds and perchlorate were detected in groundwater. An assessment of risk to exposure to soil and groundwater at LHAAP-08, based on the nonresidential use scenario, indicated that potential human health risks are within the acceptable range established by EPA. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-08 parcel is a 2.974 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-08 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-08. Contaminants in soil samples from LHAAP-08 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-08 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-08 is consistent with the non-residential use scenario evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

00863782

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 25 th day of January, ~~2010~~ 2011.

BEFORE ME, on this the 25 th day of Jan 2011, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 25 day of January,

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-08" being 2.974 acre of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-08" being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998636625, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet) and "IGNATIUS-2" (N=6955582.752 feet E=3311851.704 feet). Said traverse indicates a surface distance of 1693.005 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940", and the abbreviation C.N.I.B.C. indicates concrete nail in bottle cap.

Commencing at monument "IGNATIUS-1" referenced above,

THENCE N 52deg56'26"W 814.32' to an I.R.O.P.C. set for the Southmost corner of this tract and this POINT OF BEGINNING,

THENCE N 28deg08'32"W 374.05' along the S.W. B.L. of this tract to an I.R.O.P.C. set for this tract's Westmost corner,

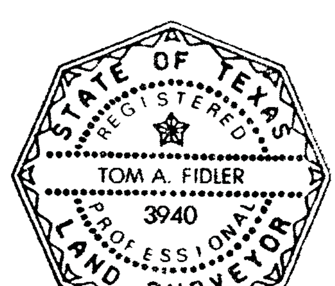
THENCE N 62deg03'14"E 348.01' along the N.W. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for this tract's Northmost corner,

THENCE S 27deg43'38"E 328.00' along the N.E. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for the North end of a curve,

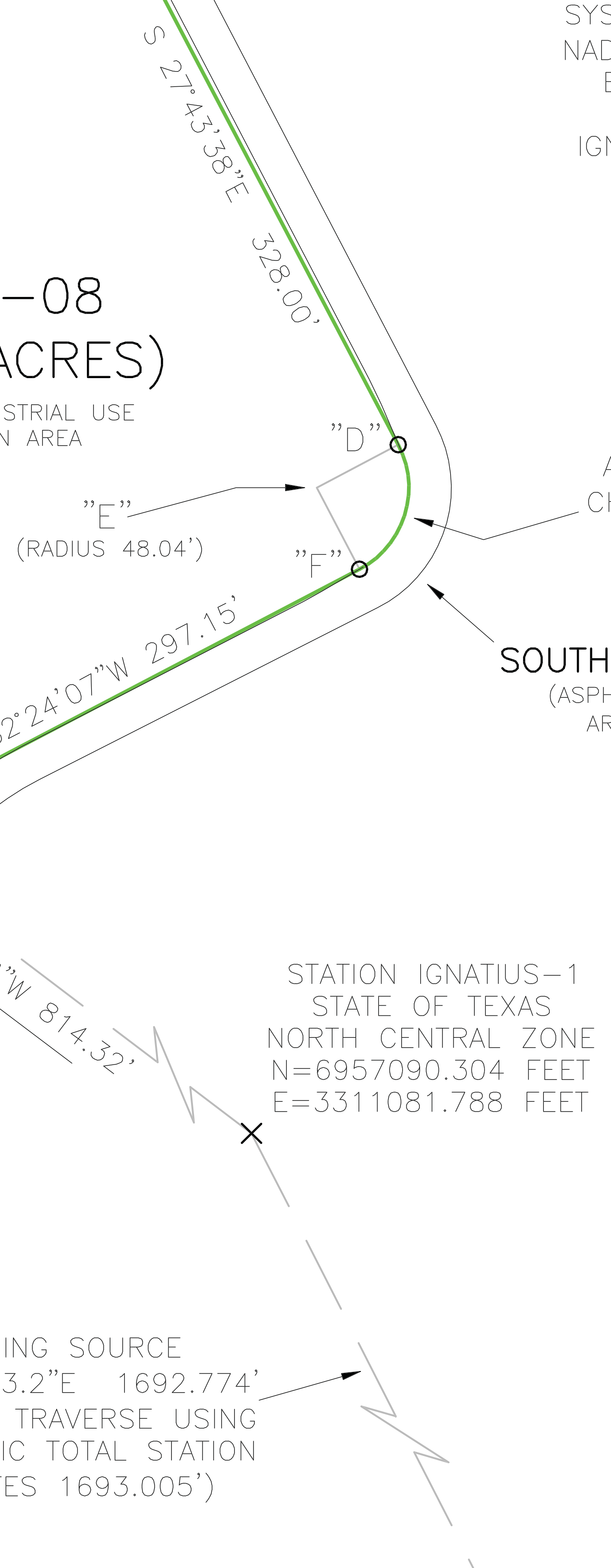
THENCE along a curve to the right (having a radius of 48.04' and an arc length of 75.57', being subtended by a chord of S 17deg20'14"W 68.02') to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for the South end of said curve,

THENCE S 62deg24'07"W 297.15' along the S.E. B.L. of this tract to this POINT OF BEGINNING, containing 2.974 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS–1 & IGNATIUS–2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



Witness my hand and seal this the

Tom A. Fidler, Registered Professio

N

SCALE 1"=100'

100 0 100 200 300

GRAPHIC SCALE – FEET

NOTES:

× INDICATES TYPE "G" CORPS

○ INDICATES CONCRETE NAIL IN

△ INDICATES 1/2" IRON REBAR ENGRAVED "FIDLER" & "RPLS

INDICAT INDUSTR

FIELD IS ON

00863784

COORDINATE TABLE

POINT	NORTH	EAST
A	6957581.048	3310431.952

(2

LHAAP-12, 12-1

LUC INSPECTION AND MAINTENANCE LOG

September 14, 2015

LUC Inspection and Maintenance Log – LHAAP 12

Date	Inspected by:	Inspection / Maintenance Activities					Corrective action or repairs required?	Repairs / Action Taken
		Protect landfill cover integrity				Prevent human exposure to groundwater		
		Vegetative Cover maintained: i.e. grass mowed	Fence and signage maintained	Observance of landfill cover degradation –e.g. desiccation cracks, erosion, or gullying	Continued compliance verified for no digging or disturbance of landfill cover or contents	Verified no withdrawal or use of groundwater (other than environmental testing)		

00863787

LHAAP-12, 12-2

LUCs FROM FINAL REMEDIAL DESIGN ADDENDUM

September 14, 2015

00863788

FINAL

REMEDIAL DESIGN ADDENDUM
LANDFILL 12 (LHAAP-12)
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

ON THE LINE

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

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

Contract Number DACA56-94-D-0020
Task Order No. 0109

June 2007

Table of Contents

List of Figures

List of Appendices

4.0 Land Use Controls for the Site

The LUCs to be implemented by the Army or its representatives for LHAAP-12 include:

- Maintenance of the integrity of the landfill cap, including, at a minimum, repairs to desiccation cracks, erosion, or gullying upon observance.
- Maintenance of a vegetative cover on the landfill cap including regular mowing.
- Maintenance of fence line and signage around landfill cap.
- Prohibition of any activities that would affect the integrity of cap.
- Prohibition of any activities that would cause exposure to the contaminated groundwater.

Although groundwater monitoring is not a LUC, it was included as a component of the remedy for LHAAP-12 identified in the 2006 ROD to evaluate the effectiveness of the landfill cap (Shaw, 2006b). The groundwater monitoring plan is included in **Appendix A**.

6.0 Remedy Implementation Actions

6.1 Land Use Control Implementation Actions

Until LHAAP-12 is transferred, the Army or its representatives will be responsible for LUC implementation, maintenance, inspection, reporting and enforcement. The Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. If periodic LUC inspections and maintenance are required to address site-specific risks, the Army will be responsible for making the results available to the appropriate regulators.

As a condition of property transfer, the Army may require the transferee to assume responsibility for various implementation actions, as indicated below. Although the Army may transfer responsibility for various implementation actions, the Army shall retain its responsibility for remedy integrity. This means that the Army is responsible for addressing substantive violations of performance objectives that would undermine the Army's CERCLA remedy. The Army also will be responsible for: 1) incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation; 2) recording survey plat and notice of restrictions for both the landfill cap and cover system boundary at the Harrison County Courthouse; 3) recording groundwater use restriction and survey plat at the Harrison County Courthouse; and 4) notifying Texas Department of Licensing and Regulation of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ.

The following LUC implementation actions shall be undertaken by the Army in order to ensure that the aforementioned LUC performance objectives for LHAAP 12 are met and maintained:

6.1.1 Comprehensive Base-wide Land Use Control Management Plan

Within 30 days of receiving USEPA and TCEQ approval of this RD Addendum, the Army will develop a Comprehensive Base-wide LUC Management Plan which shall initially consist of this document and a survey plat showing the locations where the LHAAP-12 LUCs are applied. The purpose of this Comprehensive Base-wide LUC Management Plan is to ensure the all site-specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document is also accessible to regulators, the local government and the public. The Army will locate the Comprehensive Base-wide LUC Management Plan in the City of Marshall Public Library to accompany LHAAP's Administrative Record.

As LUC RD documents for additional environmental sites are approved by USEPA and TCEQ, the Army shall likewise add those documents and survey plats to the Comprehensive Base-wide LUC Management Plan as well as update the previous copy of the plan placed in the City of Marshall Public Library.

6.1.2 Site Inspections and Reporting

Beginning with finalization of this RD Addendum, the Army will undertake annual physical inspections and reporting to confirm continued compliance with all LUC objectives. The Army will provide USEPA and TCEQ with an annual LUC Compliance Inspection document consistent with the form attached hereto as **Appendix B**. In addition, should any deficiency(ies) be found during the annual inspection, the Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific deficiency(ies) found and what efforts or measures have or will be taken to correct those deficiencies. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECOP). The need to continue annual inspections will be revisited at five year reviews.

6.1.3 Notice of Planned Property Conveyances

Planned conveyance of LHAAP-12 acreage is to U.S. Fish and Wildlife Service for incorporation into the Caddo Lake National Wildlife Refuge. The Army shall provide notice to USEPA and TCEQ of such intended conveyance. The notice shall describe the mechanism by which LUCs will continue to be implemented, maintained, inspected, reported, and enforced.

6.1.4 Opportunity to Review Text of Intended Land Use Controls

The Army will produce an ECOP for LHAAP-12, but before executing the letter of transfer, the Army will provide USEPA and TCEQ with a draft copy of that ECOP so that they may have reasonable opportunity, before document execution, to review all LUC-related provisions.

6.1.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance

Should the Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.1.6** below, the Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.1.6 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of Texas property law or CERCLA. Alternatively, should the circumstances warrant such, the Army could choose to exercise its response authorities under CERCLA, and then seek cost recovery after the fact from the person(s) or entity(ies) who violated a given LUC. Should the Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the Army will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUCs.

6.1.7 Modification or Termination of Land Use Controls

The Army shall not, without USEPA concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the Army shall obtain prior USEPA concurrence as appropriate to the exigencies of the situation.

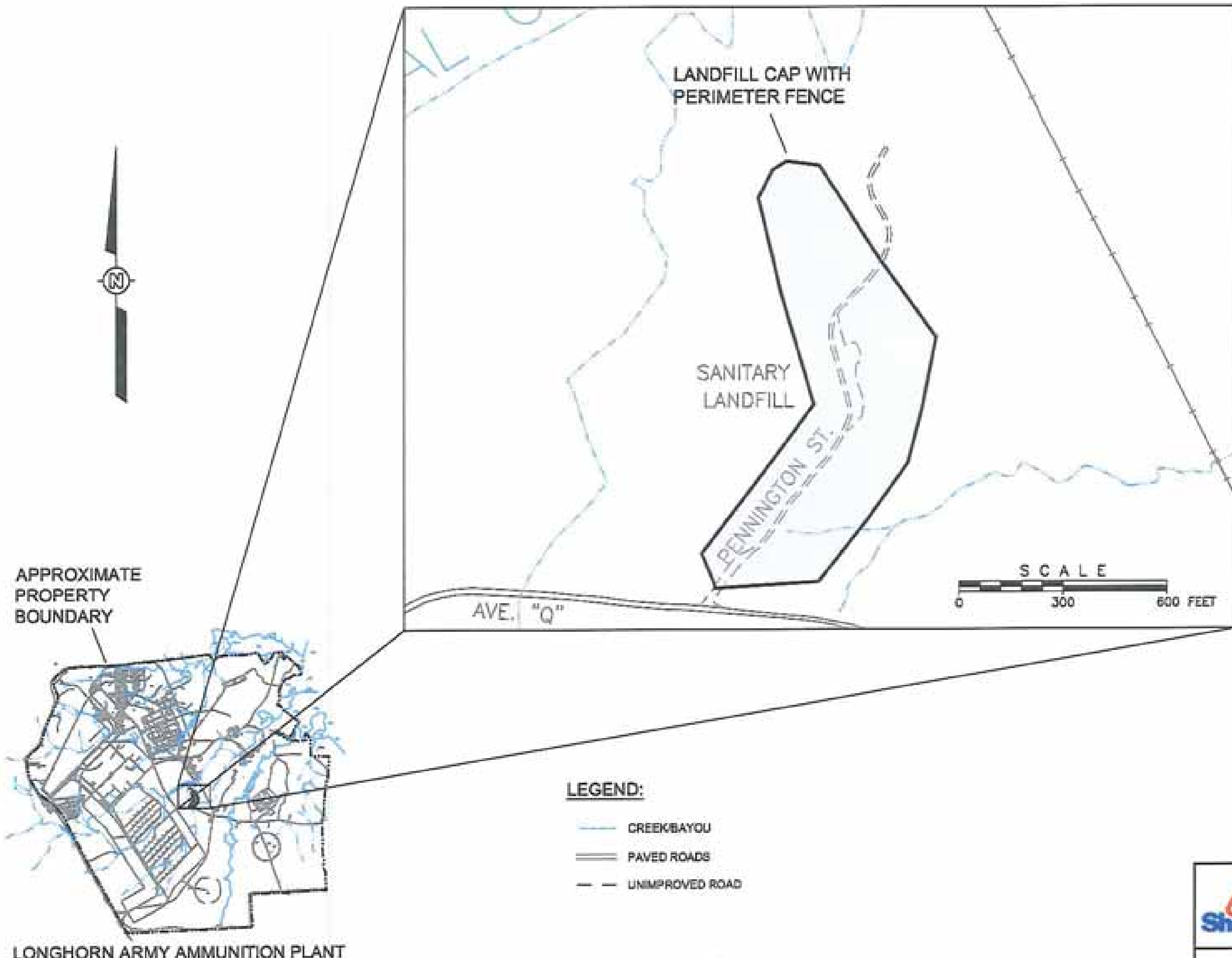
The LUCs shall remain in effect until such time as the Army and USEPA agree that the concentrations of hazardous substances have been reduced to levels that allow for unlimited exposure and unrestricted use. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the Army and USEPA has been made to terminate one or more of the LUCs, the Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

6.2 Monitored Natural Attenuation Implementation Actions

Implementation actions include development of a groundwater monitoring plan, monitoring, and reporting. Groundwater monitoring will be conducted to monitor the effectiveness of MNA in reducing contaminant concentrations over time. Monitoring will also be conducted to evaluate plume migration and ensure that TCE-contaminated groundwater does not impact nearby surface water at unacceptable levels. The Groundwater Monitoring Plan, attached as **Appendix A**, describes the wells, their locations, analytical parameters, and the frequency of the monitoring.

Annual reports will be prepared to document the monitoring program. The first year annual report will include a review of the first four quarters of data which include natural attenuation parameters and provide an evaluation for the evidence of MNA as a remedial method. The TCEQ provides guidance for MNA as a remedial action in *Monitored Natural Attenuation*

00863794



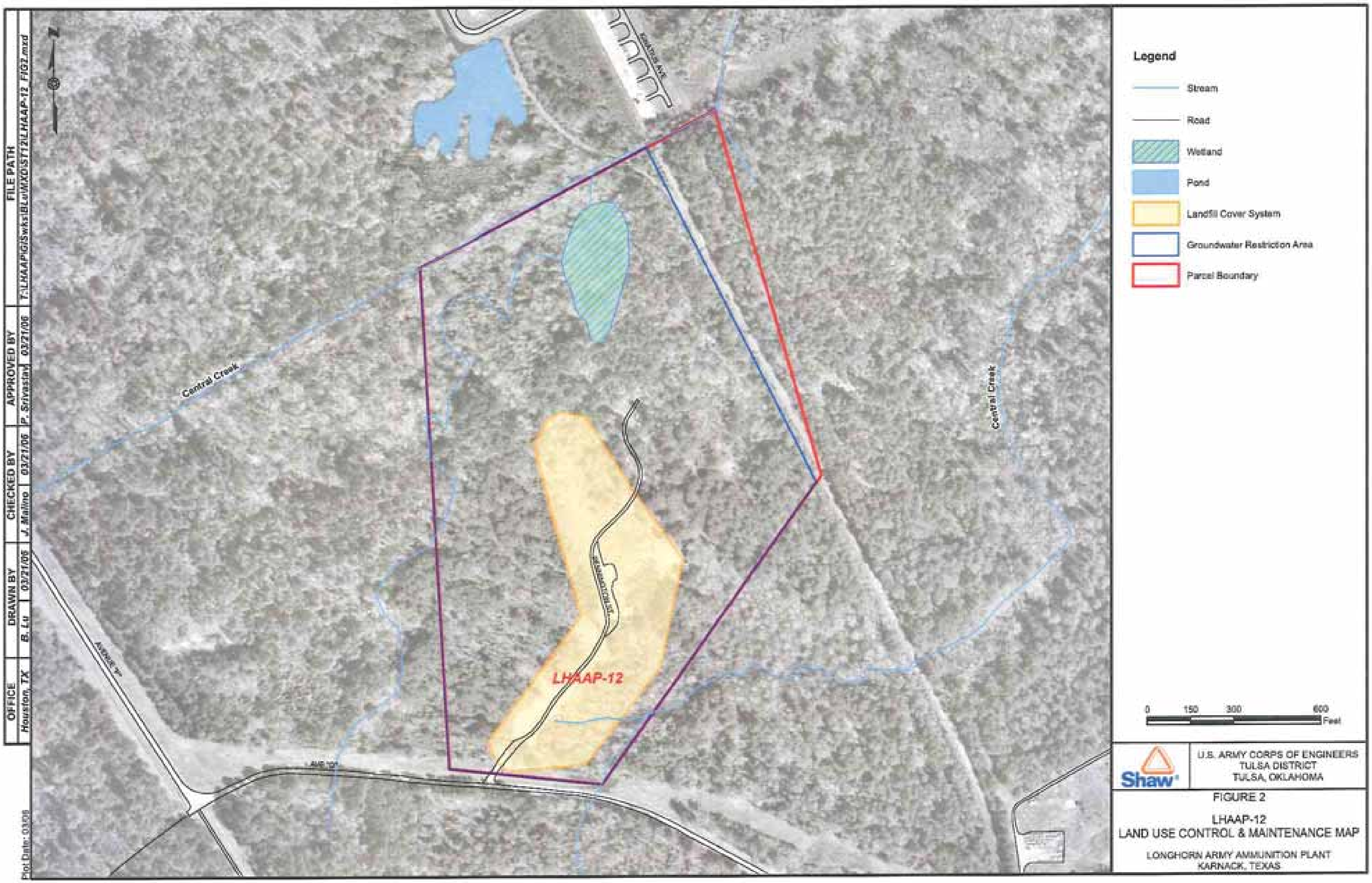
Shaw

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

FIGURE 1
SITE LOCATION MAP
LHAAP-12
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
---	---	Houston, Texas	D. DAY	2/4/04	K. EVERETT	6/30/05	P. SRIVASTAV	6/30/05	845714-B44

PLOT DATE: 7/05/05
FORMAT REVISION 3/25/99


Legend
Stream
Road
Wetland
Pond
Landfill Cover System
Groundwater Restriction Area
Parcel Boundary
0 150 300 600 Feet
Central Creek
Central Creek
LHAAP-12
Shaw
U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA
FIGURE 2
LHAAP-12
LAND USE CONTROL & MAINTENANCE MAP
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS
OFFICE
Houston, TX
DRAWN BY
B. Lu 03/21/06
CHECKED BY
J. Mallino 03/21/06
APPROVED BY
P. Srivastav 03/21/06
FILE PATH
T:\LHAAP\GIS\wks\BLu\MXD\ST12\LHAAP-12_FIG2.mxd
Plot Date: 03/06

00863795

Appendix B

Sample Annual Land Use Control Compliance Inspection Documentation

Sample Annual Land Use Control Compliance Inspection Documentation

In accordance with the Remedial Design Addendum dated __________ for LHAAP-12, an inspection of site was conducted by ______________________ [indicate transferee] on__________.

A summary of land use control mechanisms is as follows:

- Land use and restriction covenants included in ECOP – [Indicate whether the ECOP is on file with the notice of transfer]
- Groundwater restriction – [Indicate whether groundwater restrictions are still required at LHAAP-12]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-12
- No reuse activity at LHAAP-12 that would adversely affect the integrity of the landfill cap
- The fence and posted signs are properly maintained at LHAAP-12
- The vegetative cover is properly maintained over the landfill
- Landfill cap is properly maintained with no evidence of erosion, cracking, settlement, or other damage to engineered components

I, the undersigned, do document that the inspection was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ______________________________

Name/Title ______________________________

Signature: ______________________________

Completed annual compliance inspection forms, with relevant annual compliance certification forms, shall be sent no later than March 1 of each year for the previous calendar year.

U.S. Department of the Army
TCEQ
USEPA Region 6

LHAAP-12, 12-3

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-12 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

Doc 7009064 Bk OR Vol 3640 Pg 1 00863799

FILED FOR RECORD

07 JUN 13 AM 10: 09

PATSY COX
CO CLERK, HARRISON CO
BY [signature] DEPUTY

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROLS AT LHAAP-12

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The remediation site is a capped landfill located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-12. The site is included in TCEQ Notice of Registration No. 30990 as Unit Number 001. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-12 were performed in accordance with the FFA requirements.

The landfill was used intermittently for the disposal of industrial solid waste, possibly containing small quantities of hazardous constituents generated at LHAAP. A Record of Decision (ROD) for LHAAP-12 was signed by USEPA in 1995 establishing the construction of a cap as an interim remedial action for the site to mitigate potential risks posed by the burial of landfill waste. Construction of the landfill cap was completed in 1998. The final remedy consists of land use controls (LUCs) in conjunction with monitored natural attenuation as documented in the Final ROD signed by USEPA on July 24, 2006. The site was not remediated to levels suitable for unrestricted use. LUCs at LHAAP-12 are required to ensure the integrity of the landfill cap and cover system and prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the

Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-12 parcel is a 50.541 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-12 parcel are designated LUC boundaries including a 9.429 acre tract, more or less, and a 45.939 acre tract, more or less, as described in Exhibit A. The LUC boundaries are also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. The United States Department of the Army has undertaken careful environmental study of the LHAAP-12 site and concluded that the LUCs set forth below are required to ensure protection of human health and the environment.

(1) **Landfill Restriction**. A closed non-hazardous landfill (LHAAP-12) of approximately 7 acres is located within the 9.429 acre tract. The landfill restriction boundary consists of the 7-acre capped landfill and an area extending to the surrounding fence. LUCs have been established to protect the integrity of the remedy. No activity shall be conducted or permitted that would damage the integrity of the landfill cover (i.e. digging or disturbing the existing cover or contents of the landfill). The LUCs will remain in place for perpetuity unless otherwise removed by the U.S. Army per agreement with the USEPA and TCEQ.

(2) **Residential Use Restriction**. The residential use restriction boundary consists of the 9.429 acre-tract, more or less, and includes the 7-acre capped landfill and an area extending to the surrounding fence. This tract shall be used solely for the purpose of a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

(3) **Groundwater Restriction**. The groundwater use restriction boundary consists of the 45.939 acre tract, more or less, and extends beyond the landfill

boundary. Groundwater underlying this land is contaminated with trichloroethene (TCE) and other volatile organic compounds and shall not be accessed or used for any purpose without the prior written approval of U.S. Army, the USEPA and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA and the TCEQ. The LUC will remain in place until applicable or relevant and appropriate requirements (ARARs) as established in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulation 300) are met. Due to the potential for TCE-contaminated groundwater to migrate, monitored natural attenuation will be implemented to assure that TCE-contaminated groundwater will not migrate to nearby surface water at levels that may present an unacceptable risk to human health and the environment. The monitoring and reporting associated with this remedy will continue until ARARs are achieved.

The owner of the site is the Department of the Army, and its address where more specific information may be obtained from is as follows:

ATTN: DAIM-BD-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 13th day of June, 2007.

BEFORE ME, on this the 13th day of June, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 13 day of June, 2007.

NOTARY PUBLIC STATE OF TEXAS
LYNDA G. HAYS
Notary Public State of Texas
COMM. EXP. 5-02-2010

Lynda G. Hays
Notary Public in and for the State of Texas,
County of Harrison

EXHIBIT A

NOTE

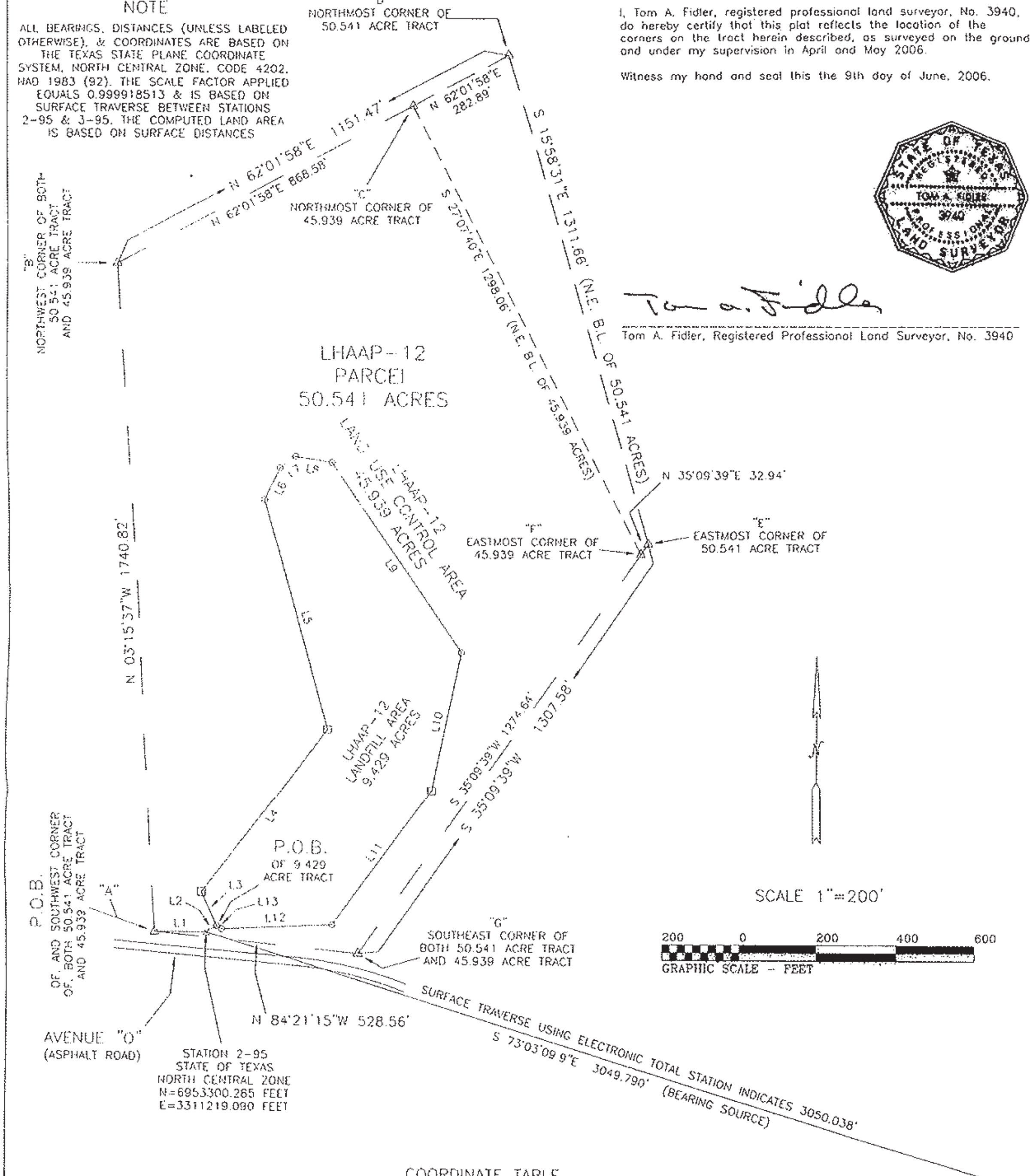
ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999918513 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS 2-95 & 3-95. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in April and May 2006.

Witness my hand and seal this the 9th day of June, 2006.

STATE OF TEXAS · REGISTERED · TOM A. FIDLER · 3940 · PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940



LINE TABLE

COURSE	BEARING	DISTANCE
L1	S 89°52'35"W	132.09'
L2	N 58°35'33"E	31.72'
L3	N 23°52'43"W	96.81'
L4	N 37°07'57"E	537.87'
L5	N 15°28'17"W	618.92'
L6	N 26°16'28"E	90.81'
L7	N 54°00'30"E	50.67'
L8	S 81°02'29"E	96.24'
L9	S 34°25'01"E	596.16'
L10	S 12°11'35"W	370.18'
L11	S 36°09'00"W	434.64'
L12	S 87°15'04"W	286.47'
L13	N 57°18'20"W	15.33'

COORDINATE TABLE

POINT	NORTH	EAST
A	6953300.000	3311087.000
B	6955038.000	3310988.000
C	6955445.333	3311755.144
D	6955578.000	3312005.000
E	6954317.000	3312366.000
F	6954290.070	3312347.030
G	6953248.000	3311613.000

NOTES:

○ INDICATES 12" DIAMETER WOODEN FENCE CORNER POST (FOUND)
□ INDICATES 10" DIAMETER WOODEN FENCE CORNER POST (FOUND)
X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
△ INDICATES 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET IN CONCRETE)
———— INDICATES BARBED WIRE FENCE AND PERIMETER OF 9.429 ACRE TRACT
— — — INDICATES PERIMETER OF 50.541 ACRE TRACT ONLY
— - — - INDICATES PERIMETER OF 45.939 ACRE TRACT ONLY
——— ——— INDICATES PERIMETER OF BOTH 50.541 ACRE TRACT AND 45.939 ACRE TRACT

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

SHEET 1 OF 4

50.541 ACRES
45.939 ACRES
9.429 ACRES
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	0605063A.DWG
06/09/2006	0605063.CRD	DRAWN BY JTJ

SHEET 2 OF 4

FIELD NOTES DESCRIPTION OF
"LHAAP-12 PARCEL"
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-12 Parcel" being 50.541 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-12 Parcel" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999918513, and is based on surface traverse (using electronic total station) between type "G" Corps of Engineers monuments "2-95"(N=6953300.285 feet & E=3311219.090 feet) and "3-95"(N=6952411.298 feet & E=3314136.438 feet). Said traverse indicates a surface distance of 3050.038 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940".

Commencing at the monument "2-95" referenced above,

THENCE S 89deg52'35"W 132.09' to an I.R.O.P.C. set in concrete for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 03deg15'37"W 1740.82' along the W.B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northwest corner,

THENCE N 62deg01'58"E 1151.47' along the N.W. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northmost corner,

THENCE S 15deg58'31"E 1311.66' along the N.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Eastmost corner,

THENCE S 35deg09'39"W 1307.58' along the S.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Southeast corner,

THENCE N 84deg21'15"W 528.56' along the S.B.L. of this tract to this POINT OF BEGINNING, containing 50.541 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

FIELD NOTES DESCRIPTION OF
"LHAAP-12 LAND USE CONTROL AREA"
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-12 Land Use Control Area" being 45.939 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said "LHAAP-12 Land Use Control Area" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999918513, and is based on surface traverse (using electronic total station) between type "G" Corps of Engineers monuments "2-95"(N=6953300.285 feet & E=3311219.090 feet) and "3-95"(N=6952411.298 feet & E=3314136.438 feet). Said traverse indicates a surface distance of 3050.038 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940".

Commencing at the monument "2-95" referenced above,

THENCE S 89deg52'35"W 132.09' to an I.R.O.P.C. set in concrete for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 03deg15'37"W 1740.82' along the W.B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northwest corner,

THENCE N 62deg01'58"E 868.58' along the N.W. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Northmost corner,

THENCE S 27deg07'40"E 1298.06' along the N.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Eastmost corner,

THENCE S 35deg09'39"W 1274.64' along the S.E. B.L. of this tract to an I.R.O.P.C. set in concrete for this tract's Southeast corner,

THENCE N 84deg21'15"W 528.56' along the S.B.L. of this tract to this POINT OF BEGINNING, containing 45.939 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

SHEET 4a OF 4

FIELD NOTES DESCRIPTION OF
"LHAAP-12 LANDFILL AREA"
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-12 Landfill Area" being 9.429 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said "LHAAP-12 Landfill Area" being more particularly described as follows:

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999918513, and is based on surface traverse (using electronic total station) between type "G" Corps of Engineers monuments "2-95"(N=6953300.285 feet & E=3311219.090 feet) and "3-95"(N=6952411.298 feet & E=3314136.438 feet). Said traverse indicates a surface distance of 3050.038 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940".

Commencing at the monument "2-95" referenced above,

THENCE N 58deg35'33"E 31.72' to a 12" diameter wooden fence corner post found for a Southwest corner of this tract and this POINT OF BEGINNING,

THENCE generally along a barbed wire fence the following eleven courses,

N 23deg52'43"W 96.81' to a 10" diameter wooden fence corner post found for the Westmost corner of this tract,

N 37deg07'57"E 537.87' to a 10" diameter wooden fence corner post,

N 15deg28'17"W 618.92' to a 12" diameter wooden fence corner post,

N 26deg16'28"E 90.81' to a 12" diameter wooden fence corner post,

N 54deg00'30"E 50.67' to a 12" diameter wooden fence corner post found for the Northmost corner of this tract, S 81deg02'29"E 96.24' to a 12" diameter wooden fence corner post,

S 34deg25'01"E 596.16' to a 12" diameter wooden fence corner post found for the Eastmost corner of this tract,

S 12deg11'35"W 370.18' to a 10" diameter wooden fence corner post,

S 36deg09'00"W 434.64' to a 12" diameter wooden fence corner post,

S 87deg15'04"W 286.47' to a 12" diameter wooden fence corner post,

N 57deg18'20"W 15.33' to this POINT OF BEGINNING, containing 9.429 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

FIGURE 1

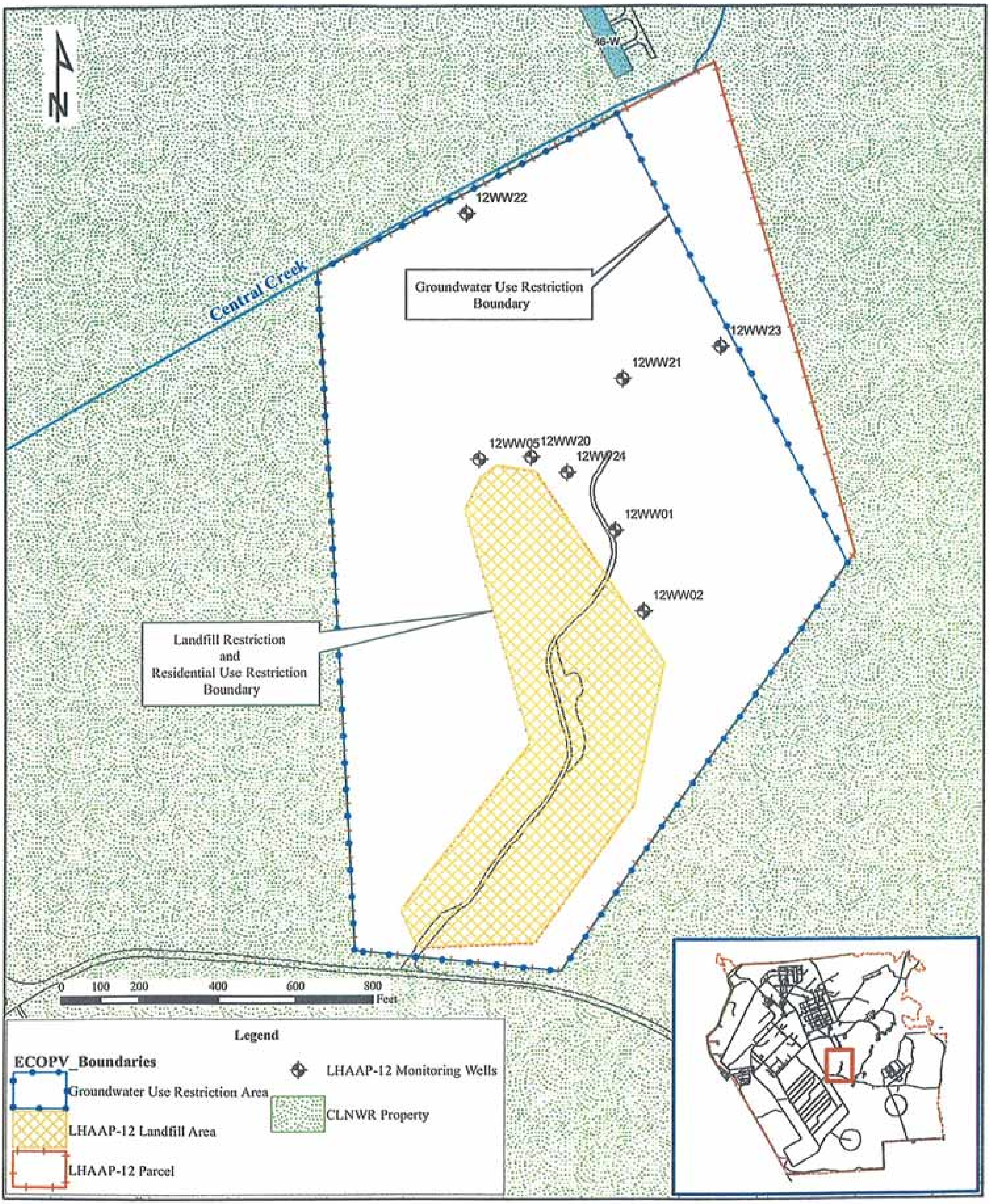


FIGURE 1

Land Use Control Boundaries

00863810

Doc 7009064 Bk OR Vol 3640 Pg 12

STATE OF TEXAS COUNTY OF HARRISON

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the volume and page of the named records of:

Harrison County

as stamped hereon by me.

Jun 13,2007

HONORABLE PATSY COX, COUNTY CLERK

Harrison County

00863811

LHAAP-12, 12-4

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

LHAAP-12, Landfill 12 Parcel
Annual Land Use Control Compliance Certification

Land use controls (LUC) at LHAAP-12 in the Landfill 12 Parcel:

• Land use restriction – Prohibition of any activities that would affect the integrity of the cap (i.e. no digging or disturbing the existing cover or contents of the landfill) and of residential use or residential development of the property

• Groundwater use restriction – Prohibition of any activities that would cause exposure to contaminated groundwater (i.e. no withdrawal or use of groundwater for other than environmental monitoring and testing)

Compliance with land use controls:

• No use of groundwater or installation of new groundwater wells (except that required for environmental monitoring and testing), or tampering with existing wells at LHAAP-12

• No reuse activity at LHAAP-12 that would adversely affect the integrity of the landfill cap (i.e no digging or disturbing the existing cover or contents of the landfill) and cap protective components (fencing and signage), and no residential use or residential development of the property

Inspection: In accordance with the LHAAP-12 Remedial Design Addendum dated 21 June 2007, an inspection of LHAAP-12 was conducted by ______________________ on__________ to visually confirm compliance with the LUCs.

I, the undersigned, do document that the inspection was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: _______________________________

Name/Title _______________________________

Signature: _______________________________

Completed annual compliance form, to be kept on file at the Administrative Office of the Caddo Lake National Wildlife Refuge by the Refuge staff and available to EPA, TCEQ and Army upon request. The certification shall be conducted no later than March 1 of each year for the previous calendar year.

LHAAP – 16, 16-1
DRAFT LUC INSPECTION AND MAINTENANCE LOG
(RAO Inspection and Maintenance Checklist)
(Well Inspection Form)

November 28, 2017

00863814

RAO Inspection and Maintenance Checklist

General Information	
Project Name	RAO Inspection and Maintenance, LHAAP-16 Landfill, Longhorn Army Ammunition Plant, Karnack, TX
Contractor	
Inspector's Name	
Inspector's Title	
Inspector's Signature	
Inspector's Contact Number	
Inspection Date	
Type of Inspection	☐ Quarterly ☐ Semiannual ☐ Annual ☐ Prior to forecast rain ☐ After a rain event ☐ Other --------------------------------

Description		Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
A.	**CAP Cover Surface**					
A.1	Are there any significant cracks present?					
A.2.	Are there any damaged areas?					
A.3	Is there any ponded water present?					
A.4	Any other relevant observations?					
B.	**CAP Vegetation and Animal Burrows**					
B.1	Are there signs of stressed/ dead vegetation?					
B.2	Are there any significant bare spots?					
B.3	Are deep-rooted plants present?					
B.4	Are there signs of animal burrows?					
B. 5	Any other relevant observations?					

Description		Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
C.	**CAP Erosion and Drainage System**					
C.1	Is there any evidence of significant/ clearly visible erosion, settlement, or other deterioration?					
C.2	Are the drainage systems in poor condition?					
C.3	Is there excessive silting or debris clogging?					
C.4	Is there erosion of banks and slopes?					
C.5	Are there areas of choking by overgrown vegetation?					
C.7	Is there pooling of water in or along side a channel or berm?					
C.8	Any other relevant observations?					
D.	**Groundwater Monitoring Wells**					
D.1	Are the installed groundwater monitoring wells in poor condition?					
D.2	Are there any signs of damage, unusual wear, rust and corrosion, vandalism, unauthorized entry/use, or settlement?					
D.3	Is well cap and/or locking mechanism not properly functioning?					
D.4	Are the well heads and protective casings damaged?					
D.5	Is the well cleared of vegetation and accessible?					
D.6	Any other relevant observations?					

Description		Yes	No	N/A	**Comments** (Attach photos/location sketches)	**Corrective Action** (Attach photos)
E.	**Site Access Features**					
E.1	Are the perimeter fence and gates damaged?					
E.2	Gate(s) damaged?					
E.3	Litter encountered within the area?					
E.4	Are the gate locks missing?					
E.4	Are signs to prevent unauthorized entry missing?					
E.5	Are the access roads in unusable or poor condition?					
E.6	Any other relevant observations?					
F.	**Concrete Aprons and Bollards**					
F.1	Are there any significant cracks present?					
F.2	Are there any damaged areas?					
F.3	Any other relevant observations?					

WELL INSPECTION FORM

Job Name: ______________________ Well ID: ______________________

Job No.: ______________________ Completed Date: ______________________

Client: ______________________ Measured Depth: ______________________

Site Location: ______________________ Inspector: ______________________

☐ **ABOVE GROUND**

Protective casing? ☐ Yes ☐ No

Material ______________________

Condition: ☐ Good ☐ Broken ☐ Cracked

Lid Condition: ☐ Good ☐ Broken ☐ Cracked

Hinge Condition: ☐ Good ☐ Less than 50% rusted ☐ More than 50% rusted

☐ **FLUSH MOUNTED**

Well cover present? ☐ Yes ☐ No

Condition: ☐ Good ☐ Broken ☐ Cracked

Condition of Sump: ☐ Clean ☐ Dry ☐ Standing Water

CONCRETE PAD:

Visible? ☐ Yes ☐ No

Dimensions ______________________ Thickness ______________________

Sloped away from casing? ☐ Yes ☐ No

Check any of the following features that apply:

☐ Many Cracks ☐ Gap Around Casing ☐ Few Cracks ☐ Ponded Water ☐ No Pad Present

CONCRETE PAD:

Inner Diameter (inches) ______________________

Condition: ☐ Good ☐ Broken ☐ Cracked ☐ Other (describe) ______________________

Cap present? ☐ Yes ☐ No

Well lock present? ☐ Yes ☐ No

Lock functioning properly? ☐ Yes ☐ No

Bump post? ☐ Yes ☐ No

Well ID visible? ☐ Yes ☐ No

WELL INTEGRITY:

Bailer present? ☐ Yes ☐ No

Visual obstruction? ☐ Yes ☐ No

Is well open to completed depth? ☐ Yes ☐ No

Is silt present in well? ☐ Yes ☐ No

Is silt greater than 25% of well screen length? ☐ Yes ☐ No

COMMENTS:

LHAAP-16, 16-2
LUCs FROM DRAFT-FINAL REMEDIAL DESIGN

November 28, 2017

00863819

DRAFT FINAL
REMEDIAL DESIGN
LHAAP-16 LANDFILL
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:

U.S. Army Corps of Engineers
Tulsa District

Prepared By:

AECOM Technical Services

January 2017

DRAFT FINAL
REMEDIAL DESIGN LHAAP-16 LANDFILL
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:

U.S. Army Corps of Engineers

Tulsa District

Prepared By:

AECOM Technical Services

Contract No. W912DY-09-D-0059

Task Order No. DS01

January 2017

List of Figures

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Acronyms and Abbreviations

µg/L	microgram per liter
ABC+	Anaerobic Biochem Plus
API	American Petroleum Institute
ARAR	applicable or relevant and appropriate requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm/sec	centimeters per second
COC	contaminant of concern
DCA	Dichloroethane
DCE	Dichloroethene
DO	dissolved oxygen
DPT	direct push technology
ECP	Environmental Condition of Property
EDS-ER	Electron Donor Solution - Extended Release
ESD	Explanation of Significant Difference
ESTCP	Environmental Security Technology Certification Program
EVO	emulsified vegetable oil
FFA	Federal Facilities Agreement
FS	Feasibility Study
HDPE	high-density polyethyelene
HFCS	high-fructose corn syrup
HSA	hollow stem auger
IRA	Interim Remedial Action
ISB	in-situ bioremediation
IWWP	Installation-Wide Work Plan
lbs	pounds
LHAAP	Longhorn Army Ammunition Plant
LTM	long-term monitoring
LUC	land use control
mg/L	milligrams per liter

MNA	monitored natural attenuation
MOA	Memorandum of Agreement
msl	mean sea level
mV	millivolt
NPL	National Priorities List
O&M	operation and maintenance
ORP	Oxidation-Reduction Potential
RACR	Remedial Action Completion Report
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
ROI	Radius of Influence
SARA	Superfund Amendment and Reauthorization Act
TAC	Texas Administrative Code
TCA	Trichloroethane
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
U.S.	United States
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
VC	Vinyl chloride
ZVI	zero valent iron

5 LAND USE CONTROL REMEDIAL DESIGN

This section describes the LUC RD for LHAAP-16. In accordance with the Final ROD (U.S. Army, 2016), the LUC RD will be finalized as the land use component of the Remedial Design.

Per the Final ROD (U.S. Army, 2016), LUCs' performance objectives are to:

- Prohibit access to the contaminated groundwater except for environmental monitoring and testing only;
- Preserve the integrity of the landfill cap, and to restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
- Restrict land use to nonresidential;
- Maintain the integrity of any current or future remedial or monitoring systems; and

The implementation, maintenance, and inspection requirements associated with each of the performance objectives that comprise this LUC RD are described below. The actions taken to implement the LUC objectives during the RA phase, as well as ongoing maintenance, monitoring and reporting requirements will be presented in the Remedial Action Completion Report (RACR), as the final LUC RD. Upon regulatory review and concurrence with the final LUC RD, it will be distributed as part of the Comprehensive LUC Management Plan.

For portions of the Site subject to land use controls that are not owned by the Army, the Army will monitor and report on the implementation, maintenance, and enforcement of land use controls, and coordinate with federal, state, and local governments and owners and occupants of properties subject to land use controls. The Army remains responsible for ensuring that the remedy remains protective of human health and the environment.

5.1 LUC Implementation

The actions required to implement the LUCs for LHAAP-16 are described below. The first of these, the initial notice of LUCs, has been completed. A figure depicting the preliminary LUC boundaries is presented in **Figure 5-1**. The following actions will be undertaken to implement the LUCs for LHAAP-16:

- Provide initial notice of the LUCs before remedial action is implemented.
    - o Develop the initial notice of the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD. The notice will consist of a brief description of the contaminants in groundwater and soil, a written description of the LUCS and a figure depicting the preliminary LUC boundaries presented in **Figure 5-1**.
    - o Transmit the notice to federal, state and local governments involved at this site and the owners and occupants of the properties subject to those use restrictions and land use controls within 90 days of ROD signature, which is on or before December 12, 2016. The notices will be sent to federal, state and local officials including: U.S. Senator Ted Cruz, U.S. Senator John Cornyn, U.S. Congressman Louie Gohmert, State Senator Kevin Eltiffe, State Representative Chris Paddie, Harrison County

Judge Hugh Taylor, Harrison County Commissioner Precinct 1 William D. Hatfield, City of Uncertain Mayor Sam Canup, and Karnack Water Supply Corporation Board Members. Notice will also be sent to the Caddo Lake National Wildlife Refuge Manager.

- Finalize the Boundaries for the LUCs as a part of the remedial action.
  - Revise the boundaries if necessary. The LUC boundary presented in this RD is subject to change, based on COC results from the two proposed wells to be installed on the east side of Harrison Bayou. The final boundaries of the groundwater LUCs (prevent the use of groundwater contaminated above cleanup levels as a potable water source and prohibit access to the contaminated groundwater except for environmental monitoring and testing only); the landfill LUCs (preserve the integrity of the landfill cap, and to restrict intrusive activities (e.g., digging) that would degrade or alter the cap); the remedial or monitoring system LUCs (maintain the integrity of any current or future remedial or monitoring systems); and, the nonresidential land use LUC (restrict land use to nonresidential) will be reviewed during remedial action activities after an evaluation of new data has been completed and revised if necessary.
  - Survey the LUC Boundaries. The boundaries will be finalized after concurrence by USEPA and TCEQ, and the LUC boundaries will be surveyed by a State-licensed surveyor. A legal description of the surveyed areas will be appended to the survey plat.
- Record the LUCs in Harrison County. The LUC plat, legal description and LUC restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566.
- Notify the Texas Department of Licensing and Regulation of the groundwater LUCs. The Texas Department of Licensing and Regulation will be notified of the groundwater restrictions, which include the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction LUCs, in conjunction with a locator map, will be provided in hard and electronic copy.

5.2 Maintenance and Monitoring Requirements

The LUCs will be maintained in place as follows:

- The landfill LUCs will remain in place as long as the landfill waste remains at the site or until the levels of Contaminants of Concern (i.e., including all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 1-1**) allow for unlimited use and unrestricted exposure;
- The LUCs restricting the use of groundwater to environmental monitoring and testing only and the LUC restricting land use to nonresidential will remain in place until the levels of COCs (i.e., including all hazardous substances, pollutants, and contaminants found at the Site

at cleanup levels as listed in **Table 1-1**) in surface and subsurface soil and groundwater allow for unlimited use and unrestricted exposure;

- The LUC to maintain the integrity of any current or future remedial or monitoring systems will remain in place until groundwater cleanup levels of COCs (i.e., including all hazardous substances, pollutants and contaminants found at the Site at cleanup levels as listed in **Table 1-1**) are met; and,
- The LUC prohibiting groundwater use (except for environmental monitoring and testing) as a potable source will remain in place until the levels of COCs (i.e., all hazardous substances, pollutants, and contaminants found at the Site at cleanup levels as listed in **Table 1-1**) in soil and groundwater allow for unlimited use and unrestricted exposure.

Landfill and Remedial or Monitoring System LUCs include physical components that require repair and maintenance. These are described in **Section 3.0.** The Inspection and Maintenance Checklist is provided in **Appendix A.**

The administrative maintenance required to ensure the five LUCs remain in place and effective until the cleanup levels of the COCs are at levels that allow unrestricted use and unlimited exposure are:

- Annual field inspections of the site to confirm that no violations of the LUCs have occurred. Documentation of the inspection will be included in the Inspection and Maintenance Checklist (see **Appendix A).**
- Annual certifications that no LUC-restricted activities have been authorized and that site conditions and use are consistent with the LUCs. The Certification Form is presented in **Appendix E).**
- Periodic transmittal of a LUC Notice to federal, state, and local authorities and to owners and occupants of LHAAP-16. The notice will include the groundwater and soil (surface and subsurface) contamination and any land use restrictions referenced in the ROD, a written description of the LUCs and a figure depicting the LUC boundaries. The transmittal will coincide with each Five Year Review and will be documented in the report.
- The final LUC RD appendix of the RACR will be added to the Comprehensive LUC Management Plan and the plan will be provided to the owner or occupant of LHAAP-16.

The U.S. Army will address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

5.3 Reporting of LUC Inspection and Monitoring

Beginning with finalization of this RD and approval of the Inspection and Maintenance forms and the Annual Certification Form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the LUC Inspection and Certification documents in the project files for incorporation into the five-year review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue inspections and certifications will be revisited at five year reviews.

5.3.1 Notice of Planned Property Conveyances

Upon transfer of Army-owned property, the Army will provide written notice to the transferee of the LHAAP-16 groundwater and soil (surface and subsurface) contamination and any land use restrictions. Within 15 days of transfer, the U.S. Army will provide written notice to USEPA and TCEQ of the division of implementation, maintenance, and enforcement responsibilities unless the information has already been provided in the LUC RD. The notice will describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the US Army may transfer responsibility for various implementation actions, the U.S. Army will also retain ultimate responsibility for the remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objectives that would undermine the U.S. Army's CERCLA remedy. The US Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation. In the event property is transferred out of Federal control, the land use controls relating to property and groundwater restrictions shall be recorded in the deed and shall be enforceable by the United States and the state of Texas.

5.3.2 Opportunity to Review Text of Intended Land Use Controls

The US Army will provide a copy of the groundwater and land use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. USEPA will also receive a copy for review. The US Army will produce an ECP or other environmental document for transfer of LHAAP-16, but before executing transfer, the US Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

5.3.3 Notification Should Action(s) which Interfere with land Use Control Effectiveness be Discovered Subsequent to Conveyance

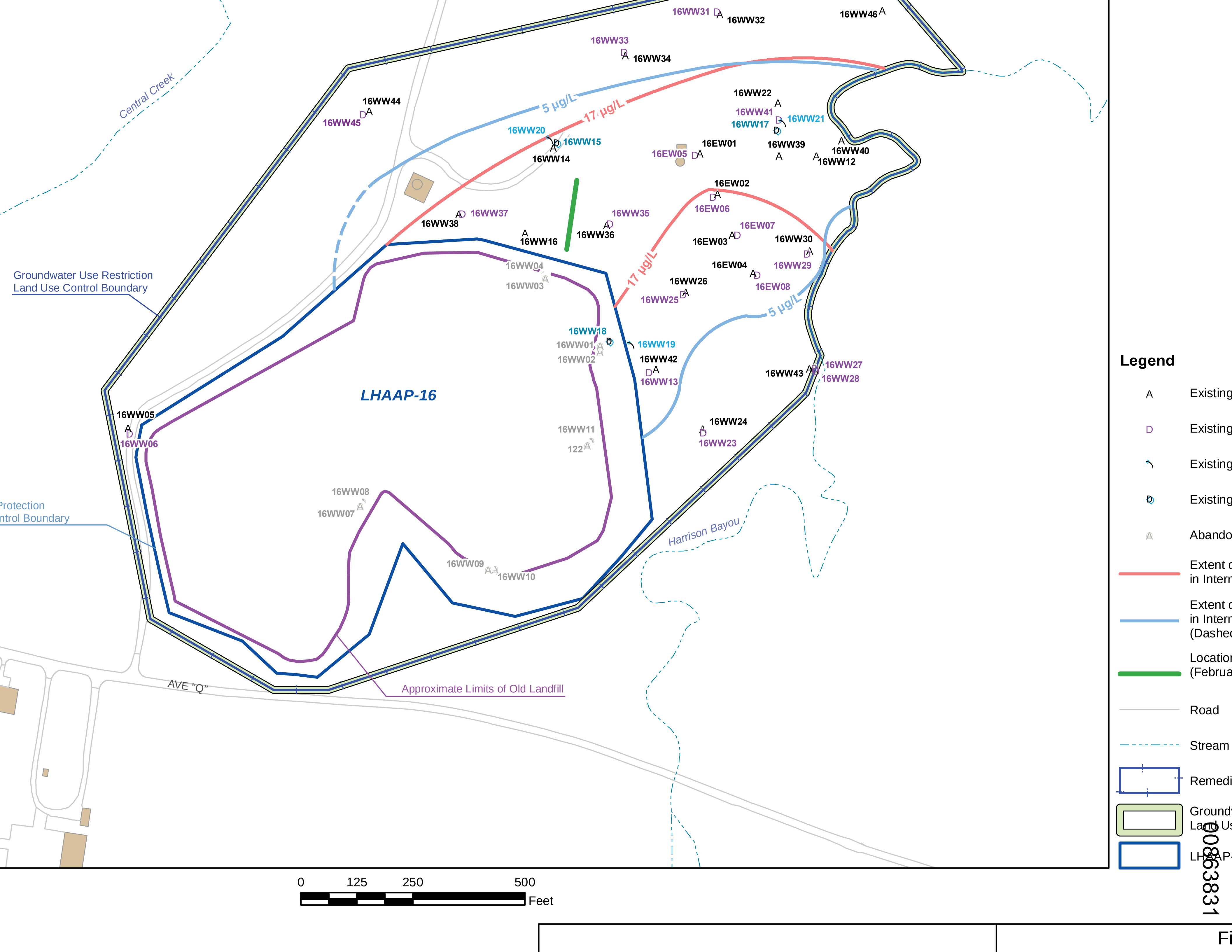
Should the US Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the US Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with Section 5.2.5 below, the US Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the US Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

5.3.4 Land Use Control Enforcement

Should the LUC remedy reflected in this RD fail, the US Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the USFWS or its lessee, to the institution of judicial action against non-federal third parties. Alternatively, should the circumstances warrant such, the US Army could choose to exercise its response authorities under CERCLA. Should the US Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the US Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

5.3.5 Modification or Termination of Land Use Controls

The LUCs shall remain in effect until such time as the US Army and USEPA agree that the concentrations of COCs in groundwater have met cleanup levels in groundwater and that surface and subsurface soil concentrations allow unrestricted use. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action complete report. If the property has been transferred and a determination by the US Army and USEPA has been made to terminate the LUC, the US Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.



LHAAP-16
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Groundwater Use Restriction
Land Use Control Boundary
Approximate Limits of Old Landfill
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16WW05
16WW06
16WW07
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16WW09
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00863831

LHAAP – 16, 16-3
NOTICE OF LAND USE CONTROL AND NONRESIDENTIAL LAND USE FOR LHAAP-16 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

(Pending)

November 28, 2017

Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas

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

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

The sites addressed in this Initial Notice of Land Use Controls are LHAAP-001-R and LHAAP-003-R, which are shown on the attached Figures and discussed below.

Land Use Controls (LUCs) are applied at LHAAP-001-R and LHAAP-003-R as part of the final remedy in accordance with the Record of Decision signed September 13, 2016. LUCs are necessary to promote ongoing protection of human safety against potential explosive hazards that may remain at the MMRP sites. The performance objectives are to prohibit the development and use of the property for residential housing, elementary and secondary schools, and child care facilities and playgrounds, and to prohibit intrusive activities such as digging or any other activity which could result in explosive safety risks.

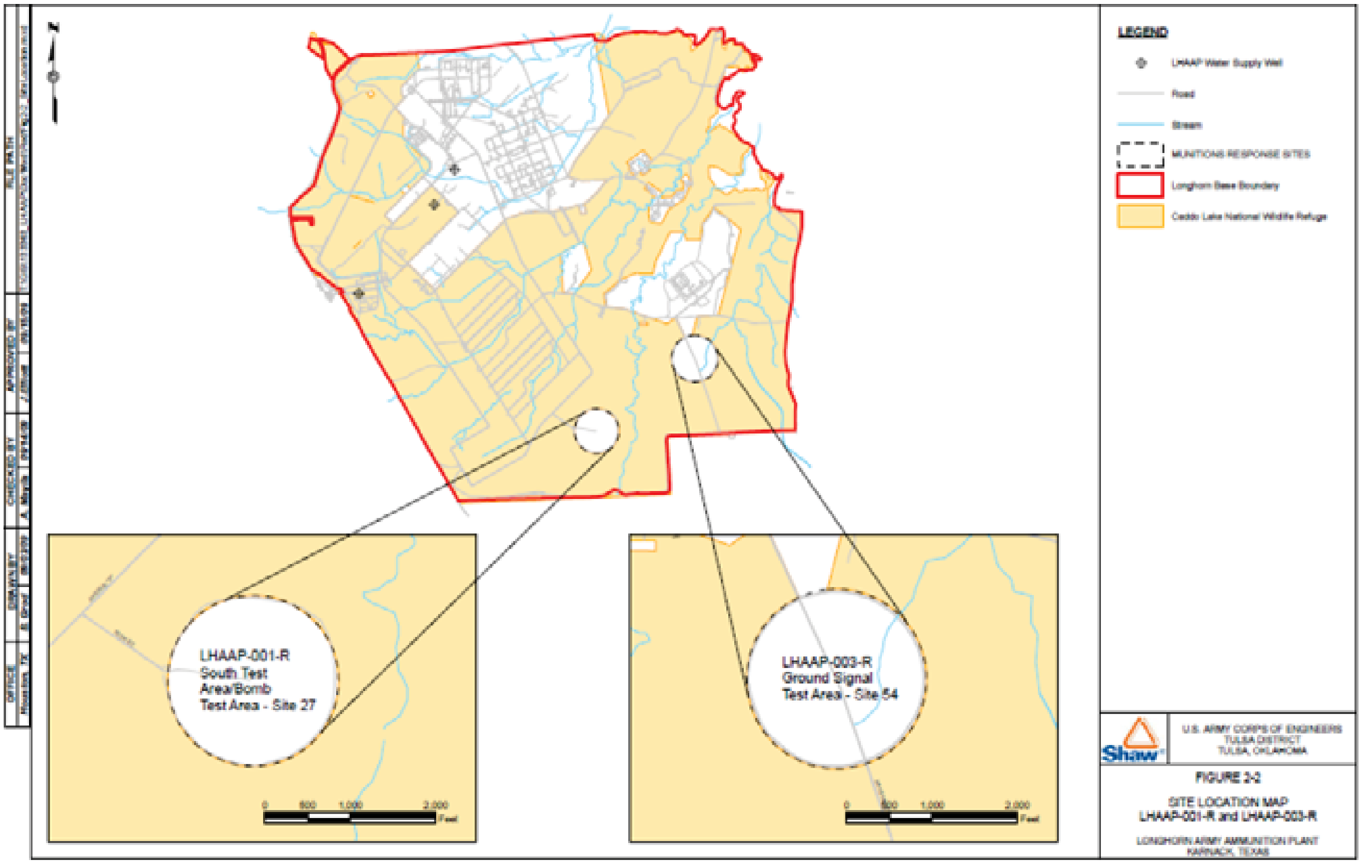
Land Use Controls

- The LUC to prohibit residential land use will remain in place until it is demonstrated that the MEC no longer presents a threat to public/human safety.
- The LUC restricting land use to nonresidential will remain in place until it is demonstrated that the MEC no longer presents a threat to public/human safety.
- A LUC to prohibit intrusive subsurface activities, including digging, will remain in place until it is demonstrated that the MEC no longer present an explosive hazard. However, intrusive subsurface activities may occur provided that the Army and the EPA approve such intrusive subsurface activities before they are commenced and provided that they are undertaken by qualified personnel who are trained in explosives safety measures.

Further information may be found in the Adminstrative Record at the Marshall Public Library, at website www.longhornaap.com or by contacting Rose M. Zeiler (479-635-0110 or rose.m.zeiler.civ@mail.mil).

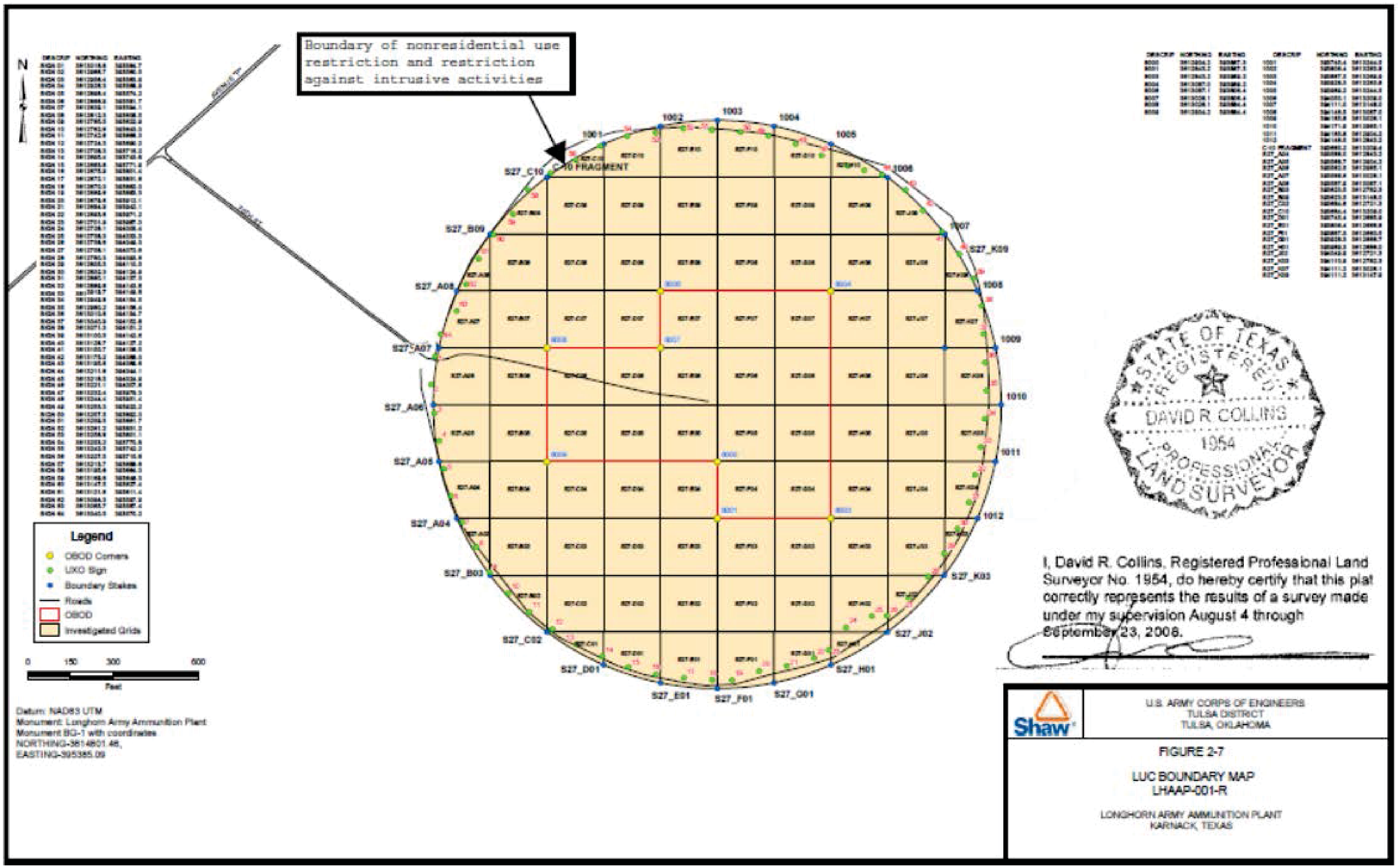
Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas



Initial Notice of Land Use Controls

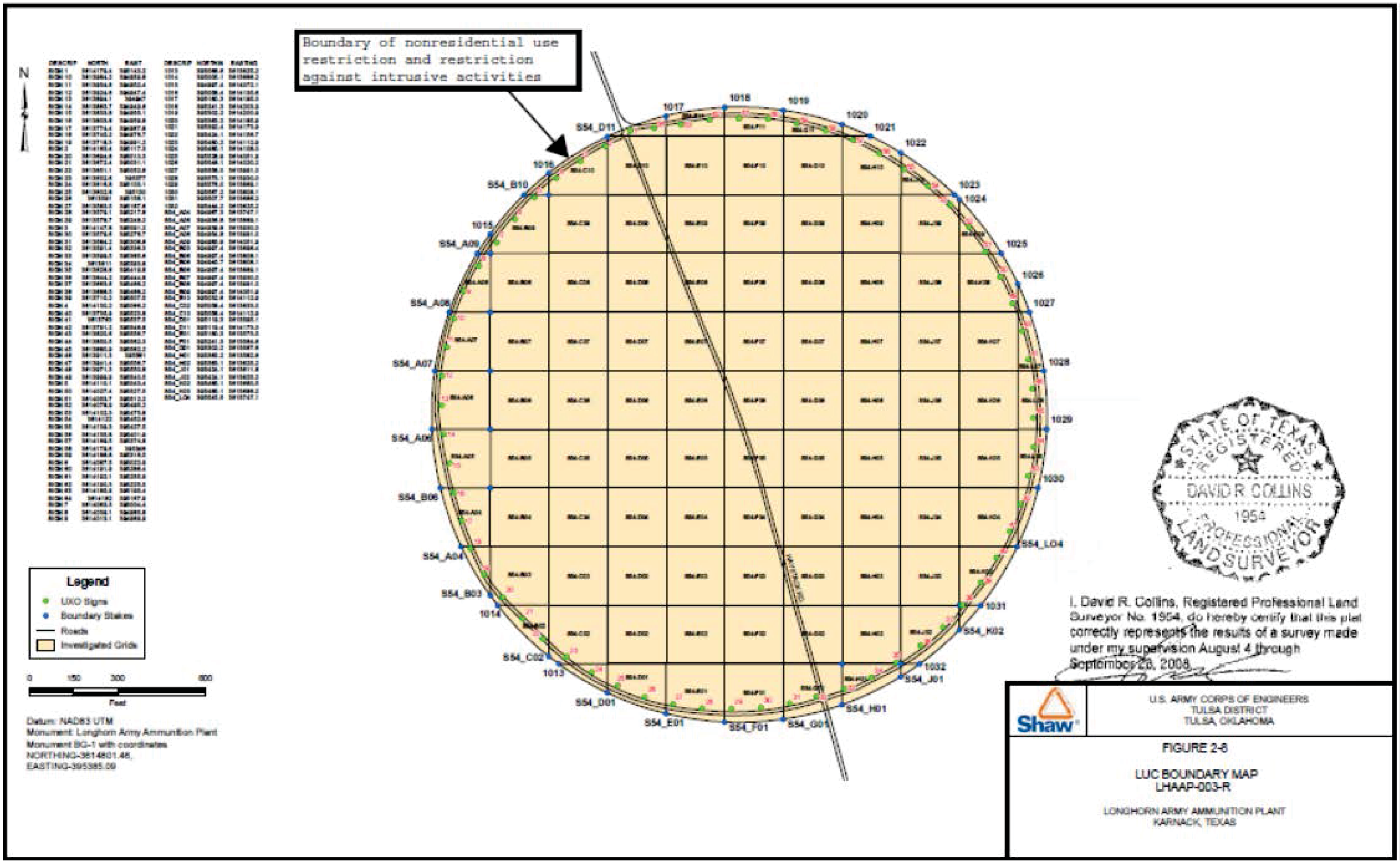
LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas



00863835

Initial Notice of Land Use Controls

LHAAP-001-R, South Test Area/South Bomb Area and
LHAAP-003-R, Ground Signal Test Area
Longhorn Army Ammunition Plant, Karnack Texas



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LHAAP – 16, 16-4

LAND USE CONTROL COMPLIANCE INSPECTION FORM

November 28, 2017

Annual Land Use Control Compliance Inspection Form

In accordance with the Remedial Design dated ________________ for LHAAP-16 an inspection of the site was conducted by _____________________ [indicate transferee] on ________________.

The land use control mechanisms are:

- Groundwater restrictions - prohibit access to the contaminated groundwater except for environmental monitoring and testing only until cleanup goals are met;
- Landfill integrity - preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
- Land use restrictions - restrict land use to nonresidential;
- Integrity of remedial and monitoring systems - maintain the integrity of any current or future remedial or monitoring systems until cleanup goals are met.

No unauthorized activities or uses have occurred. Compliance with land use controls and restrictions is as follows:

- No use of groundwater (other than environmental testing and monitoring), installation of new groundwater wells, or tampering with existing monitoring wells;
- No landfill intrusive activities (e.g., digging) that would degrade or alter the landfill cap; maintenance of vegetative cover and repair of soil subsidence or erosion areas on the cap;
- No land use other than nonresidential; and
- No activities that would compromise the integrity of the remedial or monitoring systems.

I, the undersigned, do document that the inspection was conducted as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ____

Name/Title: ____

Signature: ____

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year, retained in the file and provided to Army, EPA and TCEQ upon request.

LHAAP-19

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-19 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00863840

2013-000013785

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

5 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 11/14/2013 04:23 PM **Document Number:** 2013-000013785 **Receipt No:** 1313735 **Amount:** $ 28.00 **By:** Ann Turner, **Deputy** **Patsy Cox, County Clerk** **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AARON WILLIAMS
1645 SOUTH 100 FIRST EAST AVE

TULSA, OK 74128

STATE OF TEXAS
HARRISON COUNTY

INDUSTRIAL SOLID WASTE
CERTIFICATION OF REMEDIATION

KNOW ALL MEN BY THESE PRESENT THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-19, is a C&D Landfill located within the former Longhorn Army Ammunition Plant (LHAAP) in the northeast corner of Harrison County, Texas approximately 14 miles northeast of Marshall, Texas, and approximately 40 miles west of Shreveport, Louisiana. LHAAP was placed on the National Priorities (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-19 is not itself considered an NPL site. The TCEQ, the lead regulatory agency concurs that the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 3.

The C&D landfill, designated LHAAP-19, covers a 7.91 acre tract of land. The maximum depth of the landfill is believed to be less than 15 feet below ground surface. The C&D landfill was sporadically active from 1985 until recent closure activities were conducted. The C&D landfill was permitted by rule to receive non-friable asbestos and other demolition debris. During periods of activity, the monthly disposal rate ranged from 35 to 400 cubic yards of waste. The C&D landfill (formerly referred to as LHAAP-26) was evaluated in 1988. From the landfill evaluation dated 1988, and the buildings description dated 2004, it is concluded that all of the materials deposited in this landfill were what is normally classified as Construction and Demolition Debris (C&D) consisting of wood and metal studs, corrugated metal walls and roofs, concrete rubble, steel re-bar, dry-wall, transite (non-friable asbestos) siding, cardboard, Class 2 paper, packing, plastics, foil, wood packaging, wood debris, bricks, cement and other inert constituents. Records provided by the site manager indicate that hazardous materials such as friable asbestos were disposed of in other permitted landfills. Based on this information and certification of process knowledge by the owner, this landfill is classified as Non-Hazardous Class 2. The final closure assessment report and its supporting documentation demonstrate that the threat to human health or the environment is at or below those required for Risk Reduction Standard Number 2. However, due to the fact that waste was left in place, a cap was constructed to cover the footprint of the landfill and closure of the landfill meets Risk Reduction Standard Number 3.

Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The Texas Commission on Environmental Quality requires certain persons to provide certification and/or recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This certification is not a representation or warranty by the Texas Commission on Environmental Quality of the suitability of this land for any purpose.

II

Being a 7.91 acre tract of land situated in Harrison County, Texas, being out of and a part of a 8,493 acres tract of land known as the former Longhorn Army Ammunition Plant, situated between Highway 43 at Karnack, Texas, and the southwestern shore of Caddo Lake, and being more particularly described by metes and bounds as follows:

(All coordinates shown here on are NAD 83, Texas State Plane North Central Zone 4202, based on GPS Static Processing verified with OPUS).

Beginning at the northwest corner of the herein described tract with coordinates of North: 6951971.54, East: 3316288.74, from which an iron pin set for a GPS Base Point with coordinates of North 6951987.74, East 3316281.35 bears N 24-31-50 E a distance of 17.81 feet;

Thence N 78-23-54 E, 504.61 feet to a point for an angle point with coordinates of North: 6952073.02, East: 3316783.04

Thence S 52-47-27 E, 137.20 feet to a point for an angle point with coordinates of North: 6951990.05, East: 3316892.31;

Thence S 44-12-24 E, 108.04 feet to a point for an angle point with coordinates of North: 6951912.60, East: 3316967.64;

Thence S 01-33-58 W, 110.10 feet to a point for an angle point with coordinates of North: 6951802.55, East: 3316964.63;

Thence S 11-28-04 W, 121.11 feet to a point for an angle point with coordinates of North: 6951683.85, East: 3316940.56;

Thence S 17-11-28 W, 349.04 feet to a point for the southeast corner of the herein described tract with coordinates of North: 6951350.41, East: 3316837.39;

Thence N 89-11-23 W, 294.12 feet to a point for the southwest corner of the herein described tract with coordinates of North: 6951354.57, East: 3316543.30;

Thence N 22-57-01 W, 332.88 feet to an angle point with coordinates of North: 6951661.10, East: 3316413.50;

Thence N 21-53-42 W , 334.57 feet to the place of beginning and containing 7.91 acres of land according to a survey made on the ground on November 12, 2009 by Ace Surveying, Inc.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-19 site and the TCEQ concluded that no further investigation or remedial action is required for LHAAP-19.

Limited monitoring will take place in the form of inspections of the landfill cap and any maintenance required to maintain the cap integrity for a period of five years. The Army shall correct, as needed, erosion of cover material, lack of vegetative growth, and subsidence or ponding of water. If any of these problems occur after the end of the five-year post-closure period or persist for longer than the first five years of post-closure care, the owner or operator shall be responsible for their correction until all problems have been adequately resolved. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences;

child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

Institutional controls placed on the property to ensure appropriate future use include: (1) Use must remain non-residential as described above; and (2) No activity shall be conducted or permitted that would damage the integrity of the landfill cover (i.e. unauthorized digging or disturbing the existing cover or contents of the landfill). These restrictions will be placed in the deed transferring any part of the property out of federal ownership.

III

The owner of the site is the Department of the Army and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington, D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 14th day of November 2013.

STATE OF TEXAS
COUNTY OF Gregg

BEFORE ME, on this the 14th day of Nov, 2013, personally appeared Rose M. Zeiler, of The United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 14th day of Nov, 2013.

Brenda McBride

Notary Public in and for the State of Texas,

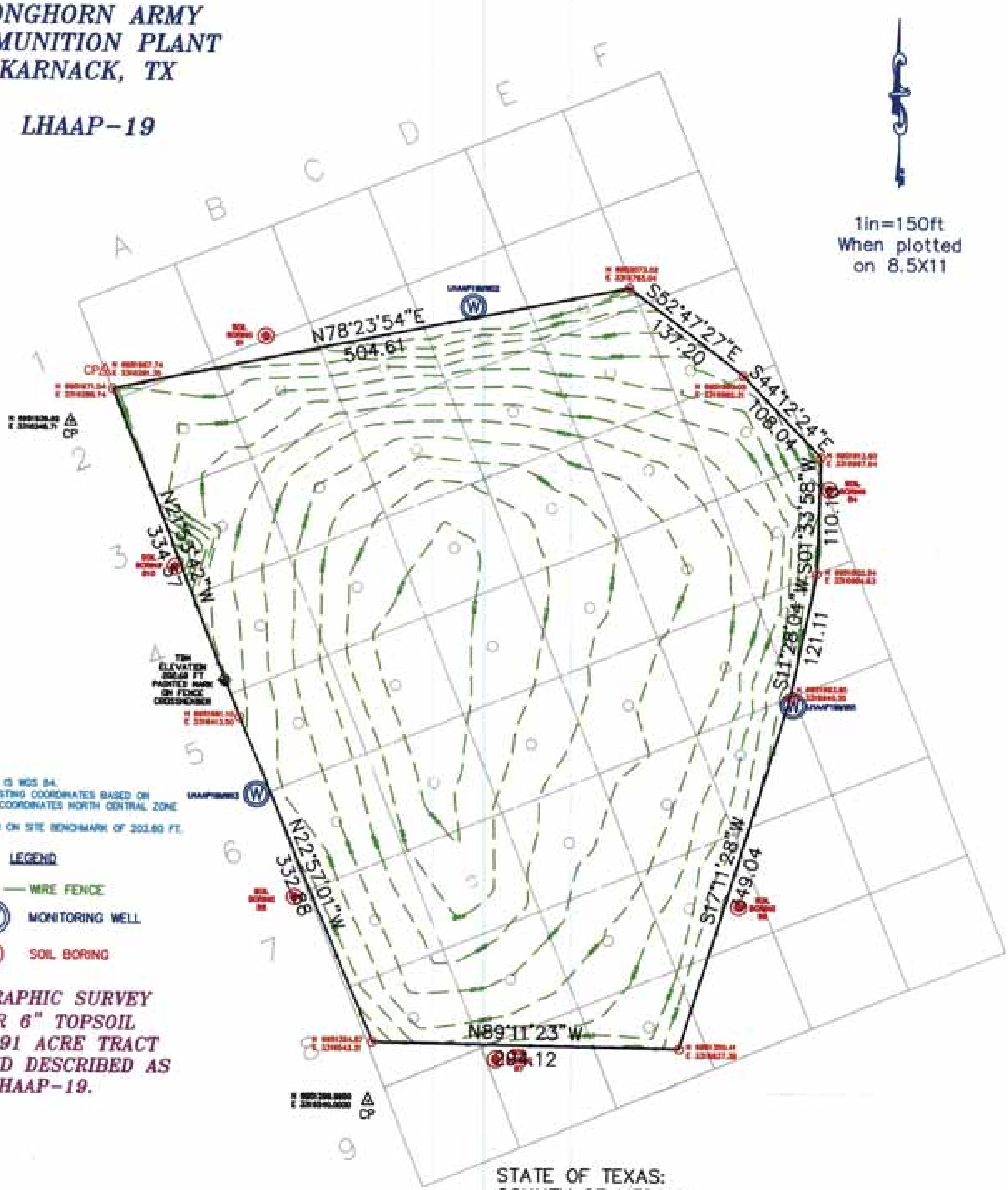
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
BRENDA McBRIDE
Notary Public State of Texas
COMM. EXP. 5-4-2014

00863844

LONGHORN ARMY
AMMUNITION PLANT
KARNACK, TX

LHAAP–19



NOTES:
1) BASIS OF BEARING IS WGS 84.
2) NORTHING AND EASTING COORDINATES BASED ON TEXAS STATE PLANE COORDINATES NORTH CENTRAL ZONE #4202, NAD83.
3) ELEVATIONS BASED ON SITE BENCHMARK OF 203.60 FT.

LEGEND

— x — WIRE FENCE

(W) MONITORING WELL

SOIL BORING

TOPOGRAPHIC SURVEY
AFTER 6" TOPSOIL
OF A 7.91 ACRE TRACT
OF LAND DESCRIBED AS
LHAAP–19.

AS Ace Surveying, Inc.
P. O. BOX 597
DEVINE, TEXAS 78016
830–334–7264
830–665–5796 FAX
acesurveying@sbcglobal.net

STATE OF TEXAS REGISTERED RHONDA K. BUTLER 5409 PROFESSIONAL LAND SURVEYOR

STATE OF TEXAS:
COUNTY OF MEDINA:

I, RHONDA K. BUTLER, DO HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM AN ACTUAL SURVEY MADE ON THE GROUND BY MEN WORKING UNDER MY SUPERVISION.

RHONDA K. BUTLER
REGISTERED PROFESSIONAL LAND SURVEYOR #5409

SURVEYED: NOVEMBER 12, 2009
FILE NO: ALAMO 1, KARNACK

LHAAP-35/36

NOTICE OF NONRESIDENTIAL LAND USE AT SUMPS/WASTE RACK SUMP LOCATIONS (LHAAP-35/36) FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00863846

2012-000000706

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000706	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump094 (called Sump 094 on the attached Exhibit A) is part of LHAAP-35/36. Sump094 is a former sump location near Building 16-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump094 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump094) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump094 parcel is 64 square feet, more or less, or 0.00146 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump094 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump094 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump094 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump094 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the ____th day of ____________, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

NOTARY PUBLIC
STATE OF TEXAS

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 64.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 07deg59'31"W 569.56' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 8.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 8.00' to this POINT OF BEGINNING.

This tract contains 64.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

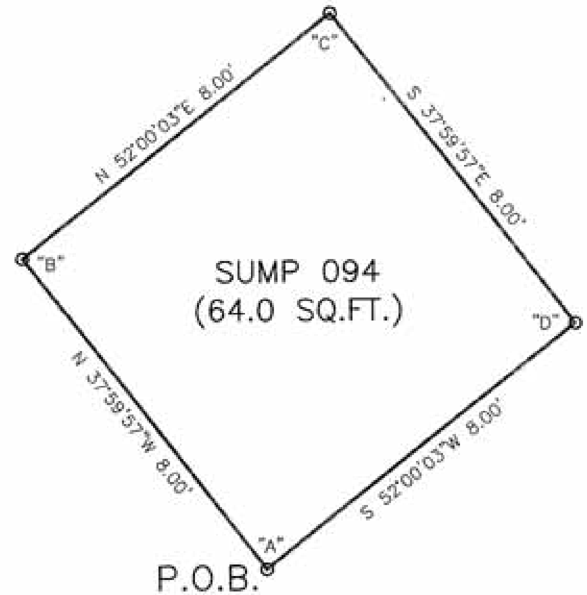
NOTE

L BEARINGS, DISTANCES (UNLESS LABELED
HERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
STEM, NORTH CENTRAL ZONE, CODE 4202,
D 1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
/LER-1 & TYLER-2. THE COMPUTED LAND
AREA IS BASED ON SURFACE DISTANCES.

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW,
PHONE (903) 236-3377 FAX
E-MAIL landmark@cable



COORDINATE TABLE

POINT	NORTH	EAST
A	6959071.485	3314200.311
B	6959077.789	3314195.385
C	6959082.715	3314201.689
D	6959076.411	3314206.615

SCALE 1"=3'

3 0 3 6
GRAPHIC SCALE - FEET

om A. Fidler, registered professional land surveyor, No. 3940,
nereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.

N 07°59'31"W 569.56'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRI
IS ON SEPARATE SH

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

n A. Fidler, Registered Professional Land Surveyor, No. 3940

SUMP 094
(64.0 SQUARE FE
LONGHORN ARMY AMMUNI
HARRISON COUNT

JOB #0407088	0407088.CRD
03/14/2011	1103025H.DWG

00863851

00863852

2012-000000707

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MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000707	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump095 (called Sump 095 on the attached Exhibit A) is part of LHAAP-35/36. Sump095 is a former sump location near Building 34-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump095 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump095) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump095 parcel is 69.6 square feet, more or less, or 0.00159 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump095 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump095 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump095 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump095 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM- ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 69.6 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 43deg48'28"E 725.22' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following eight courses :

(01)	N 37deg59'57"W	12.00'	to a point for tract corner,
(02)	S 52deg00'03"W	3.10'	to a point for tract corner,
(03)	N 37deg59'57"W	6.00'	to a point for the Westmost corner of this tract,
(04)	N 52deg00'03"E	8.00'	to a point for the Northmost corner of this tract,
(05)	S 37deg59'57"E	6.00'	to a point for tract corner,
(06)	S 52deg00'03"W	3.10'	to a point for tract corner,
(07)	S 37deg59'57"E	12.00'	to a point for the Eastmost corner of this tract,
(08)	S 52deg00'03"W	1.80'	to this POINT OF BEGINNING.

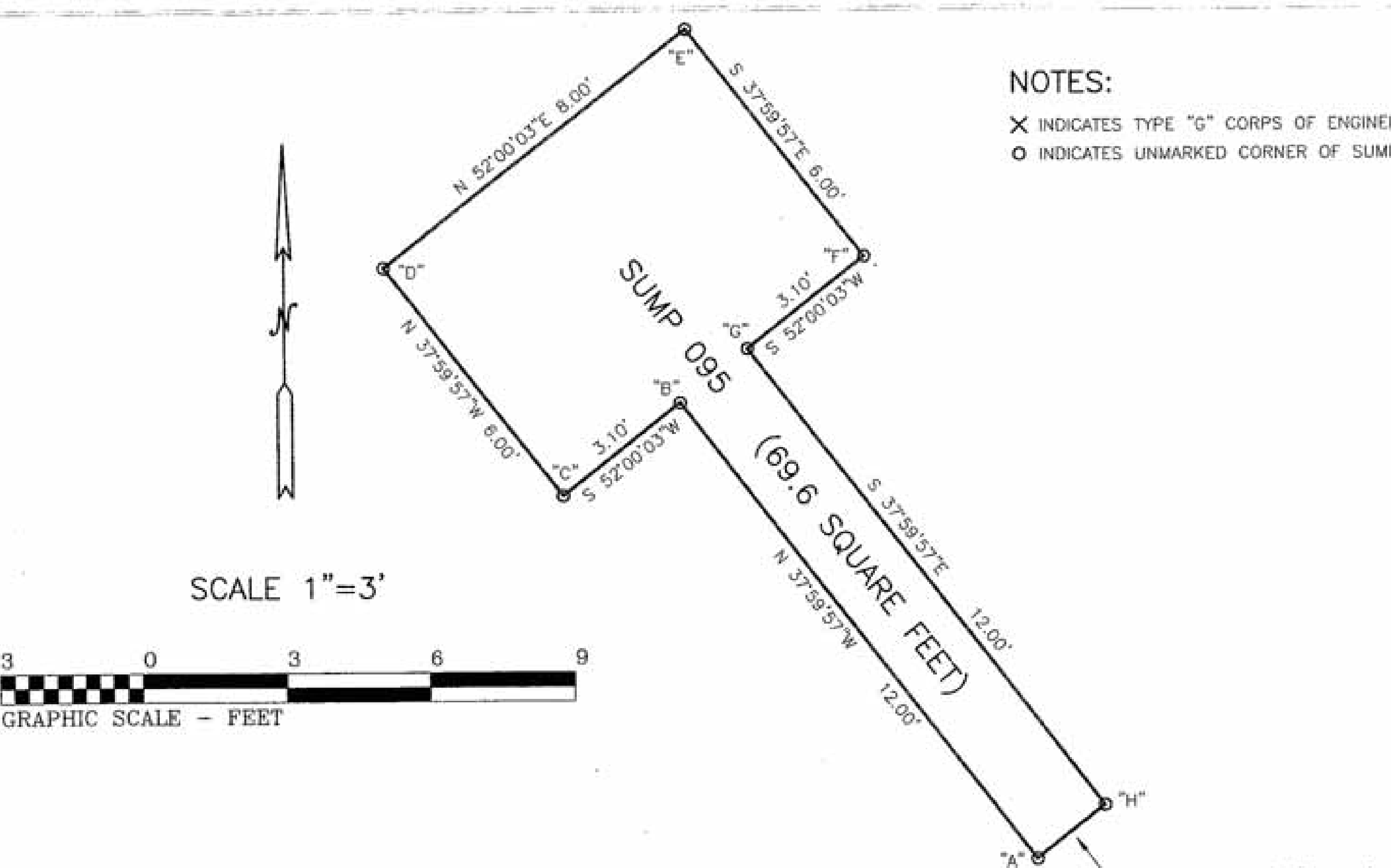
This tract contains 69.6 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULT[cut off]
PROFESSIONAL LAND SU[cut off]
P.O. BOX 606 LONGVIEW, T[cut off]
PHONE (903) 236-3377 FAX ([cut off]
E-MAIL landmark@cablely[cut off]



P.O.B.

N 43°48'28"E 725.22'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

NOTE

ALL BEARINGS, DISTANCES (UNLESS[cut off] OTHERWISE), & COORDINATES ARE [cut off] THE TEXAS STATE PLANE COOR[cut off] SYSTEM, NORTH CENTRAL ZONE, C[cut off] NAD 1983 (92). THE SCALE FACTO[cut off] EQUALS 0.9998954238 & IS BA[cut off] SURFACE TRAVERSE BETWEEN ST[cut off] TYLER-1 & TYLER-2. THE COMPU[cut off] AREA IS BASED ON SURFACE DIS[cut off]

COORDINATE TABLE

POINT	NORTH	EAST
A	6959030.826	3314781[cut off]
B	6959040.282	3314774[cut off]
C	6959038.373	3314771[cut off]
D	6959043.101	3314768[cut off]
E	6959048.027	3314774[cut off]
F	6959043.299	3314777[cut off]
G	6959041.390	3314775[cut off]
H	6959031.934	3314782[cut off]

FIELD NOTES DESCRIP[cut off]
IS ON SEPARATE SH[cut off]

[cut off]m A. Fidler, registered professional land surveyor, No. 3940, [cut off]ereby certify that this plat reflects the location of the [cut off]ers on the tract herein described, as surveyed on the ground [cut off] under my supervision in February & March 2011.

[cut off]ess my hand and seal March 14, 2011.

STATE OF TEXAS REGISTERED TOM A. FID[illegible] 3940 PROFESSIONAL LAND SURVEYOR

[cut off] A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 095
(69.6 SQUARE FE[cut off]
LONGHORN ARMY AMMU[cut off]
HARRISON COUNT[cut off]

JOB #0407088	0407088.CRD
03/14/2011	1103025F.DWG

00863857

2012-000000708

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000708	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

00863859

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump096 (called Sump 096 on the attached Exhibit A) is part of LHAAP-35/36. Sump096 is a former sump location near Building 34-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump096 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump096) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump096 parcel is 64 square feet, more or less, or 0.00146 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump096 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump096 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump096 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump096 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

00863861

Assistant Chief of Staff for Installation Management
ATTN: DAIM- ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

NOTARY PUBLIC STATE OF TEXAS
JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 64.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 36deg34'53"E 696.04' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 8.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 8.00' to this POINT OF BEGINNING.

This tract contains 64.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

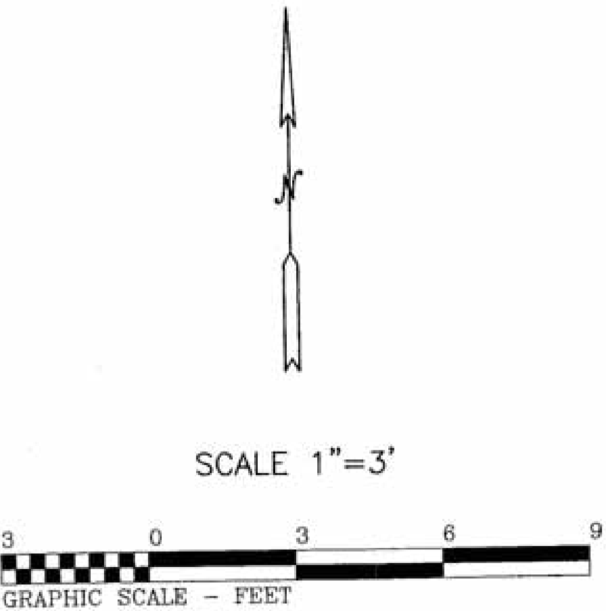
STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

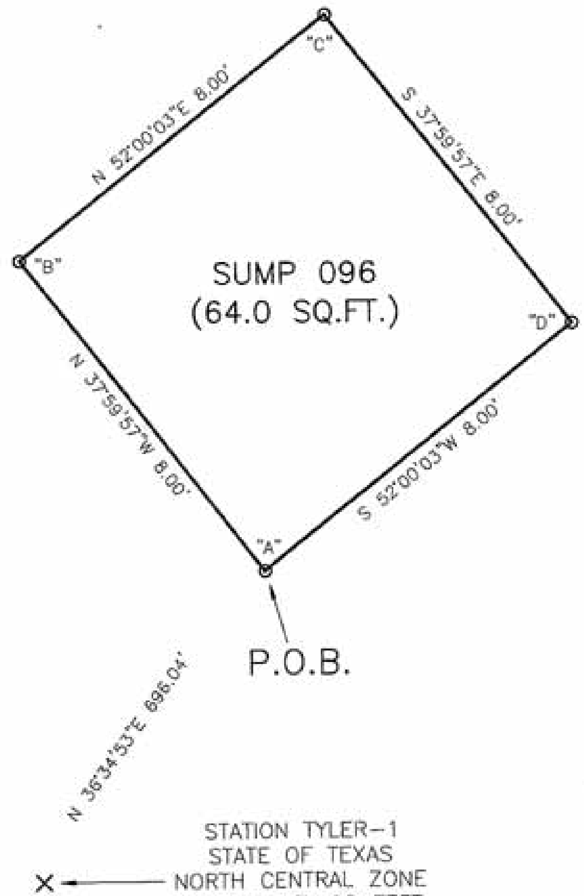
Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTA
PROFESSIONAL LAND SUR
P.O. BOX 606 LONGVIEW, TE
PHONE (903) 236-3377 FAX (
E-MAIL landmark@cablely

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP





STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS
OTHERWISE), & COORDINATES ARE
THE TEXAS STATE PLANE COORD
SYSTEM, NORTH CENTRAL ZONE, CO
NAD 1983 (92). THE SCALE FACTOR
EQUALS 0.9998954238 & IS BAS
SURFACE TRAVERSE BETWEEN ST
TYLER-1 & TYLER-2. THE COMPU
AREA IS BASED ON SURFACE DIS

COORDINATE TABLE

POINT	NORTH	EAST
A	6959066.385	3314694
B	6959072.689	3314689
C	6959077.615	3314695
D	6959071.311	3314700

FIELD NOTES DESCRIP
IS ON SEPARATE SH

m A. Fidler, registered professional land surveyor, No. 3940,
hereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

n A. Fidler, Registered Professional Land Surveyor No. 3940

SUMP 096
(64.0 SQUARE FE
LONGHORN ARMY AMMUNI
HARRISON COUNT

JOB #0407088	0407088.CRD
03/14/2011	1103025G.DWG

00863864

2012-000000709

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000709	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump097 (called Sump 097 on the attached Exhibit A) is part of LHAAP-35/36. Sump097 is a former sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump097 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump097) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump097 parcel is 76.6 square feet, more or less, or 0.00175 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump097 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump097 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump097 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump097 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

NOTARY PUBLIC STATE OF TEXAS
JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

SUMP 037

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

00863868

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 76.6 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 33deg53'28"E 842.86' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete which defines this sump,

THENCE along the external face of the concrete which defines this sump the following four courses, each course ending at a corner of the external face of said concrete :

(01)	N 58deg18'32"W	6.20',	being this sump's Westmost corner,
(02)	N 37deg53'34"E	12.45',	being this sump's Northmost corner,
(03)	S 58deg06'49"E	6.18',	being this sump's Eastmost corner,
(04)	S 37deg47'39"W	12.43',	being the aforementioned POINT OF BEGINNING.

This tract contains 76.6 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULT
PROFESSIONAL LAND SU

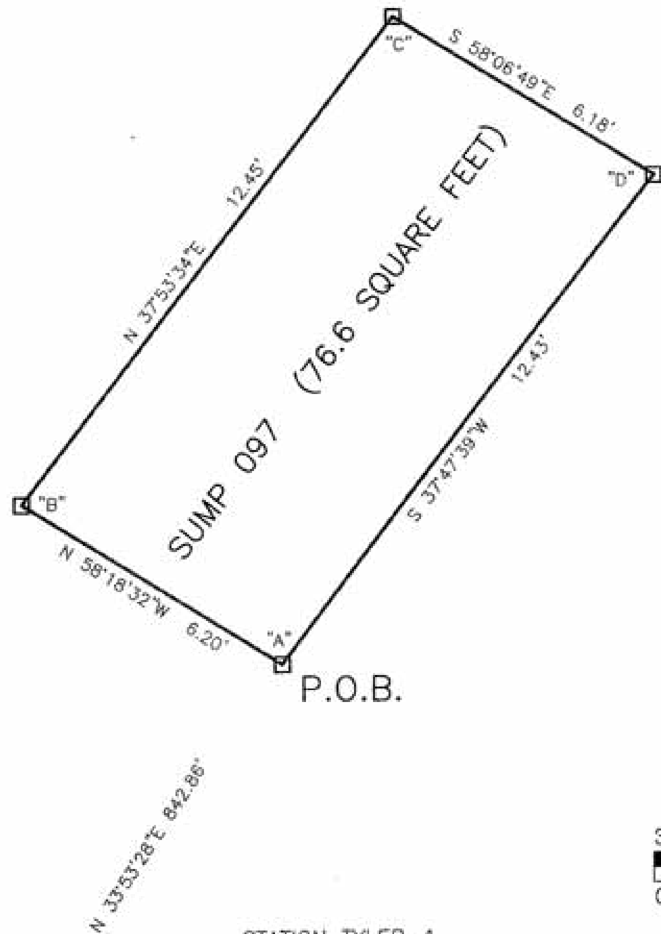
P.O. BOX 606 LONGVIEW, T
PHONE (903) 236-3377 FAX
E-MAIL landmark@cablel

NOTE

L BEARINGS, DISTANCES (UNLESS LABELED
HERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
STEM, NORTH CENTRAL ZONE, CODE 4202,
D 1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAND
AREA IS BASED ON SURFACE DISTANCES.

OTES:

INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
INDICATES CORNER OF EXTERNAL FACE OF CONCRETE
INDICATES UNMARKED POINT



COORDINATE T

POINT	NORTH
A	6959207.120
B	6959210.377
C	6959220.206
D	6959216.943

SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

om A. Fidler, registered professional land surveyor, No. 3940,
hereby certify that this plat reflects the location of the
ners on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 4, 2011.

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRI
IS ON SEPARATE SH

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

n A. Fidler, Registered Professional Land Surveyor No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 097
(76.6 SQUARE FE
LONGHORN ARMY AMMUNI
HARRISON COUNT

JOB #0407088	0407088.CRD
MAR. 4, 2011	0908074Z.DW

2012-000000710

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000710	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump098 (called Sump 098 on the attached Exhibit A) is part of LHAAP-35/36. Sump098 is a former sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump098 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump098) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump098 parcel is 39.4 square feet, more or less, or 0.0009 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump098 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump098 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump098 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump098 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 39.4 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 28deg58'18"E 815.98' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete which defines this sump,

THENCE along the external face of the concrete which defines this sump the following four courses, each course ending at a corner of the external face of said concrete :

(01)	N 51deg59'37"W	9.74',	being this sump's Westmost corner,
(02)	N 43deg01'55"E	4.05',	being this sump's Northmost corner,
(03)	S 52deg06'01"E	9.75',	being this sump's Eastmost corner,
(04)	S 43deg15'56"W	4.07',	being the aforementioned POINT OF BEGINNING.

This tract contains 39.4 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

00863875

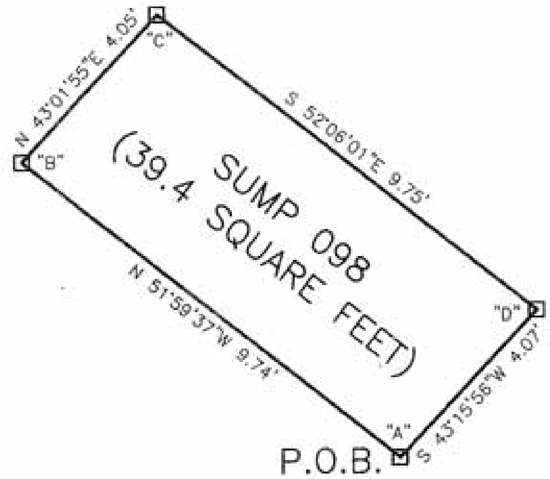
NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- ☐ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE
- O INDICATES UNMARKED POINT

SCALE 1"=3'

3 6 9

E - FEET



STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959221.331	3314674.744
B	6959227.327	3314667.072
C	6959230.288	3314669.837
D	6959224.296	3314677.534

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

gistered professional land surveyor, No. 3940,
at this plat reflects the location of the
t herein described, as surveyed on the ground
rvision in February & March 2011.

nd seal March 4, 2011.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

stered Professional Land Surveyor, No. 3940

SUMP 098
(39.4 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	Y.PTS Y.LOT
MAR. 4, 2011	0908074Y.DWG	DRAWN BY: TJ

00863876

2012-000000711

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000711	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, Deputy	
Patsy Cox, County Clerk Harrison County, Texas	

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

00863877

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump099 (called Sump 099 on the attached Exhibit A) is part of LHAAP-35/36. Sump099 is a former sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump099 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump099) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump099 parcel is 48 square feet, more or less, or 0.0011 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump099 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump099 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump099 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump099 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

NOTARY PUBLIC STATE OF TEXAS

Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

00863880

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 48.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 27deg36'35"E 879.49' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 6.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 6.00' to this POINT OF BEGINNING.

This tract contains 48.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

NOTE

. BEARINGS, DISTANCES (UNLESS LABELED
IERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
STEM, NORTH CENTRAL ZONE, CODE 4202,
) 1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAND
AREA IS BASED ON SURFACE DISTANCES.

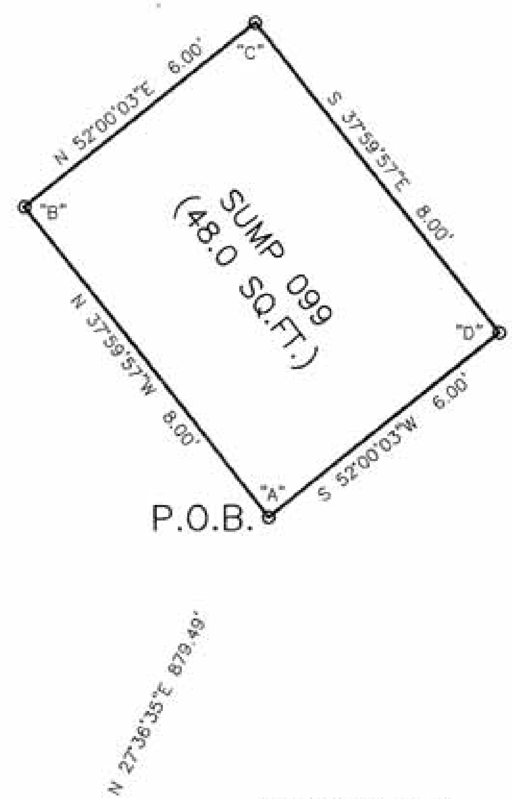
NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP

LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW, T
PHONE (903) 236-3377 FAX (
E-MAIL landmark@coblely

COORDINATE TABLE

POINT	NORTH	EAST
A	6959286.801	3314687.099
B	6959293.105	3314682.173
C	6959296.799	3314686.901
D	6959290.495	3314691.827



SCALE 1"=3'

3 0 3 6
GRAPHIC SCALE - FEET

m A. Fidler, registered professional land surveyor, No. 3940,
ereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIP
IS ON SEPARATE SHE

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 099
(48.0 SQUARE FE
LONGHORN ARMY AMMUNIT
HARRISON COUNTY, T

JOB #0407088	0407088.CRD
03/14/2011	1103025J.DWG

00863881

00863882

2012-000000712

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000712	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump100 (called Sump 100 on the attached Exhibit A) is part of LHAAP-35/36. Sump100 is a former sump location near Building 45-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump100 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump100) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump100 parcel is 80 square feet, more or less, or 0.00183 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump100 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump100 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump100 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump100 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

NOTARY PUBLIC STATE OF TEXAS
JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester
Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 80.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 23deg52'16"E 995.90' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 8.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 10.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 8.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 10.00' to this POINT OF BEGINNING.

This tract contains 80.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

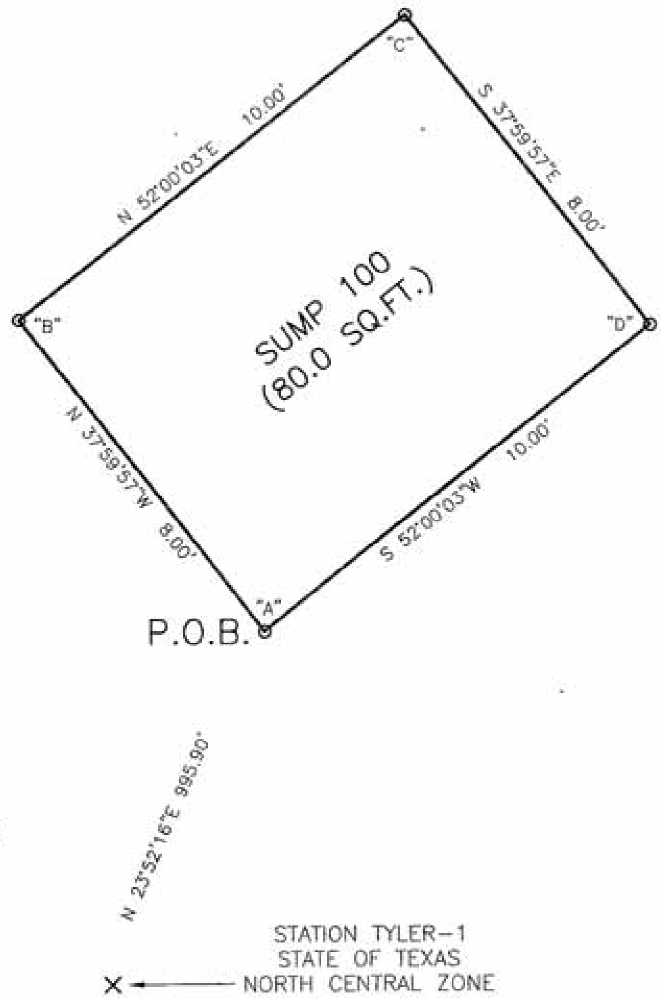
LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW, T
PHONE (903) 236-3377 FAX
E-MAIL landmark@cablel

NOTE

BEARINGS, DISTANCES (UNLESS LABELED
HERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
STEM, NORTH CENTRAL ZONE, CODE 4202,
D 1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAND
AREA IS BASED ON SURFACE DISTANCES.

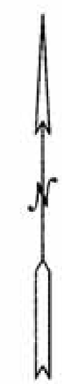
NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND
O INDICATES UNMARKED CORNER OF SUMP

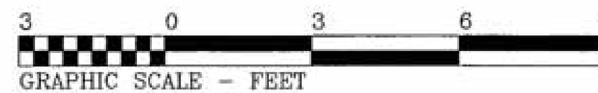


COORDINATE TABLE

POINT	NORTH	EAST
A	6959418.170	3314682.523
B	6959424.474	3314677.597
C	6959430.630	3314685.477
D	6959424.326	3314690.403



SCALE 1"=3'



m A. Fidler, registered professional land surveyor, No. 3940,
ereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRIP
IS ON SEPARATE SH

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

A. Fidler, Registered Professional Land Surveyor, No. 3940

SUMP 100
(80.0 SQUARE FE
LONGHORN ARMY AMMU
HARRISON COUNT

JOB #0407088	0407088.CRD
03/14/2011	1103025K.DWG

00863887

00863888

2012-000000713

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000713	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump101 (called Sump 101 on the attached Exhibit A) is part of LHAAP-35/36. Sump101 is a former sump location near Building 45-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump101 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump101) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump101 parcel is 67 square feet, more or less, or 0.00153 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump101 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump101 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump101 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump101 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

NOTARY PUBLIC STATE OF TEXAS
JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 67.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 27deg18'47"E 1027.58' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete which defines this sump,

THENCE along the external face of the concrete which defines this sump the following four courses, each course ending at a corner of the external face of said concrete :

(01)	N 38deg59'52"W	11.24',	being this sump's Westmost corner,
(02)	N 57deg48'20"E	5.99',	being this sump's Northmost corner,
(03)	S 39deg05'42"E	11.26',	being this sump's Eastmost corner,
(04)	S 57deg59'19"W	6.01',	being the aforementioned POINT OF BEGINNING.

This tract contains 67.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

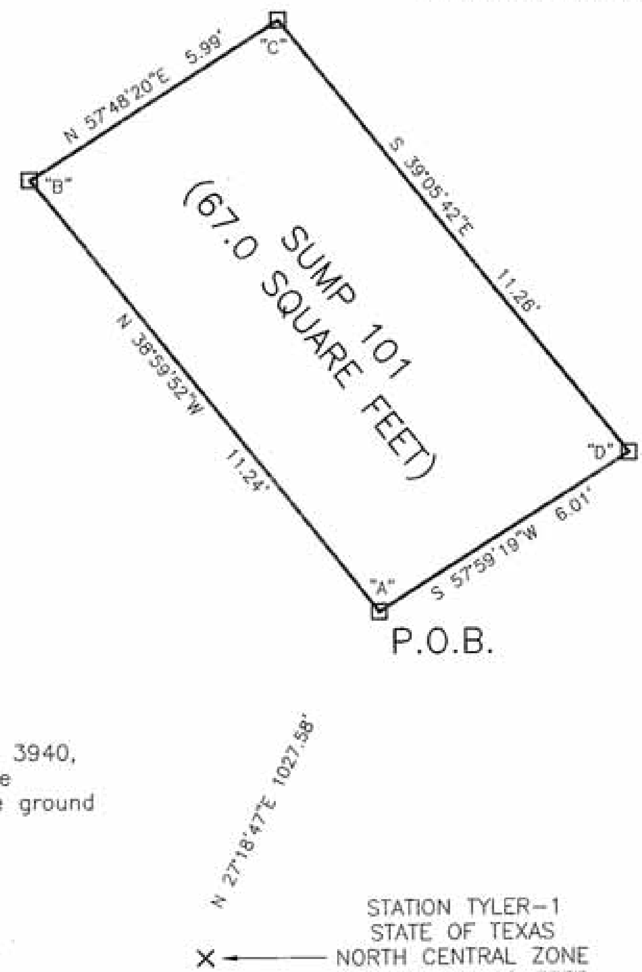
NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE
- O INDICATES UNMARKED POINT

SCALE 1"=3'

3 6 9

E – FEET



STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6959420.476	3314751.003
B	6959429.211	3314743.930
C	6959432.404	3314749.001
D	6959423.663	3314756.102

gistered professional land surveyor, No. 3940, hat this plat reflects the location of the ct herein described, as surveyed on the ground ervision in February & March 2011.

nd seal March 4, 2011.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

istered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 101
(67.0 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	A.PTS A...G
MAR. 4, 2011	1103025A.DWG	DRAWN BY: TJ

00863893

00863894

2012-000000714

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM Document Number: 2012-000000714 Receipt No: 1200645 Amount: $ 32.00 By: Ann Turner, Deputy Patsy Cox, County Clerk Harrison County, Texas	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump102 (called Sump 102 on the attached Exhibit A) is part of LHAAP-35/36. Sump102 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump102 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump102) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump102 parcel is 154.4 square feet, more or less, or 0.00354 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump102 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump102 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump102 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump102 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

NOTARY PUBLIC STATE OF TEXAS
JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 154.4 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 17deg29'41"E 550.28' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following ten courses :

(01)	S 15deg52'38"E	7.67'	to a point for the Eastmost corner of this tract,
(02)	S 74deg07'22"W	6.94'	to a point for tract corner,
(03)	N 15deg52'38"W	5.54'	to a point for tract corner,
(04)	S 74deg07'22"W	12.94'	to a point for tract corner,
(05)	S 36deg37'46"W	24.51'	to a point for tract corner,
(06)	S 53deg22'14"E	7.10'	to a point for tract corner,
(07)	S 36deg37'46"W	2.10'	to a point for the Southmost corner of this tract,
(08)	N 53deg22'14"W	9.25'	to a point for the Westmost corner of this tract,
(09)	N 36deg37'46"E	27.31'	to a point for tract corner,
(10)	N 74deg07'22"E	20.63'	to this POINT OF BEGINNING.

This tract contains 154.4 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Fidler, R.P.L.S. Number 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

CORPS OF ENGINEERS MONUMENT (FOUND)
CORNER OF SUMP

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

SCALE 1"=6'

6 12 18

E - FEET

COORDINATE TABLE

POINT	NORTH	EAST
A	6957307.354	3315333.565
B	6957299.975	3315335.664
C	6957298.077	3315328.991
D	6957303.409	3315327.474
E	6957299.870	3315315.030
F	6957280.203	3315300.409
G	6957275.965	3315306.110
H	6957274.278	3315304.856
I	6957279.797	3315297.433
J	6957301.711	3315313.725

gistered professional land surveyor, No. 3940,
nat this plat reflects the location of the
ct herein described, as surveyed on the ground
ervision in February & March 2011.

nd seal March 11, 2011.

istered Professional Land Surveyor, No. 3940

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

SUMP 102
(154.4 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1101007	0407088.CRD	B.PTS BG
MAR. 11, 2011	11030258.DWG	DRAWN BY TJ

00863899

2012-000000715

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000715	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump103 (called Sump 103 on the attached Exhibit A) is part of LHAAP-35/36. Sump103 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump103 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump103) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump103 parcel is 209.1 square feet, more or less, or 0.0048 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump103 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump103 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump103 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump103 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

00863903

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 209.1 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 20deg31'34"E 601.43' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following ten courses :

(01) S 16deg10'14"E 10.01' to a point for the Eastmost corner of this tract,
(02) S 73deg49'46"W 9.99' to a point for tract corner,
(03) N 16deg10'14"W 2.67' to a point for tract corner,
(04) S 36deg37'46"W 27.57' to a point for the Southmost corner of this tract,
(05) N 53deg22'14"W 29.02' to a point for the Westmost corner of this tract,
(06) N 36deg37'46"E 2.10' to a point for tract corner,
(07) S 53deg22'14"E 27.18' to a point for tract corner,
(08) N 36deg37'46"E 26.86' to a point for tract corner,
(09) N 16deg10'14"W 5.03' to a point for tract corner,
(10) N 73deg49'46"E 9.99' to this POINT OF BEGINNING.

This tract contains 209.1 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Fidler, R.P.L.S. Number 3940

n A. Fidler, registered professional land surveyor, No. 3940,
ereby certify that this plat reflects the location of the
rs on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ss my hand and seal March 11, 2011.

A. Fidler, Registered Professional Land Surveyor, No. 3940

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

LANDMARK CONSULT[...]
PROFESSIONAL LAND SU[...]
P.O. BOX 606 LONGVIEW, T[...]
PHONE (903) 236-3377 FAX ([...]
E-MAIL landmark@cablely[...]

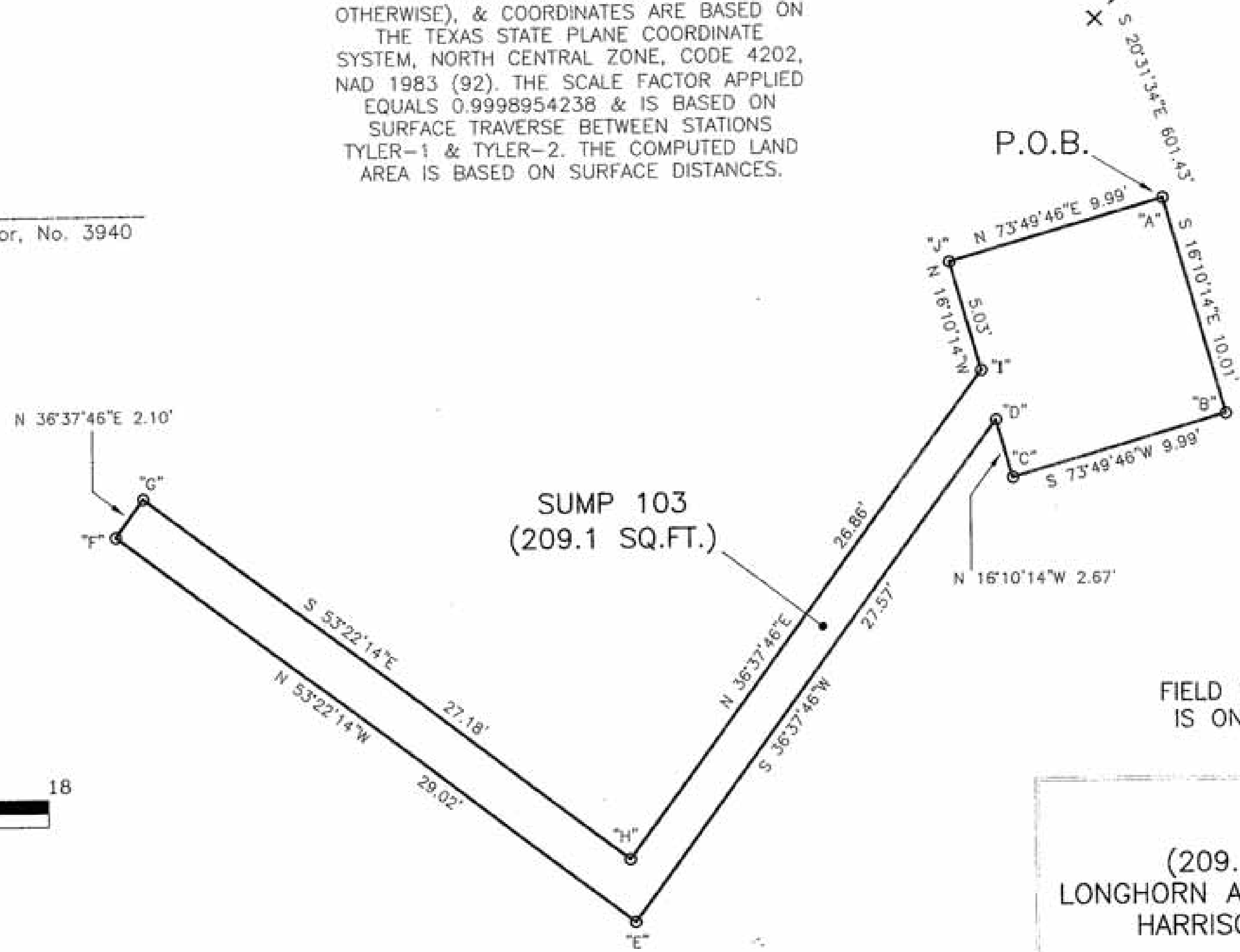
STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINAT[...]

POINT	NORTH
A	6957268.937
B	6957259.319
C	6957256.536
D	6957259.104
E	6957236.982
F	6957254.297
G	6957255.984
H	6957239.765
I	6957261.320
J	6957266.154



FIELD NOTES DESCRI[...]
IS ON SEPARATE SH[...]

SCALE 1"=6'

6 0 6 12 18
GRAPHIC SCALE - FEET

OTES:

INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
INDICATES UNMARKED CORNER OF SUMP

SUMP 103
(209.1 SQUARE F[...]
LONGHORN ARMY AMMUNI[...]
HARRISON COUNT[...]

JOB #1101007	0407088.CRD
MAR. 11, 2011	1103025C.DWG

00863905

2012-000000716

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000716	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump104 (called Sump 104 on the attached Exhibit A) is part of LHAAP-35/36. Sump104 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump104 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump104) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump104 parcel is 149.2 square feet, more or less, or 0.00342 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump104 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump104 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump104 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump104 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

00863909

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester
Notary Public in and for the State of Texas,
County of Harrison

00863910

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 149.2 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 09deg38'40"E 580.62' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following eight courses :

(01)	S 53deg22'14"E	23.26'	to a point for the Eastmost corner of this tract,
(02)	S 36deg37'46"W	2.24'	to a point for tract corner,
(03)	N 53deg22'14"W	20.93'	to a point for tract corner,
(04)	S 36deg37'46"W	24.04'	to a point for the Southmost corner of this tract,
(05)	N 53deg22'14"W	7.69'	to a point for the Westmost corner of this tract,
(06)	N 36deg37'46"E	7.70'	to a point for tract corner,
(07)	S 53deg22'14"E	5.37'	to a point for tract corner,
(08)	N 36deg37'46"E	18.58'	to this POINT OF BEGINNING.

This tract contains 149.2 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

n A. Fidler, registered professional land surveyor, No. 3940,
ereby certify that this plat reflects the location of the
rs on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ss my hand and seal March 11, 2011.

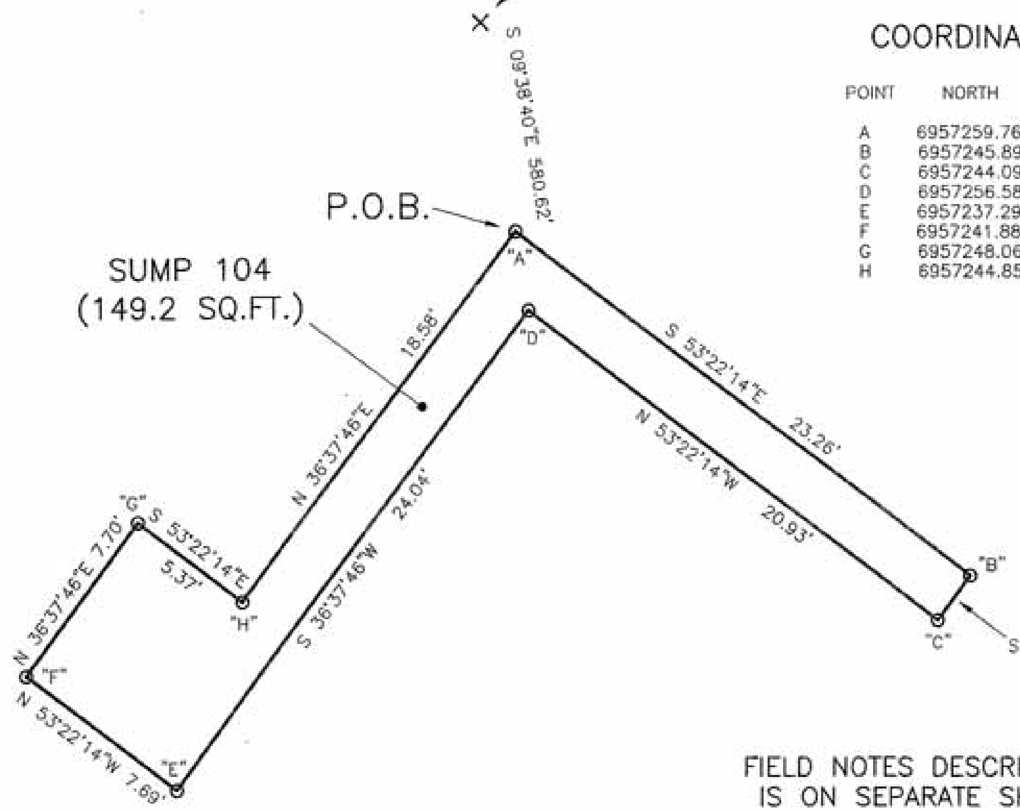
A. Fidler, Registered Professional Land Surveyor, No. 3940

LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW, T
PHONE (903) 236-3377 FAX
E-MAIL landmark@cable

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET



COORDINAT

POINT	NORTH
A	6957259.767
B	6957245.891
C	6957244.097
D	6957256.587
E	6957237.294
F	6957241.884
G	6957248.063
H	6957244.859

FIELD NOTES DESCRIP
IS ON SEPARATE SH

SCALE 1"=6'

6 0 6 12 18
GRAPHIC SCALE - FEET

OTES:

INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
INDICATES UNMARKED CORNER OF SUMP

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

SUMP 104
(149.2 SQUARE FE
LONGHORN ARMY AMMUNIT
HARRISON COUNTY

JOB #1101007	0407088.CRD
MAR. 11, 2011	1103025D.DWG

00863911

00863912

2012-000000717

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000717	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, Deputy	
Patsy Cox, County Clerk Harrison County, Texas	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump105 (called Sump 105 on the attached Exhibit A) is part of LHAAP-35/36. Sump105 is a former sump location near Building 16-T physically located within site boundary of LHAAP-35C(53) of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump105 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump105) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump105 parcel is 201.7 square feet, more or less, or 0.00463 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump105 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump105 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump105 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump105 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester
Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 201.7 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-2" referenced above,

THENCE S 13deg17'42"E 623.38' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following eight courses :

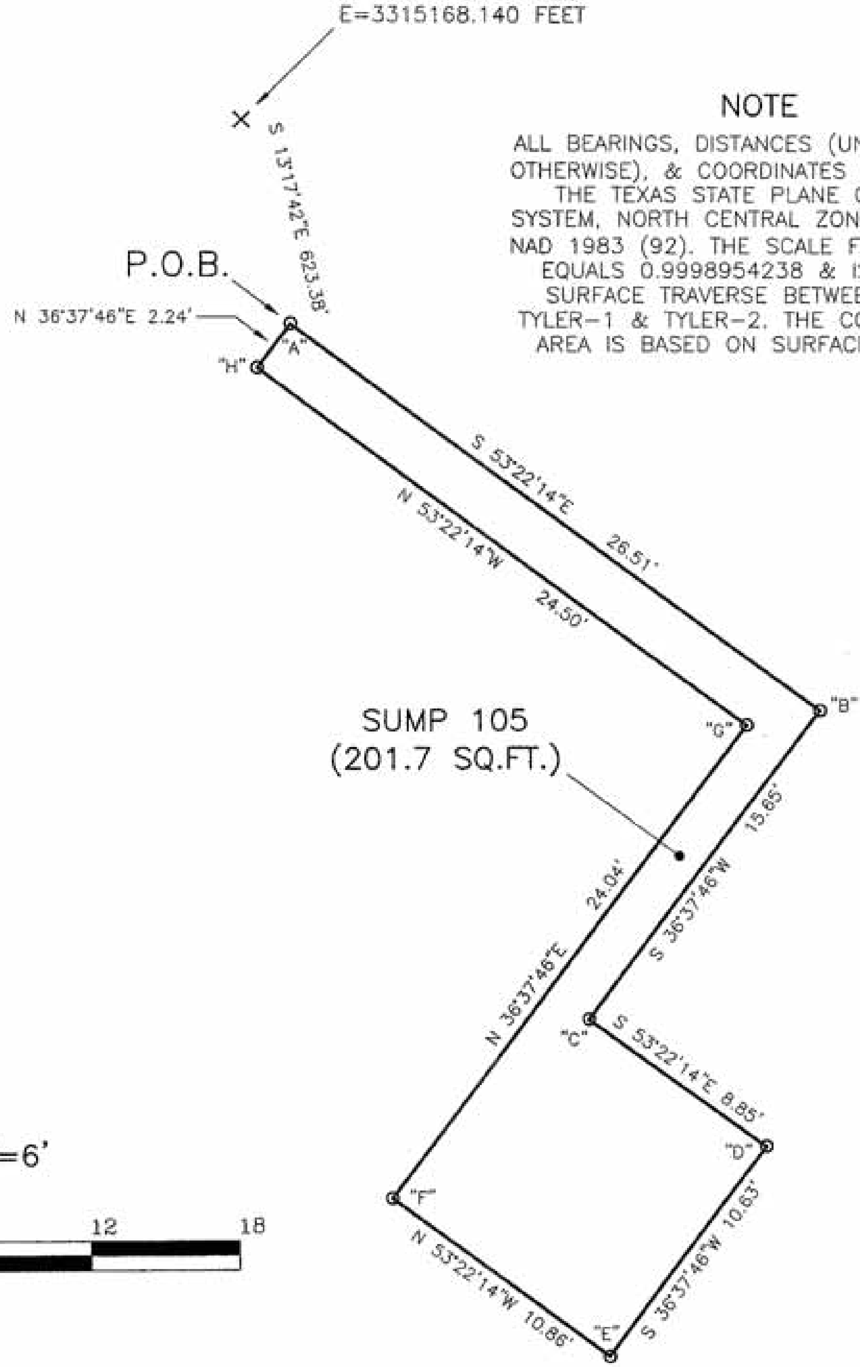
(01) S 53deg22'14"E 26.51' to a point for the Eastmost corner of this tract,
(02) S 36deg37'46"W 15.65' to a point for tract corner,
(03) S 53deg22'14"E 8.85' to a point for tract corner,
(04) S 36deg37'46"W 10.63' to a point for the Southmost corner of this tract,
(05) N 53deg22'14"W 10.86' to a point for tract corner,
(06) N 36deg37'46"E 24.04' to a point for tract corner,
(07) N 53deg22'14"W 24.50' to a point for the Westmost corner of this tract,
(08) N 36deg37'46"E 2.24' to this POINT OF BEGINNING.

This tract contains 201.7 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

00863917



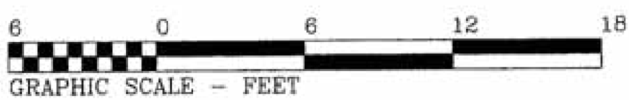
NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

COORDINATE TABLE

POINT	NORTH	EAST
A	6957225.505	3315311.497
B	6957209.690	3315332.769
C	6957197.135	3315323.434
D	6957191.856	3315330.535
E	6957183.323	3315324.191
F	6957189.801	3315315.477
G	6957209.095	3315329.822
H	6957223.711	3315310.163

SCALE 1"=6'



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in February & March 2011.

Witness my hand and seal March 11, 2011.

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

O INDICATES UNMARKED CORNER OF SUMP

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

SUMP 105
(201.7 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1101007	0407088.CRD	E.PTS	E.LEG

2012-000000718

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6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000718	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. Sump123 (called Sump 123 on the attached Exhibit A) is part of LHAAP-35/36. Sump123 is a former sump location near Building 18-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which Sump123 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps (including Sump123) were also associated with wash racks (waste rack sumps) where containers were cleaned and stored. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at

TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The Sump123 parcel is 60 square feet, more or less, or 0.00137 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the Sump123 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from Sump123 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of Sump123 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of Sump123 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

NOTARY PUBLIC STATE OF TEXAS
JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

00863922

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 60.0 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 07deg59'31"W 569.56' to a point for the Southmost corner of this sump and this POINT OF BEGINNING,

THENCE along the boundary of this tract the following four courses :

(01) N 37deg59'57"W 6.00' to a point for the Westmost corner of this tract,
(02) N 52deg00'03"E 10.00' to a point for the Northmost corner of this tract,
(03) S 37deg59'57"E 6.00' to a point for the Eastmost corner of this tract,
(04) S 52deg00'03"W 10.00' to this POINT OF BEGINNING.

This tract contains 60.0 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

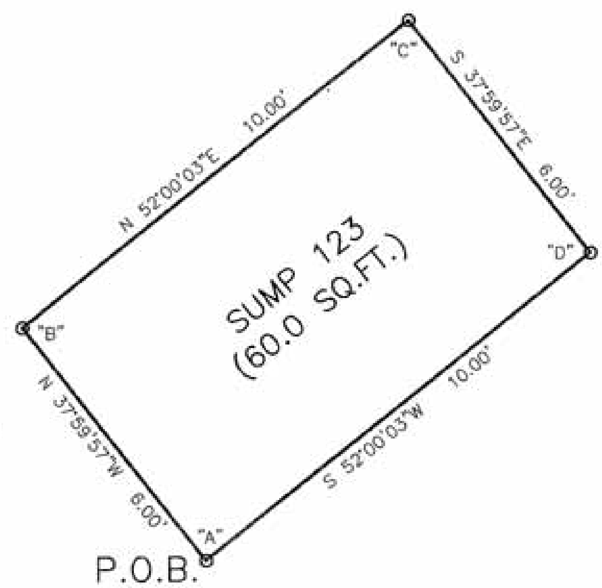
LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW,
PHONE (903) 236-3377 FAX
E-MAIL landmark@cable

NOTE

L BEARINGS, DISTANCES (UNLESS LABELED
HERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
STEM, NORTH CENTRAL ZONE, CODE 4202,
D 1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAND
AREA IS BASED ON SURFACE DISTANCES.

NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
O INDICATES UNMARKED CORNER OF SUMP



COORDINATE TABLE

POINT	NORTH	EAST
A	6959122.758	3314187.907
B	6959127.486	3314184.213
C	6959133.642	3314192.093
D	6959128.914	3314195.787

SCALE 1"=3'

3 0 3 6
GRAPHIC SCALE – FEET

N 08°28'00"W 622.08'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

om A. Fidler, registered professional land surveyor, No. 3940,
hereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.

FIELD NOTES DESCRIP
IS ON SEPARATE SH

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

n A. Fidler, Registered Professional Land Surveyor, No. 3940

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

SUMP 123
(60.0 SQUARE FE
LONGHORN ARMY AMMUNI
HARRISON COUNT

JOB #0407088	0407088.CRD
03/14/2011	1103025I.DWG

00863923

00863924

2012-000000719

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MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000719	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, Deputy	
Patsy Cox, County Clerk Harrison County, Texas	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. WRSump001 (called W.R. Sump 001 on the attached Exhibit A) is part of LHAAP-35/36. WRSump001 is a former waste rack sump location near Building 34-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36 of which WRSump001 is a part is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2, no further action.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps were also associated with wash racks (waste rack sumps including WRSump001) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The WRSump001 parcel is 57.1 square feet, more or less, or 0.00131 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the WRSump001 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from WRSump001 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of WRSump001 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of WRSump001 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 57.1 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

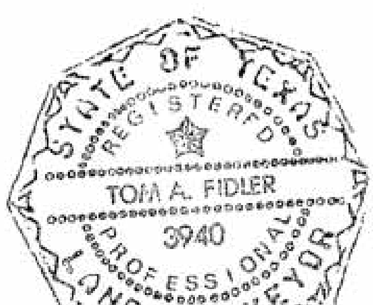
THENCE N 42deg37'08"E 700.32' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete wall which defines this sump,

THENCE along the external face of the concrete wall which defines this sump the following twelve courses, each course ending at a corner of the external face of said concrete wall :

(01)	N 36deg36'16"W	4.50',	
(02)	N 51deg51'25"E	1.07',	
(03)	N 38deg08'35"W	2.46',	
(04)	S 63deg07'08"W	0.85',	
(05)	N 38deg08'35"W	7.98',	being this sump's Westmost corner,
(06)	N 51deg51'25"E	3.70',	being this sump's Northmost corner,
(07)	S 39deg59'44"E	8.17',	
(08)	S 52deg07'09"W	1.00',	
(09)	S 39deg59'44"E	2.34',	
(10)	N 50deg00'16"E	1.14',	
(11)	S 39deg59'44"E	4.67',	being this sump's Eastmost corner,
(12)	S 52deg10'33"W	4.68',	being the aforementioned POINT OF BEGINNING.

This tract contains 57.1 square feet, more or less.

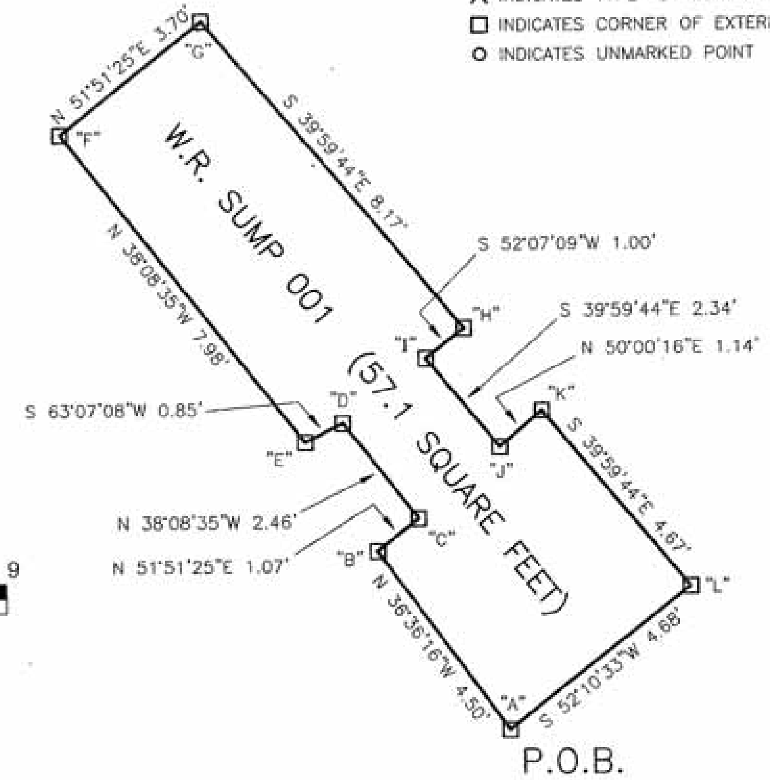
I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL
O INDICATES UNMARKED POINT

LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW,
PHONE (903) 236-3377 FAX
E-MAIL landmark@cablel



SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE – FEET

NOTE

ALL BEARINGS, DISTANCES (UNLES OTHERWISE), & COORDINATES ARE THE TEXAS STATE PLANE COOR SYSTEM, NORTH CENTRAL ZONE, C NAD 1983 (92). THE SCALE FACTO EQUALS 0.9998954238 & IS BA SURFACE TRAVERSE BETWEEN S TYLER-1 & TYLER-2. THE COMPU AREA IS BASED ON SURFACE DI

COORDINATE TABLE

POINT	NORTH	EAST
A	6959022.804	3314753
B	6959026.415	3314751
C	6959027.074	3314751
D	6959029.012	3314750
E	6959028.627	3314749
F	6959034.899	3314744
G	6959037.183	3314747
H	6959030.925	3314752
I	6959030.313	3314752
J	6959028.519	3314753
K	6959029.252	3314754
L	6959025.676	3314757
M	6959022.804	3314753

om A. Fidler, registered professional land surveyor, No. 3940, hereby certify that this plat reflects the location of the ners on the tract herein described, as surveyed on the ground under my supervision in February & March 2011.

ess my hand and seal March 1, 2011.

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

FIELD NOTES DESCRI
IS ON SEPARATE SH

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

n A. Fidler, Registered Professional Land Surveyor, No. 3940

W.R. SUMP 00
(57.1 SQUARE FE
LONGHORN ARMY AMMUNI
HARRISON COUNT

JOB #0407088	0407088.CR
MAR. 1, 2011	0908074W.DW

00863929

00863930

2012-000000720

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000720	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. WRSump002 (called W.R. Sump 002 on the attached Exhibit A) is part of LHAAP-35/36. WRSump002 is a former waste rack sump location near Building 38-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which WRSump002 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2, no further action.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps were also associated with wash racks (waste rack sumps including WRSump002) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The WRSump002 parcel is 61.1 square feet, more or less, or 0.00140 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the WRSump002 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from WRSump002 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of WRSump002 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of WRSump002 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

Notary Public in and for the State of Texas,
County of Harrison

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 61.1 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 27deg03'19"E 797.78' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete wall which defines this sump,

THENCE along the external face of the concrete wall which defines this sump the following twelve courses, each course ending at a corner of the external face of said concrete wall :

(01)	N 50deg15'02"W	4.01',	being this sump's Westmost corner,
(02)	N 38deg19'51"E	7.83',	
(03)	S 58deg29'13"E	0.84',	
(04)	N 41deg11'11"E	3.09',	
(05)	N 51deg30'19"W	1.32',	
(06)	N 40deg19'40"E	4.55',	being this sump's Northmost corner,
(07)	S 54deg31'45"E	4.65',	being this sump's Eastmost corner,
(08)	S 38deg16'58"W	4.65',	
(09)	N 53deg12'50"W	1.23',	
(10)	S 39deg42'05"W	3.32',	
(11)	S 51deg04'42"E	0.79',	
(12)	S 38deg16'58"W	7.89',	being the aforementioned POINT OF BEGINNING.

This tract contains 61.1 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL

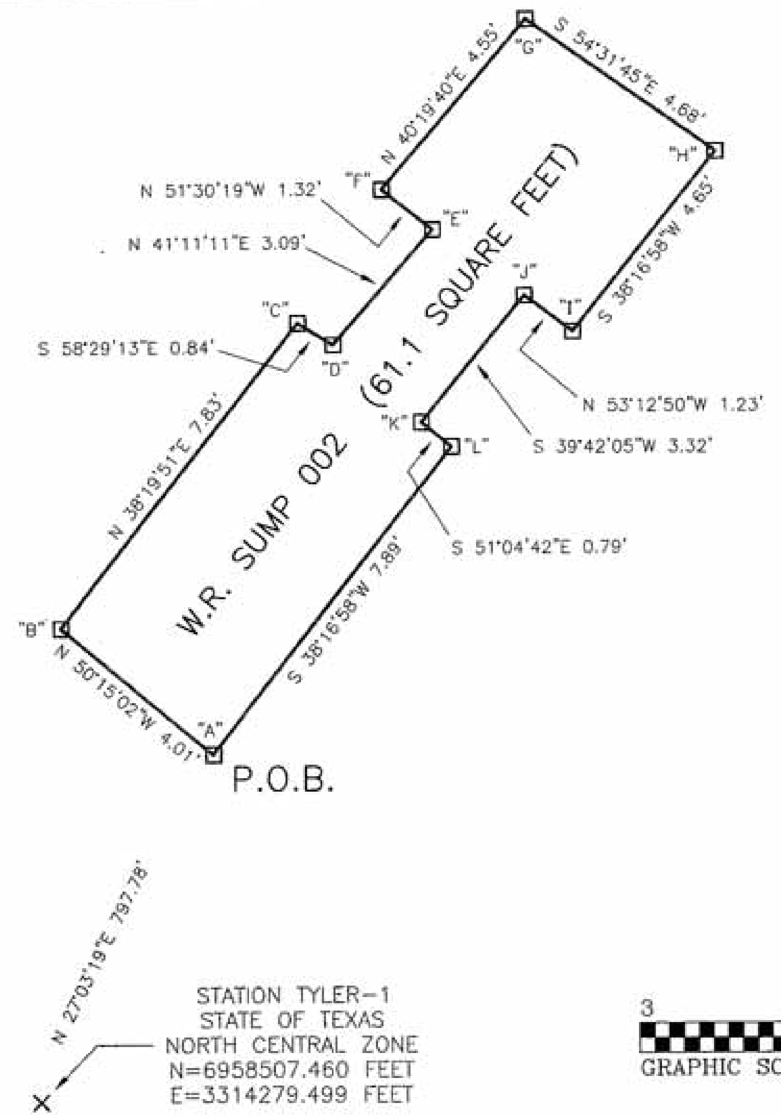
LANDMARK CONSULT
PROFESSIONAL LAND SU
P.O. BOX 606 LONGVIEW, T
PHONE (903) 236-3377 FAX
E-MAIL landmark@cable

NOTE

BEARINGS, DISTANCES (UNLESS LABELED
ERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
TEM, NORTH CENTRAL ZONE, CODE 4202,
1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAND
REA IS BASED ON SURFACE DISTANCES.

OTES:

NDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
NDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL
NDICATES UNMARKED POINT



COORDINATE T

POINT	NORTH
A	6959217.937
B	6959220.500
C	6959226.642
D	6959226.201
E	6959228.524
F	6959229.343
G	6959232.815
H	6959230.097
I	6959226.443
J	6959227.177
K	6959224.624
L	6959224.129
M	6959217.937

SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

m A. Fidler, registered professional land surveyor, No. 3940,
hereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 1, 2011.

FIELD NOTES DESCRIP
IS ON SEPARATE SHE

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

A. Fidler, Registered Professional Land Surveyor, No. 3940

W.R. SUMP 002
(61.1 SQUARE FE
LONGHORN ARMY AMMUNIT
HARRISON COUNT

JOB #0407088	0407088.CRD
MAR. 1, 2011	0908074X.DWG

00863935

00863936

2012-000000721

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000721	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. WRSump003 (called W.R. Sump 003 on the attached Exhibit A) is part of LHAAP-35/36. WRSump003 is a former waste rack sump location near Building 16-Y physically located within site boundary of LHAAP-48 of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-35/36, of which WRSump003 is a part, is not considered an NPL site. Environmental activities at LHAAP-35/36 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2, no further action.

LHAAP-35/36 is a collection of 125 process sumps and 20 waste rack sumps found in multiple locations across the installation and predominantly associated with process areas. All of the production buildings had sumps that collected wash down water. Sumps were also associated with wash racks (waste rack sumps including WRSump003) where containers were cleaned and stored. Further information may be found in the

Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The WRSump003 parcel is 69.5 square feet, more or less, or 0.00159 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the WRSump003 site and USEPA and TCEQ concluded that no further investigation or action is required. Contaminants in soil samples from WRSump003 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of WRSump003 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of WRSump003 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 30 th day of June, 2011.

BEFORE ME, on this the 30 th day of June, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 30 day of June, 2011.

JENNIFER LESTER
Notary Public State of Texas
COMM. EXP. 01/03/2015

NOTARY PUBLIC STATE OF TEXAS

Jennifer Lester

Notary Public in and for the State of Texas,
County of Harrison

00863940

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 69.5 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "TYLER-1" referenced above,

THENCE N 00deg06'48"W 643.61' to this POINT OF BEGINNING, said point being at the Southmost corner of the external face of the concrete wall which defines this sump,

THENCE along the external face of the concrete wall which defines this sump the following twelve courses, each course ending at a corner of the external face of said concrete wall :

(01)	N 37deg49'35"W	4.09',	being this sump's Westmost corner,
(02)	N 48deg49'52"E	10.08',	
(03)	S 40deg22'17"E	0.96',	
(04)	N 51deg37'59"E	1.64',	
(05)	N 32deg53'50"W	1.27',	
(06)	N 49deg58'25"E	4.65',	being this sump's Northmost corner,
(07)	S 41deg50'19"E	4.65',	being this sump's Eastmost corner,
(08)	S 43deg56'08"W	4.79',	
(09)	N 44deg10'19"W	1.61',	
(10)	S 52deg56'11"W	1.74',	
(11)	S 39deg31'31"E	1.01',	
(12)	S 49deg33'58"W	10.21',	being the aforementioned POINT OF BEGINNING.

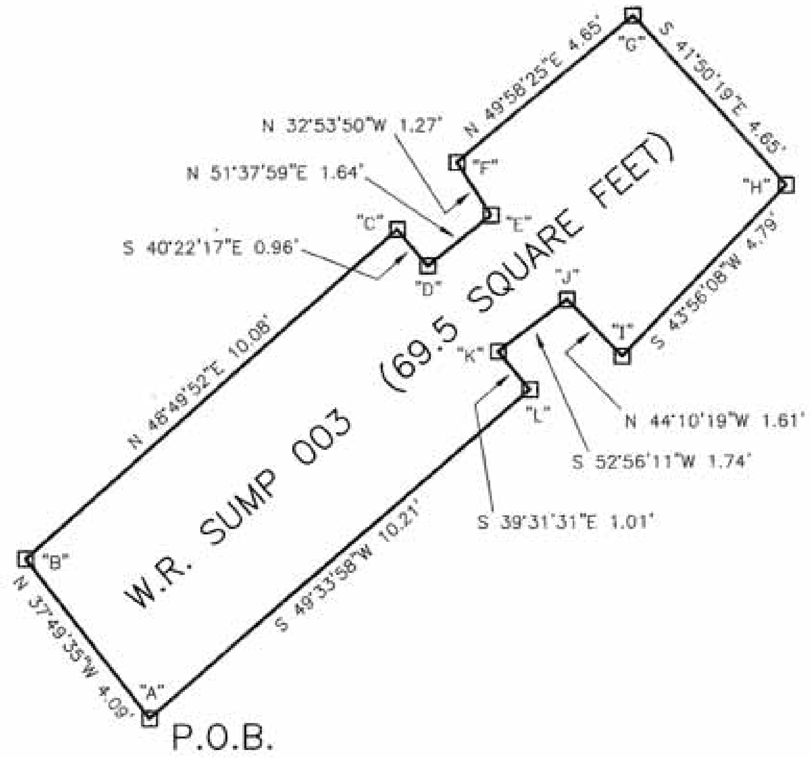
This tract contains 69.5 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940

NOTE

. BEARINGS, DISTANCES (UNLESS LABELED
HERWISE), & COORDINATES ARE BASED ON
THE TEXAS STATE PLANE COORDINATE
STEM, NORTH CENTRAL ZONE, CODE 4202,
D 1983 (92). THE SCALE FACTOR APPLIED
EQUALS 0.9998954238 & IS BASED ON
SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAND
AREA IS BASED ON SURFACE DISTANCES.



LANDMARK CONSULT
PROFESSIONAL LAND SU

P.O. BOX 606 LONGVIEW,
PHONE (903) 236-3377 FAX
E-MAIL landmark@cable

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUME
- ☐ INDICATES CORNER OF EXTERNAL FACE OF CONCRE
- O INDICATES UNMARKED POINT

COORDINATE T

POINT	NORTH
A	6959151.071
B	6959154.302
C	6959160.937
D	6959160.202
E	6959161.221
F	6959162.288
G	6959165.278
H	6959161.816
I	6959158.365
J	6959159.516
K	6959158.468
L	6959157.691

N

om A. Fidler, registered professional land surveyor, No. 3940,
hereby certify that this plat reflects the location of the
ers on the tract herein described, as surveyed on the ground
under my supervision in February & March 2011.

ess my hand and seal March 1, 2011.

N 00°06'48"W 643.61'

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

SCALE 1"=3'

3 0 3 6 9
GRAPHIC SCALE - FEET

FIELD NOTES DESCRIP
IS ON SEPARATE SHE

STATE OF TEXAS REGISTERED TOM A. [illegible] 3940 PROFESSIONAL LAND SURVEYOR

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

W.R. SUMP 003
(69.5 SQUARE FE
LONGHORN ARMY AMMUNIT
HARRISON COUNT

JOB #0407088	0407088.CRD
MAR. 1, 2011	0908074V.DWG

A. Fidler, Registered Professional Land Surveyor, No. 3940

00863941

LHAAP-37, 37-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

FINAL
REMEDIAL DESIGN
LHAAP-35B (37), CHEMICAL LABORATORY AND LHAAP-67, ABOVEGROUND STORAGE TANK FARM
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared by

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

August 1, 2011

Table of Contents

4.0 Land Use Controls for the Site

The LUCs to be implemented by the Army or its representatives for LHAAP-35B(37) and LHAAP-67 to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health include:

- Ensure no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met

Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566.The LUC addresses the areas of LHAAP-35B(37) and LHAAP-67 that include groundwater plumes at LHAAP-35B(37) and LHAAP-67 with levels of contamination that require implementation of a remedy (see **Section 2.0**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and TCEQ concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-35B(37) and LHAAP-67 forms the basis for the remedy. The reasonably anticipated future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation, will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566 and compliance with the use assumption will be documented in the Five-Year Review reports.

6.2 Land Use Control Implementation Actions

The Army or its representatives will be responsible for LUC implementation and certification, reporting and enforcement. The Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

As a condition of property transfer, the Army may require the transferee to assume responsibility for various implementation actions, as indicated below. Although the Army may transfer responsibility for various implementation actions, the Army shall retain its responsibility for remedy integrity. This means that the Army is responsible for addressing substantive violations of performance objectives that would undermine the Army's CERCLA remedy. The Army also will be responsible for: 1) incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation; 2) recording groundwater use restriction and survey plat at the Harrison County Courthouse; and 3) notifying Texas Department of Licensing and Regulation of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The following LUC implementation actions shall be undertaken by the Army in order to ensure that the aforementioned LUC performance objectives for LHAAP-35B(37) and LHAAP-67 are met and maintained:

6.2.1 Comprehensive Land Use Control Management Plan

Within 30 days of receiving USEPA and TCEQ approval of this RD, the Army will incorporate this document into the Comprehensive LUC Management Plan. The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document is also accessible to regulators, the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record. As LUC RD documents for additional environmental sites are approved by USEPA and TCEQ, the Army shall likewise add those documents and survey plats to the Comprehensive LUC Management Plan as well as update the previous copy of the plan placed in the Marshall Public Library.

6.2.2 Site Certifications and Reporting

Beginning with finalization of this RD, the Army will undertake annual certifications to confirm continued compliance with the LUC objectives. The Army will retain the annual LUC Compliance Certification documents in the project files for incorporation into the Five-Year Review Reports, and these documents will be made available to USEPA and TCEQ upon request. The certification form will be consistent with the form attached as **Appendix B**. In addition, should any violations be found during the annual certification, the Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations**.** Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental transfer document. The need to continue annual certifications will be revisited at Five-Year Reviews.

6.2.3 Notice of Planned Property Conveyances

The Army shall provide notice to USEPA and TCEQ of plans to convey LHAAP-35B(37) and LHAAP-67 acreage. The notice shall describe the mechanism by which LUCs will continue to be implemented, maintained, inspected, reported, and enforced.

6.2.4 Opportunity to Review Text of Intended Land Use Controls

Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. In addition, the Army will produce an ECP or other environmental document for transfer of LHAAP-35B(37) and LHAAP-67, but before executing transfer, the Army will provide USEPA and TCEQ with a draft copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before document execution, to review all LUC-related provisions.

6.2.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance

Should the Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.2.6** below, the Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.2.6 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of Texas property law or CERCLA. Alternatively, should the circumstances warrant such, the Army could choose to exercise its response authorities under CERCLA, and then seek cost recovery after the fact from the person(s) or entity(ies) who violated a given LUC. Should the Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the Army will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUCs.

6.2.7 Modification or Termination of Land Use Controls

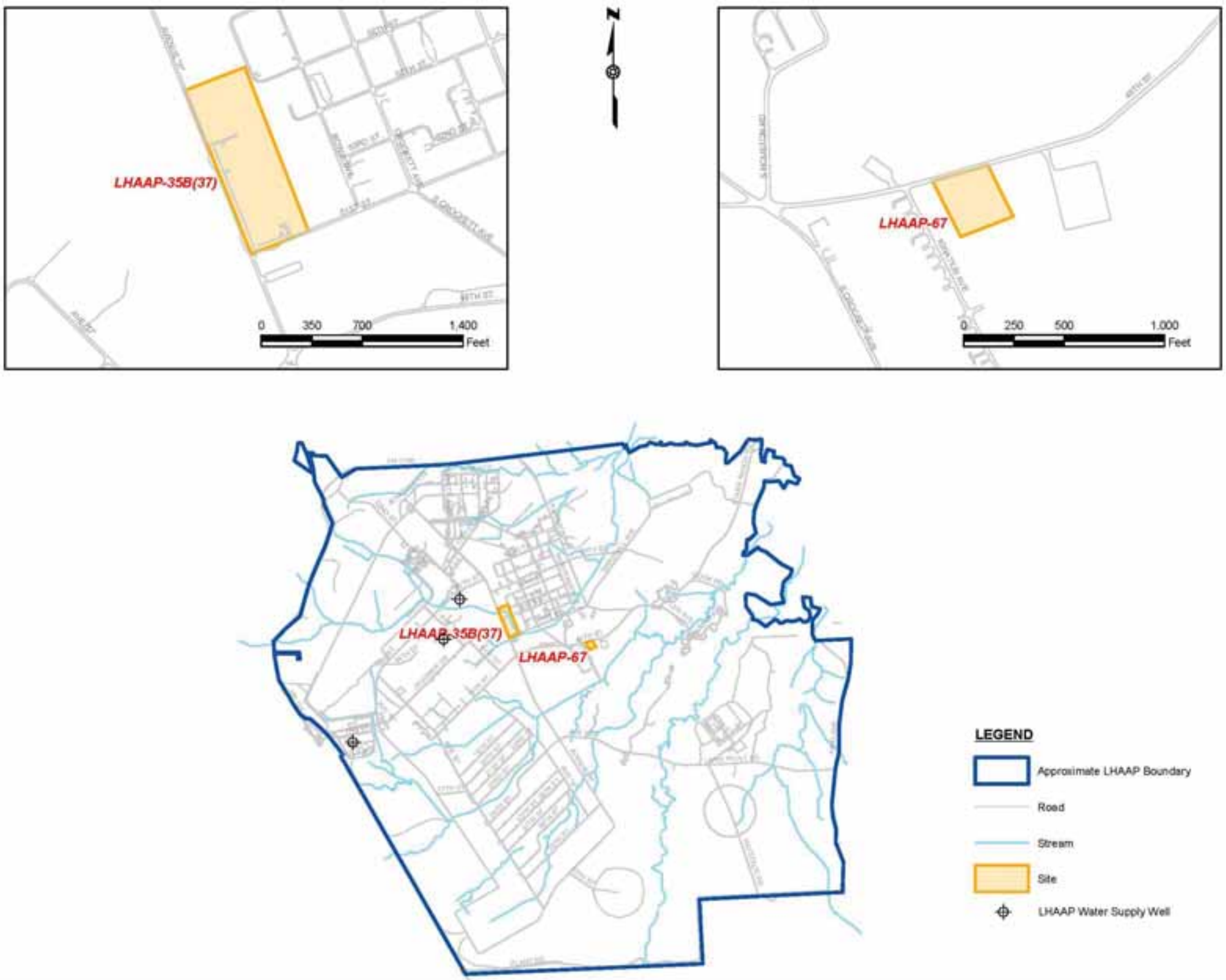
The Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUCs shall remain in effect until such time as the Army, TCEQ and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the Army, TCEQ and USEPA has been made to terminate one or more of the LUCs, the Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

6.3 Monitored Natural Attenuation Implementation Actions

Implementation actions include installation of additional monitoring wells, plugging and abandonment of monitoring wells not designated for long-term monitoring, implementation of a groundwater monitoring plan, monitoring, and reporting. The project schedule and cost summary for implementation actions are provided in **Appendix H**. Groundwater monitoring will be conducted to monitor the effectiveness of MNA in reducing contaminant concentrations over time. Monitoring will also be conducted to evaluate plume migration and ensure that chlorinated solvents-contaminated groundwater does not impact nearby surface water at unacceptable levels. Surface water sampling will be conducted to confirm contaminated groundwater is not migrating to surface water. The Groundwater Monitoring Plan, attached as **Appendix A**, describes the wells, their locations, analytical parameters, the frequency of the monitoring, surface water sampling, and presents a list of the monitored constituents and their respective MCLs. Groundwater monitoring and surface water sampling conducted at LHAAP-35B(37) and LHAAP-67 will follow the Health and Safety Plan (**Appendix E**), the Contractor Quality Control Plan (**Appendix F**), the Chemical Data Acquisition Plan (**Appendix G**), Field Activities (**Appendix C**) and Field Procedures (**Appendix D**) as contained in the appendices of the Remedial Design LHAAP-35B(37) and LHAAP-67.

Annual reports will be prepared for any year in which sampling occurs to document the monitoring program. The first year's annual report will include a review of the first four quarters of data, which include natural attenuation parameters and provide an evaluation for the evidence of MNA as a remedial method and a review of the first year's surface water sample data. The TCEQ provides guidance for MNA as a remedial action in *Monitored Natural Attenuation Demonstrations* (Texas Natural Resource Conservation Commission [TNRCC], RG-366/TRRP-33, October 2001). Although LHAAP is being addressed under the Risk Reduction Standards rather than Texas Risk Reduction Program (TRRP), this guidance is comparable to USEPA guidance and may be used as a guideline for the evaluation of the groundwater data. TRRP guidance specifies recommended lines of evidence to document the occurrence of natural attenuation at a site. For the first annual report, primary and secondary lines of evidence will be evaluated to document that attenuation is occurring at LHAAP-35B(37) and LHAAP-67. The primary line



OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		FILE PATH
Houston, TX	B. Lu	10/12/07	N. Olson	10/31/07	P. Srivastav	10/31/07	T:\GIS\Longhorn\MXD\ST35B67\ROD\SiteLocs.mxd

Shaw

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

FIGURE 2-2
SITE LOCATION MAP
REMEDIAL DESIGN
LHAAP-35B(37) AND LHAAP-67, GROUP 4
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

LHAAP-37, 37-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-35B (37) FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2015-000002401

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/16/2015 11:17 AM	
Document Number: 2015-000002401	
Receipt No: 1502837	
Amount: $ 50.00	
By: Denise Kio, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
112 E. PECAN ST,STE 400
FED-EX ENVELOPE
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-35B (37)

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-35B (37) (Chemical Laboratory). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-35B (37) were performed in accordance with the FFA requirements.

The LHAAP-35B (37) was built during the construction of Plant 3 (1953-1955) and was originally used to support the production activities at LHAAP. A Record of Decision (ROD) for LHAAP-35B (37) was signed by the USEPA in 2010 establishing the final remedy which consists of land use control (LUC) in conjunction with monitored natural attenuation (MNA). The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-35B (37) is required to prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-35B (37) parcel is a 12.2-acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-35B (37) parcel is designated a LUC boundary which is a 16.578-acre tract, more or less, as described in Exhibit A. The LUC boundary is also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12. The United States Department of the Army has undertaken careful environmental study of the LHAAP-35B (37) site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 16.578-acre tract, more or less. Groundwater underlying this land is contaminated with trichloroethene (TCE), tetrachloroethene (PCE), and 1,1-dichloroethene (1,1-DCE) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 19 th day of February, 2015.

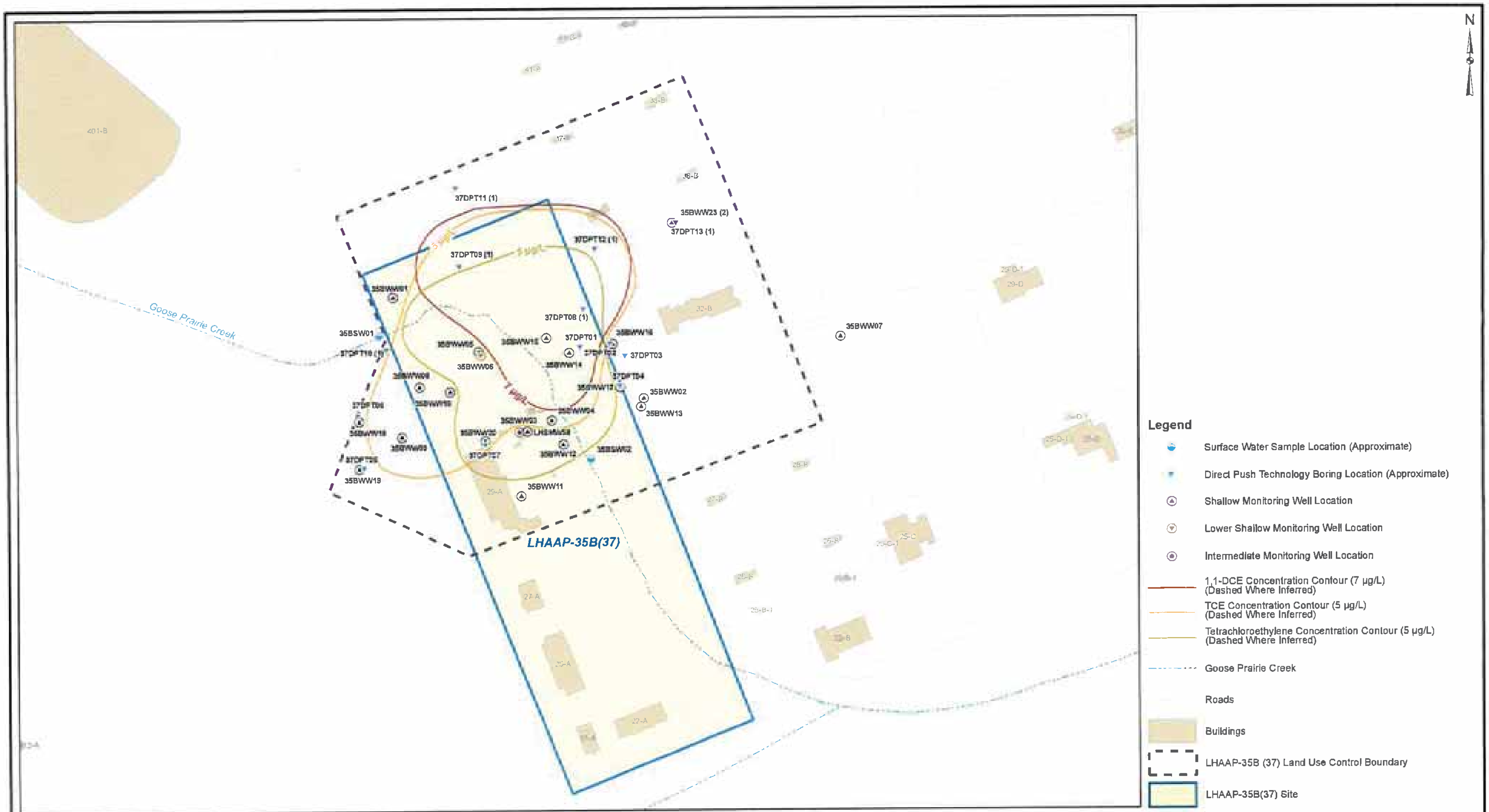
BEFORE ME, on this the 19 th day of February 2015 personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 19th day of February, 2015.

Genie Warner

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
GENIE WARNER
Notary Public State of Texas
COMM. EXP. 8/1/2018



Notes:
1. Installed and sampled May 2014.
2. 35BWW23 installed May 2014 and sampled July 2014.

AECOM

Figure 1
Land Use Control Boundary
Remedial Action Completion Report
LHAAP-35B (37)
Longhorn Army Ammunition Plant
Karnack, Texas

60256135

December 2014

00863955

EXHIBIT A
SURVEY PLAT

00863957

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-35B(37)" Land Use Control Area being 16.578 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-35B(37)" Land Use Control Area being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.99986172702, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-21" (N=6956579.781 feet E=3308499.969 feet) and "X-11" (N=6960733.698 feet E=3304750.367 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on State Plane distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" and "RPLS 3940" .

Commencing at monument "C-21" referenced above,

THENCE N 22deg47'20"W 1290.84' to a concrete nail set (near the centerline of the asphalt pavement of "Avenue P") for the Southmost corner of this tract and this POINT OF BEGINNING,

THENCE N 67deg25'22"W 354.97' along a S.B.L. of this tract to an I.R.O.P.C. set for this tract's Westmost corner,

THENCE N 20deg54'22"E 363.80' along a W.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Avenue P") for this tract's Westerly reentrant corner,

THENCE N 22deg33'04"W 285.83' along a W.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Avenue P") for this tract's N.W.C., said nail being S 52deg54'59"E 3687.90' from the aforementioned "X-11" monument,

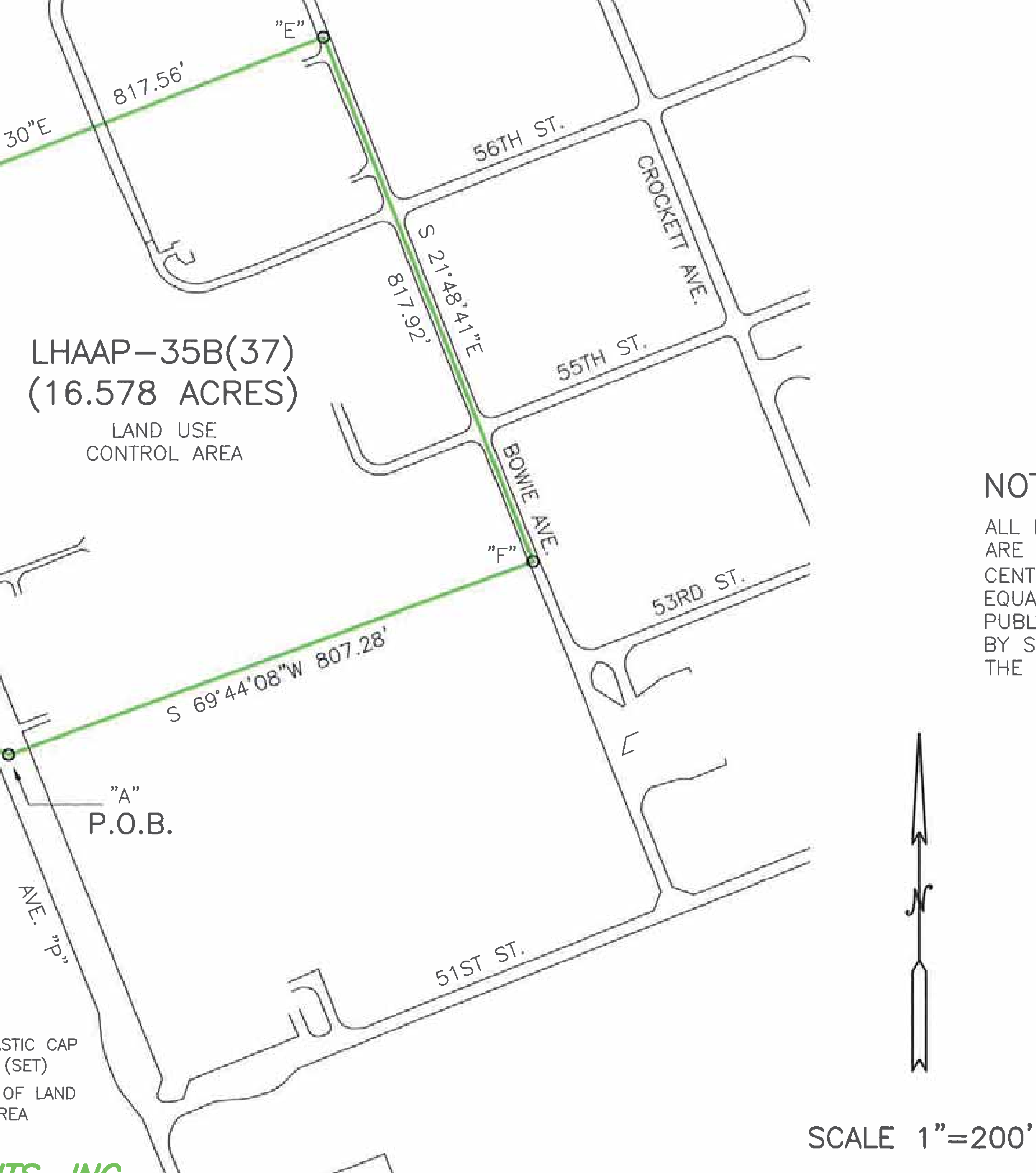
THENCE N 68deg33'30"E 817.56' along the N.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Bowie Avenue") for this tract's Northmost corner,

THENCE S 21deg48'41"E 817.92' along the E.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Bowie Avenue") for this tract's Eastmost corner,

THENCE S 69deg44'08"W 807.28' along a S.B.L. of this tract to this POINT OF BEGINNING, containing 16.578 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER



Witness my hand and seal this
the 21st day of January, 2015.

Tom A. Fidler, Registered Professiona

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTH
ARE BASED ON THE TEXAS STATE PLANE COORDI
CENTRAL ZONE, CODE 4202, NAD 1983 (92). TH
EQUALS 0.99986172702 & IS BASED ON CALCUL
PUBLISHED STATE PLANE COORDINATES OF STATIO
BY SURFACE TRAVERSE CALCULATED DISTANCE BE
THE COMPUTED LAND AREA IS BASED ON STATE

COORDINATE

POINT	NORTH
A	6957769.855
B	6957906.138
C	6958245.983
D	6958509.961
E	6958808.823
F	6958049.461

00863958

LHAAP-3
(16.5

LHAAP-37, 37-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 8/1/11 for LHAAP-35B (37), a certification of site was conducted by _____________________ [indicate transferee] on __________.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-35B (37)]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35B (37).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ______________________________

Name/Title: ____

Signature: ______________________________

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

00863961

LHAAP-46, 46-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

00863962

Final
Remedial Design
LHAAP-46, Plant 2 Area, Group 4
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers – Tulsa District
1645 South 101st, East Avenue
Tulsa, Oklahoma 74128

Prepared by Shaw Environmental, Inc.
1401 Enclave Parkway, Suite 250
Houston, Texas 77077

Contract No. W912QR-04-D-0027, Task Order No. DS02
Shaw Project No. 117591
Rev 0
September 2011

Shaw® a world of Solutions™

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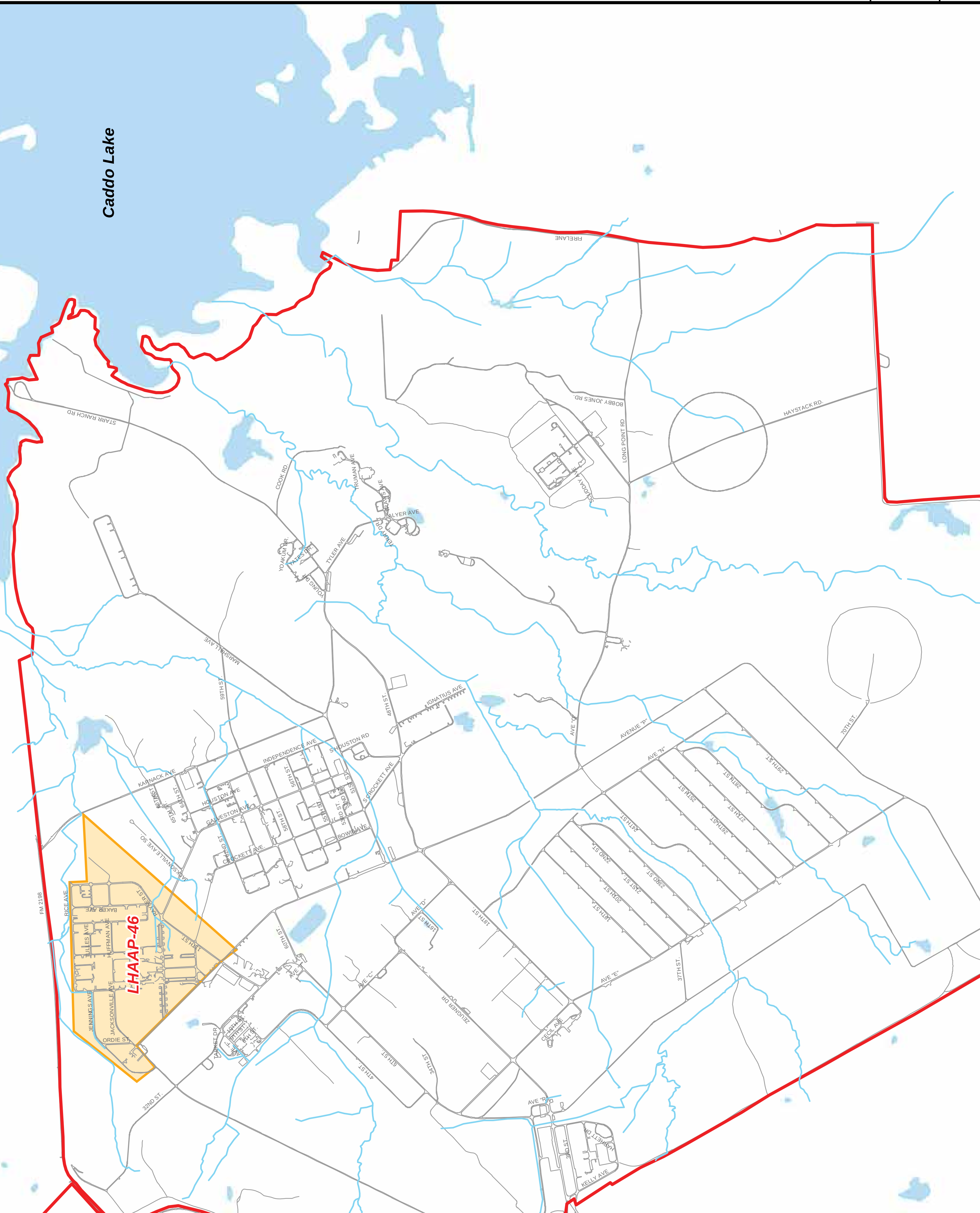


Caddo Lake
LHAAP-46
STARR RANCH RD
FIRELANE
BOBBY JONES RD.
LONG POINT RD
HAYSTACK RD.
COOK RD.
TRUMAN AVE
TYLER AVE
YOAKUM DR.
YATES DR.
YOUNG DR.
MARSHALL AVE
59TH ST.
IGNATIUS AVE
48TH ST.
S. HOUSTON RD
INDEPENDENCE AVE
KARNACK AVE
HOUSTON AVE
GALVESTON AVE
CROCKETT AVE
S. CROCKETT AVE
BOWIE AVE
AVENUE "P"
AVE "N"
AVE "Q"
70TH ST.
29TH ST.
28TH ST.
27TH ST.
26TH ST.
25TH ST.
24TH ST.
23RD ST.
22ND ST.
21ST ST.
20TH ST.
19TH ST.
18TH ST.
16TH ST.
AVE "D"
AVE "C"
AVE "E"
37TH ST.
ZEUGNER DR
CECIL AVE
AVE "R"
HARVEY DR
KELLY AVE
FM 2198
RICE AVE
BAKER AVE
HUFFMAN AVE
JENNINGS AVE
JACKSONVILLE AVE
JACKSONVILLE AVE SO.
ORDIE ST
13TH ST.
32ND ST.
4TH ST.
6TH ST.
31ST ST.
3RD ST.
60TH ST.

2.0 LAND USE CONTROL

The objective of the LUC at LHAAP-46 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566. **Appendix A** provides sample LUC compliance certification documentation.

The LUC addresses the area of LHAAP-46 that includes two groundwater plumes at LHAAP-46 with levels of contamination that require implementation of a remedy (see **Section 1.3**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and Texas Commission on Environmental Quality (TCEQ) concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-46 forms the basis for the remedy. The future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation and will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Compliance with the use assumption will be documented in the five-year review reports.

4.0 LAND USE CONTROL DESIGN AND IMPLEMENTATION PLAN

This section describes the LUC design and implementation activities for LHAAP-46. The activities will result in a surveyed and recorded groundwater use restriction boundary and an operation and maintenance plan for the LUC.

The objective of the LUC at LHAAP-46 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met. Notification of the groundwater use restriction will accompany all transfer documents. The U.S. Army is responsible for long-term implementation, maintenance, inspection, reporting, and enforcement of the LUC.

The LUC will address the area of LHAAP-46 that includes two groundwater plumes with levels of contamination that require implementation of a remedy (see **Section 1.3**). The Land Use Control Operation and Maintenance (LUC O&M) Plan will identify the measures required for the monitoring and enforcement of the groundwater use restriction.

Upon review and concurrence of this RD, the LUC O&M Plan will be coordinated with regulators, finalized and distributed as part of the Comprehensive LUC Management Plan.

4.1 Land Use Control Implementation

The U.S. Army will undertake the following actions to implement the groundwater restriction LUC for LHAAP-46:

- Define the Area of the Groundwater Use Restriction. The groundwater use restriction boundary will be defined based on the review of the first round of groundwater sampling data in conjunction with historic data. The extent of plume will be bounded by a buffer and may extend to natural groundwater and surface water boundaries.
- Survey the LUC Boundary. The proposed boundary will be finalized after all wells are installed and sampled. Concurrence by USEPA and TCEQ will be obtained, and the LUC boundary will be surveyed by a State-licensed surveyor. A legal description of the surveyed area will be appended to the survey plat.
- Record the LUC in Harrison County. The LUC plat, legal description and groundwater use restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.56.

- Notify the Texas Department of Licensing and Regulation of the LUC. The Texas Department of Licensing and Regulation will be notified of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the U.S. Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction, in conjunction with a locator map, will be provided in hard and electronic copy.

- Develop the LUC O&M Plan. A LUC O&M Plan for LHAAP-46 will be developed. It will include the elements presented in **Section 4.2** below, the county recordation of the LUC survey plat, legal description and restriction language and the annual inspection/certification form.

4.2 Land Use Control Operation and Maintenance

The U.S. Army or its representatives will be responsible for the operation and maintenance of the LHAAP-46 LUC. This includes certification, reporting and enforcement activities. The U.S. Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. To facilitate long-term operation and maintenance of the groundwater use restriction LUC remedy, U.S. Army will develop a plan that will encompass the elements described in the following subsections.

4.2.1 Site Certification and Reporting

Beginning with finalization of this RD and approval of the annual inspection form, the U.S. Army will undertake annual inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the annual LUC Inspection/Certification documents in the project files for incorporation into the Five Year Review Reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the annual certification, the U.S. Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue annual certifications will be revisited at five year reviews.

4.2.2 Notice of Planned Property Conveyances

The U.S. Army shall provide notice to USEPA and TCEQ of plans to convey the LHAAP-46 acreage. The notice shall describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the

U.S. Army shall retain its responsibility for remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objective that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation.

4.2.3 Opportunity to Review Text of Intended Land Use Controls

U.S. Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. USEPA will also receive a copy for review. In addition, the U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-46, but before executing transfer, the U.S. Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

4.2.4 Notification Should Action(s) which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objective, the U.S. Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 4.2.5** below, the U.S. Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

4.2.5 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the U.S. Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the U.S. Fish and Wildlife Service or its lessee, to the institution of judicial action against nonfederal third parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

4.2.6 Modification or Termination of Land Use Controls

The U.S. Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objective. Likewise, the U.S. Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the U.S. Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUCs shall remain in effect until such time as the U.S. Army and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

4.2.7 Comprehensive Land Use Control Management Plan

Upon finalization of the LUC O&M Plan a copy will be inserted into the Comprehensive LUC Management Plan for Longhorn. The Comprehensive LUC Management Plan figure and table will be updated to reflect the inclusion of LHAAP-46.

The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site-specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document will be provided to USEPA and TCEQ, and will also be accessible to the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record.

The land use assumption of industrial reuse as part of a national wildlife refuge forms the basis for the remedy at LHAAP-46 and this land use assumption will be in included in the Comprehensive LUC Management Plan with supporting documentation.

LHAAP-46, 46-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-46 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00863971

2014-000013307

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 12/09/2014 10:42 AM	
Document Number: 2014-000013307	
Receipt No: 1415412	
Amount: $ 50.00	
By: Pam Rockwell, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
ATTN: AMANDA LAGARDE (FEDEX ENV)
112 E PECAN ST., SUITE 400
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-46

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-46 (Plant 2 Area). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-46 were performed in accordance with the FFA requirements.

The LHAAP-46 site was used for production of pyrotechnic and illumination devices until 1997. A Record of Decision (ROD) for LHAAP-46 was signed by U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which consists of land use control (LUC) in conjunction with monitored natural attenuation (MNA). The LUC will ensure protection of human health by restricting the use of groundwater to environmental monitoring and testing only. MNA will be implemented to establish confidence in attenuation trends and verify that the constituents of concern (COCs) are stable or shrinking and will not migrate to nearby surface water at levels that may present an unacceptable risk to human health or the environment. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-46 parcel is a 190 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-46 parcel are designated LUC boundaries including a 63.772-acre tract, more or less, as described in Exhibit A. The LUC boundaries are also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. The United States Department of the Army has undertaken careful environmental study of the LHAAP-46 site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 63.772-acre tract, more or less. Groundwater underlying this land is contaminated with trichloroethene (TCE) and other volatile organic compounds (VOCs) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

00863974

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 20th day of November, 2014.

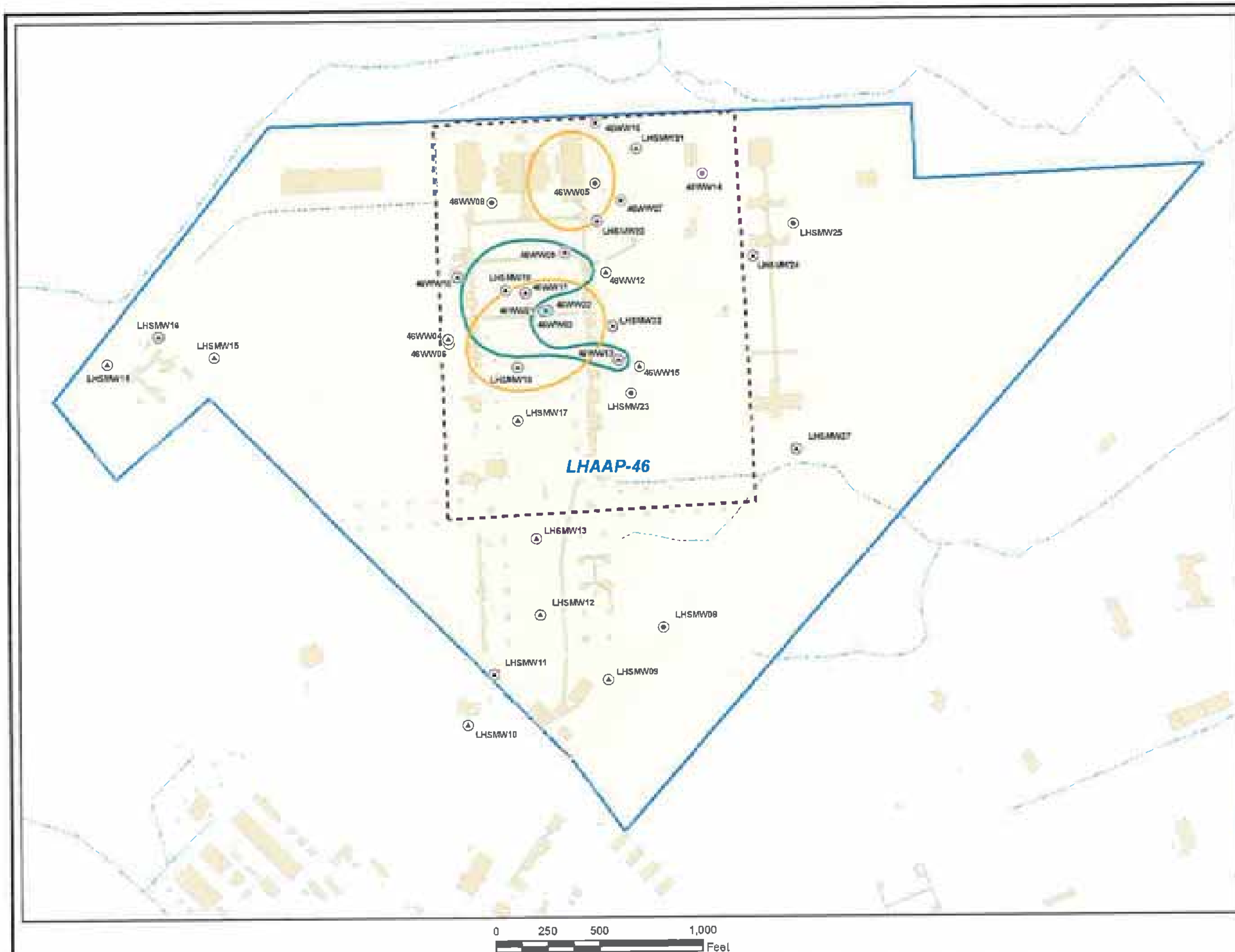
BEFORE ME, on this the 20 th day of November, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 20 day of November, 2014.

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Notary Public in and for the State of Texas,
County of Harrison

EXHIBIT A



Legend

- Shallow Monitoring Well Location
- Intermediate Monitoring Well Location
- Deep Monitoring Well Location
- Intermediate Zone TCE Plume (5 µg/L)
- Shallow Zone TCE Plume (5µg/L)
- Stream
- Road
- Surveyed Land Use Control Boundary
- Former Buildings or Concrete Slab
- LHAAP-46 Site Boundary

µg/L = micrograms per liter

Source: September 2011 Final Remedial Design for LHAAP-46, Plant 2 Area, Group 4, Longhorn Army Ammunition Plant, Karnack, Texas (Shaw, 2011).

AECOM

Figure 1
Land Use Control Boundary

LHAAP-46 Site
Longhorn Army Ammunition Plant
Karnack, Texas

60256135

October 2014

00863976

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-46" Land Use Control Area being 63.772 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-46" Land Use Control Area being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861858, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.701 feet between said monuments. The computed land area is based on grid distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940" .

Commencing at monument "X-11" referenced above,

THENCE N 36deg34'22"E 1386.89' to a concrete nail set (in white paint on asphalt) for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 01deg52'33"W 1886.35' along the W.B.L. of this tract to an I.R.O.P.C. set (in a 6' tall chain link fence running Easterly and Westerly) for this tract's N.W.C. ,

THENCE along said fence, which defines the Northerly Boundary Lines of this tract, the following eleven courses :

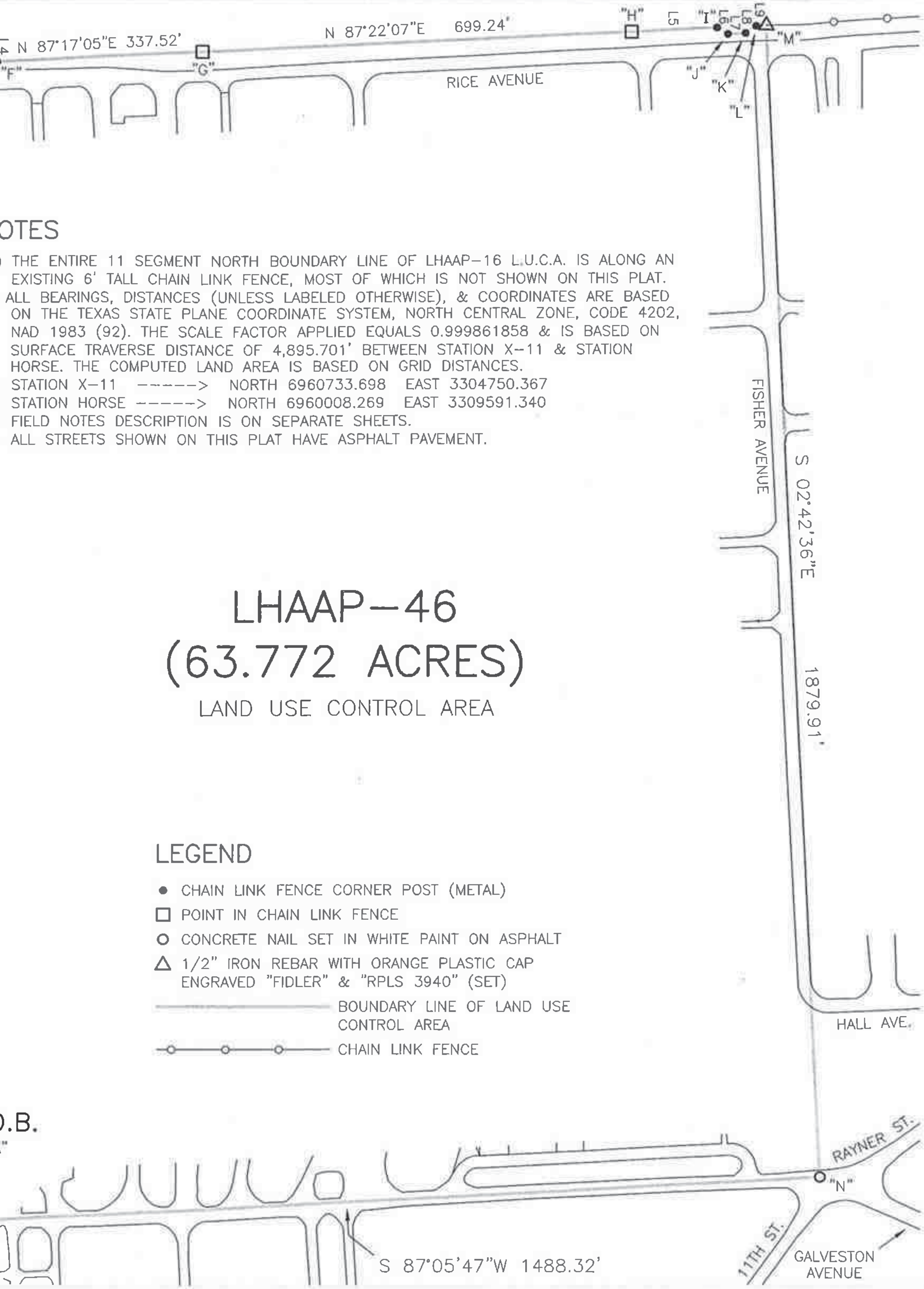
(01) N 86deg41'48"E 82.30' to a fence corner post,
(02) N 39deg20'47"E 18.62' to a bent fence corner post,
(03) N 86deg29'33"E 97.31' to a fence corner post,
(04) S 38deg05'14"E 19.89' to a fence corner post,
(05) N 87deg17'05"E 337.52' to a point in said fence,
(06) N 87deg22'07"E 699.24' to a point in said fence,
(07) N 87deg22'02"E 139.25' to a fence corner post,
(08) S 59deg03'44"E 20.98' to a fence corner post,
(09) N 86deg53'55"E 29.32' to a fence corner post,
(10) N 55deg19'37"E 21.12' to a fence corner post,
(11) N 86deg05'43"E 16.55' to an I.R.O.P.C. set in said fence for this tract's N.E.C. ,

THENCE S 02deg42'36"E 1879.91' along the E.B.L. of this tract to a concrete nail set (in white paint on asphalt) for this tract's S.E.C., from which monument "HORSE" referenced above bears S 52deg51'46"E 3171.37',

THENCE S 87deg05'47"W 1488.32' along the S.B.L. of this tract to this POINT OF BEGINNING. This tract contains 63.772 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL



OTES

- THE ENTIRE 11 SEGMENT NORTH BOUNDARY LINE OF LHAAP-16 L.U.C.A. IS ALONG AN EXISTING 6' TALL CHAIN LINK FENCE, MOST OF WHICH IS NOT SHOWN ON THIS PLAT.
- ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861858 & IS BASED ON SURFACE TRAVERSE DISTANCE OF 4,895.701' BETWEEN STATION X-11 & STATION HORSE. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.
  STATION X-11 ------> NORTH 6960733.698 EAST 3304750.367
  STATION HORSE ------> NORTH 6960008.269 EAST 3309591.340
- FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS.
- ALL STREETS SHOWN ON THIS PLAT HAVE ASPHALT PAVEMENT.

LHAAP-46
(63.772 ACRES)
LAND USE CONTROL AREA

LEGEND

- ● CHAIN LINK FENCE CORNER POST (METAL)
- □ POINT IN CHAIN LINK FENCE
- ○ CONCRETE NAIL SET IN WHITE PAINT ON ASPHALT
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA
- CHAIN LINK FENCE

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the groun[d] and under my supervision in October, 2014.

Witness my hand and seal this the 20th day of October, 2014.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 86°41'48"E	82.30'
L2	N 39°20'47"E	18.62'
L3	N 86°29'33"E	97.31'
L4	S 38°05'14"E	19.89'
L5	N 87°22'02"E	139.25'
L6	S 59°03'44"E	20.98'
L7	N 86°53'55"E	29.32'
L8	N 55°19'37"E	21.12'
L9	N 86°05'43"E	16.55'

N

SCALE 1"=200'

200 0 200 400
GRAPHIC SCALE - FEET

COORDINATE TABLE

POINT	NORTH	EAST
A	6961847.512	3305576.740
B	6963732.849	3305514.995
C	6963737.591	3305597.161
D	6963751.988	3305608.964
E	6963757.942	3305706.095
F	6963742.285	3305718.366
G	6963758.275	3306055.508
H	6963790.379	3306754.008
I	6963796.775	3306893.111
J	6963785.987	3306911.111
K	6963787.573	3306940.387
L	6963799.588	3306957.756
M	6963800.715	3306974.265
N	6961922.907	3307063.146

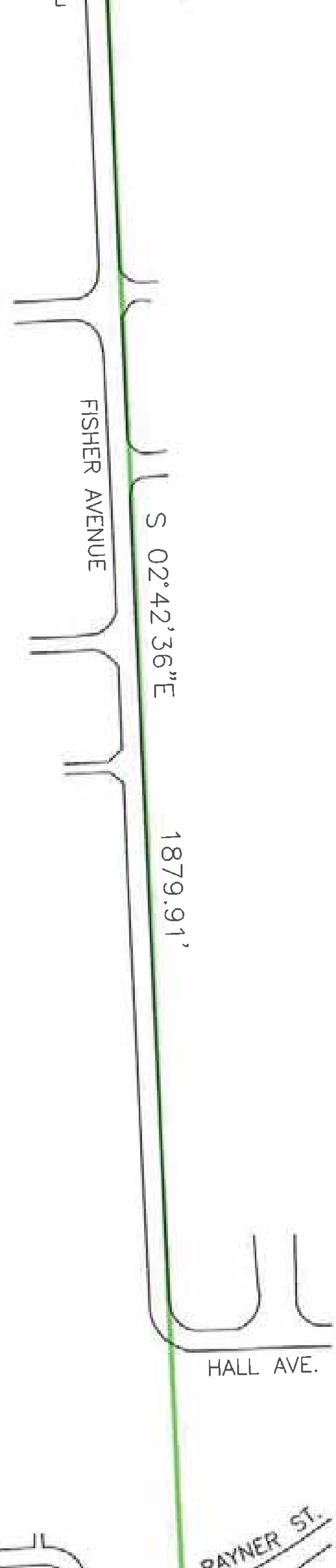
LHAAP-46 L.U.C.A.
(63.772 ACRES)
LONGHORN ARMY AMMUNITION P[LANT]
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	U.PTS
10/20/2014	1103025U.DWG	DRAWN BY

00863978

SEGMENT NORTH BOUNDARY LINE OF LHAAP-16 L.U.C.A. IS ALONG AN
L CHAIN LINK FENCE, MOST OF WHICH IS NOT SHOWN ON THIS PLAT.
ISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED
STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202,
THE SCALE FACTOR APPLIED EQUALS 0.999861858 & IS BASED ON
RSE DISTANCE OF 4,895.701' BETWEEN STATION X-11 & STATION
MPUTED LAND AREA IS BASED ON GRID DISTANCES.
------> NORTH 6960733.698 EAST 3304750.367
------> NORTH 6960008.269 EAST 3309591.340
SCRIPTION IS ON SEPARATE SHEETS.
IOWN ON THIS PLAT HAVE ASPHALT PAVEMENT.

LHAAP-46
(63.772 ACRES)
LAND USE CONTROL AREA



ARK CONSULTANTS, INC.
OFESSIONAL LAND SURVEYORS
BOX 606 LONGVIEW, TEXAS 75606
903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

Witness my hand and seal this
the 20th day of October, 2014.

Tom A. Fidler, Registered Professiona

LINE TABLE

LINE	BEARING	DISTANCE
L1	N 86°41'48"E	82.30'
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L8	N 55°19'37"E	21.12'
L9	N 86°05'43"E	16.55'

LEGEND

- ● CHAIN LINK FENCE CORNER POST (METAL)
- □ POINT IN CHAIN LINK FENCE
- ○ CONCRETE NAIL SET IN WHITE PAINT ON ASPHALT
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA
- CHAIN LINK FENCE

COORDINATE TABLE

POINT	NORTH	EAST
A	6961847.512	3305576.740
B	6963732.849	3305514.995
C	6963737.591	3305597.161
D	6963751.988	3305608.964
E	6963757.942	3305706.095
F	6963742.285	3305718.366
G	6963758.275	3306055.508

SCALE

200 0

GRAPHIC SCALE - FEE

LHAAP
(63.7

00863979

LHAAP-46, 46-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 9/30/11 for LHAAP-46 a certification of site was conducted by ____________________ [indicate transferee] on __________.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-46]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-46.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ______________________________

Name/Title: ____

Signature: ______________________________

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-49

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-49 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2012-000000704

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000704	
Receipt No: 1200645	
Amount: $ 36.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas, in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. LHAAP-49 is a former Acid Storage location at the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA) became effective on December 30, 1991. LHAAP-49 is considered an NPL listed site, and remedial activities at LHAAP-49 were performed in accordance with the FFA requirements.

LHAAP-49 is located in the west-central portion of LHAAP. LHAAP-49 is the former Acid Storage Area, which was used from 1942 to 1945 for storage and formulation of acids and acid mixtures in support of trinitrotoluene production during World War II. Nitric acid and sulfuric acid were manufactured and handled in large quantities in this area. A no further action Record of Decision for LHAAP-49 was signed by USEPA in 2010 establishing no remedy was required. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

LHAAP-49 is a 30.540 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of LHAAP-49 and USEPA and TCEQ concluded that no further investigation or action is required.

Limited monitoring of LHAAP-49 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-49 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

00863986

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 21 th day of July, 2011.

BEFORE ME, on this the 21 th day of July, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 21 day of July, 2011.

ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Notary Public in and for the State of Texas,
County of Harrison

LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 30.540 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998768897, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "HMX-3" (N=6956487.252 feet E=3303483.509 feet) and "HMX-5" (N=6958206.213 feet E=3305201.721 feet). Said traverse indicates a surface distance of 2430.748 feet between said monuments. The computed land area is based on grid (State Plane) distances.

BEGINNING at a 60d nail set for the Southmost corner of this tract, said nail being in asphalt pavement at the intersection of 6th Street and 4th Street, from which nail the monument "HMX-3" referenced above bears N 09deg00'02"E 74.61' ,

THENCE N 46deg42'14"W crossing some of said asphalt pavement, then generally along 4th Street's Northeast edge of asphalt, then crossing a curved section of 4th Street's asphalt, and continuing beyond 4th Street's asphalt, for a total distance of 509.81', to a 60d nail set for the Southmost West corner of this tract,

THENCE N 45deg04'42"E eventually crossing 4th Street's asphalt, then generally along 4th Street's Southeast edge of asphalt, for a total distance of 1323.80', to a 60d nail set (in the Southeast edge of said asphalt pavement) for the Westerly reentrant corner of this tract,

THENCE N 45deg22'03"W crossing 4th Street's asphalt pavement and continuing for a total distance of 308.18' to a point (in the Southeasterly edge of flowing water [May 3, 2011] of Goose Prairie Creek) for the Northmost West corner of this tract, from which point a 1/2" iron rod with Tom Fidler orange plastic cap set for reference bears S 45deg22'03"E 11.34', said rod being at the top of the Southeasterly bank of Goose Prairie Creek,

THENCE N 47deg40'44"E 331.25' along a N.W. B.L. of this tract to a point (in the Southeasterly edge of flowing water [May 3, 2011] of Goose Prairie Creek) for the Westmost North corner of this tract, from which point a 1/2" iron rod with Tom Fidler orange plastic cap set for reference bears S 44deg45'45"E 13.46', said rod being at the top of the Southeasterly bank of Goose Prairie Creek,

THENCE S 44deg45'45"E along a N.E. B.L. of this tract, and eventually crossing 4th Street's asphalt pavement, for a total distance of 292.85' to a 60d nail set in the Southeast edge of said asphalt pavement for the Northerly reentrant corner of this tract,

THENCE N 44deg47'09"E generally along 4th Street's Southeast

North corner of this tract,

THENCE S 45deg47'29"E crossing some of said pavement, then generally along the Southwest edge of the asphalt pavement of Avenue "C", then entering said pavement at the intersection of Avenue "C" and 6th Street, for a total distance of 507.27' to a 60d nail set for the Eastmost corner of this tract, from which the monument "HMX-5" referenced above bears N 13deg12'58"E 77.94' ,

THENCE S 44deg55'17"W crossing some of said pavement, then generally along the Northwest edge of the asphalt pavement of 6th Street, then entering said pavement at the aforementioned intersection of 6th Street and 4th Street, for a total distance of 2424.55' to this POINT OF BEGINNING.

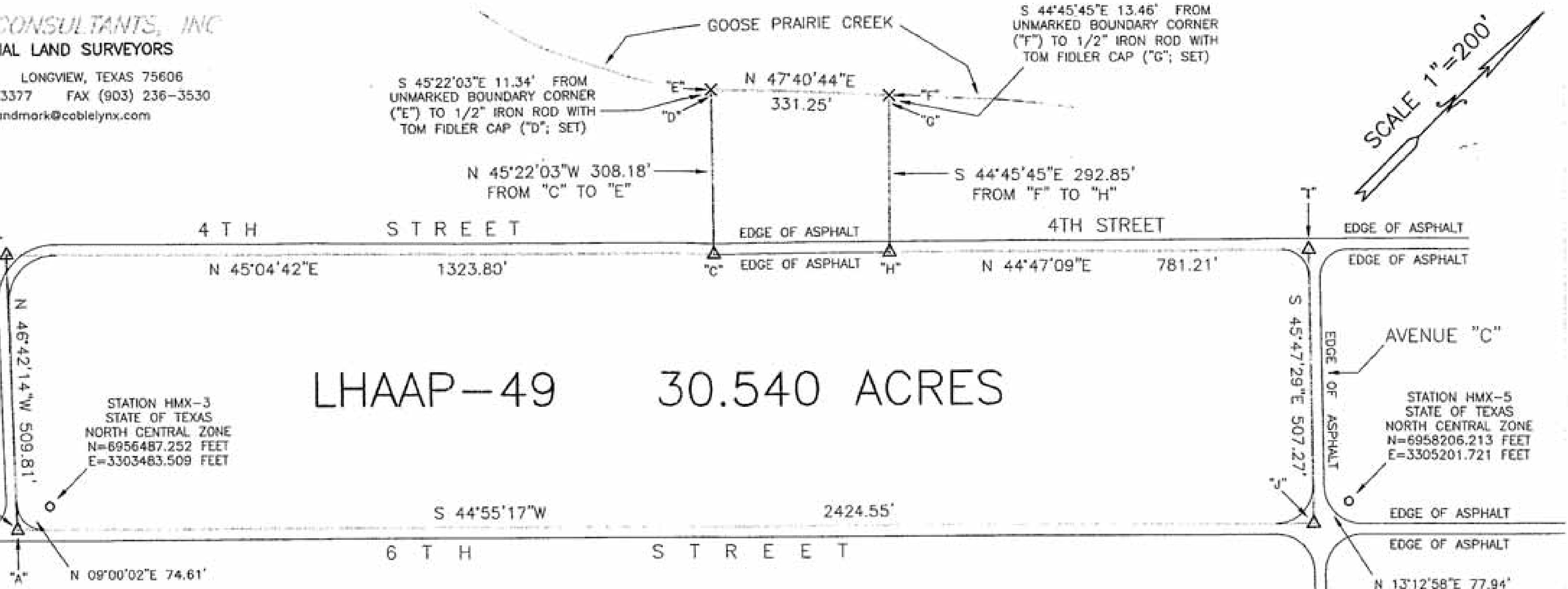
This tract contains 30.540 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

CONSULTANTS, INC
...AL LAND SURVEYORS
LONGVIEW, TEXAS 75606
...3377 FAX (903) 236-3530
...ndmark@cablelynx.com



...ICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
...ICATES 60d NAIL (SET)
...ICATES UNMARKED POINT AT SOUTHEASTERLY EDGE OF CREEK
...TER MAY 3, 2011 (GOOSE PRAIRIE CREEK)

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998768897 & IS BASED ON GRID DISTANCE (BETWEEN STATIONS HMX-3 AND HMX-5) DIVIDED BY SURFACE TRAVERSE DISTANCE (BETWEEN SAME MONUMENTS). THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.

EDGE OF ASPHALT
EDGE OF ASPHALT
AVENUE "C"

... registered professional land surveyor, No. 3940, ...y that this plat reflects the location of the ...tract herein described, as surveyed on the ground ...supervision in April 2011.

...d and seal May 5, 2011.

COORDINATE TABLE

POINT	NORTH	EAST
A	6956413.564	3303471.837
B	6956763.174	3303100.790
C	6957697.967	3304038.137
D(ROD)	6957906.516	3303826.894
E	6957914.483	3303818.824
F	6958137.506	3304063.741
G(ROD)	6958127.951	3304073.216
H	6957929.573	3304269.956
I	6958484.036	3304820.288
J	6958130.332	3305183.901

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

STATE OF TEXAS REGISTERED ... PROFESSIONAL LAND SURVEYOR

Registered Professional Land Surveyor, No. 3940

LHAAP-49
(30.540 ACRES)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1104040	0407088.CRD	M.PTS M.LEG
MAY 5, 2011	1103025M.DWG	DRAWN BY JTJ

00863989

LHAAP-50, 50-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

00863991

Final
Remedial Design
LHAAP-50
Former Sump Water Tank, Group 4
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers – Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128

Prepared by Shaw Environmental, Inc.
1401 Enclave Parkway, Suite 250
Houston, Texas 77077

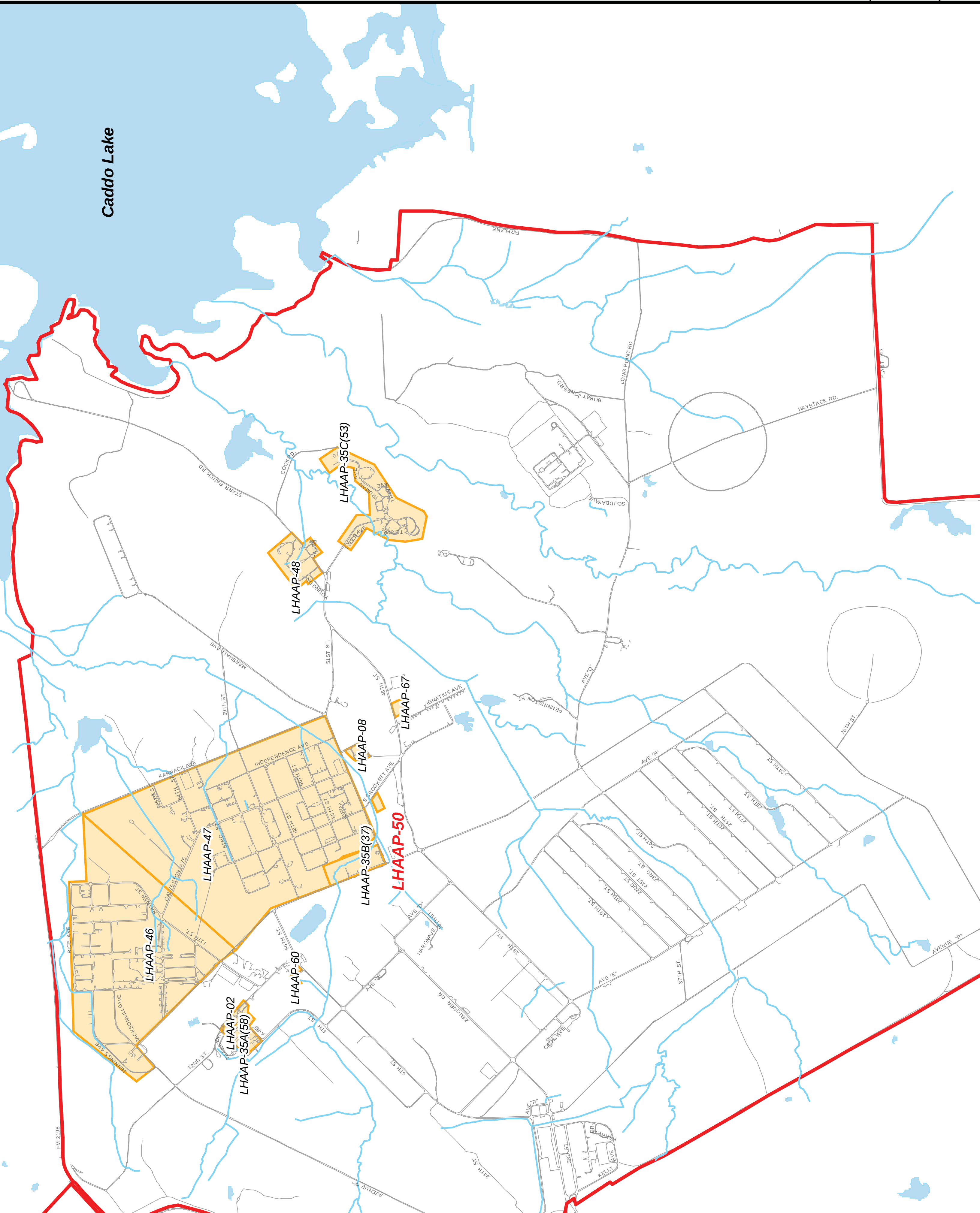
Contract No. W912QR-04-D-0027, Task Order No. DS02
Project No. 117591
Rev 0
September 2011

Shaw® a world of Solutions™

Table of Contents

Contract No. W912QR-04-D-0027, Task Order No. DS02• Final • Rev 0 • September 2011

00863993


Caddo Lake
LHAAP-50
LHAAP-35C(53)
LHAAP-48
LHAAP-67
LHAAP-08
LHAAP-47
LHAAP-35B(37)
LHAAP-46
LHAAP-60
LHAAP-02
LHAAP-35A(58)
STARR RANCH RD
COOK RD
LONG POINT RD
BOBBY JONES RD
HAYSTACK RD.
PLANT RD
SCUDDAY AVE
MARSHALL AVE
51ST ST.
59TH ST.
48TH ST
IGNATIUS AVE
PENNINGTON ST
AVE "Q"
70TH ST.
KARNACK AVE
INDEPENDENCE AVE
S. CROCKETT AVE
GALVESTON AVE
11TH ST
RICE AVE
JACKSONVILLE AVE
JENNINGS AVE
32ND ST.
60TH ST
ZEIGNER DR
NARONAVE
AVE "E"
37TH ST.
AVENUE "P"
AVENUE "P"
34TH ST
6TH ST
4TH ST
3RD ST.
KELLY
AVE "N"
28TH ST
27TH ST
26TH ST
25TH ST.
24TH ST
23RD ST
22ND ST
21ST ST
20TH ST
19TH ST
18TH ST
FM 2198

3.0 LAND USE CONTROL

The objective of LUC at LHAAP-50 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup levels are met. Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566. **Appendix B** provides sample LUC compliance certification documentation.

The LUC addresses the area of LHAAP-50 that has groundwater plumes (in both the shallow and intermediate groundwater zones) with levels of contamination that require implementation of a remedy (see **Section 2.3**). The groundwater restriction LUC would be maintained until the concentration of contaminants and by-product contaminants have been reduced to below their respective cleanup levels.

The U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. The U.S. Army shall obtain USEPA and TCEQ concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-50 forms the basis for the remedy. The future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation and will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Compliance with the use assumption will be documented in the five-year review reports.

6.0 LAND USE CONTROL DESIGN AND IMPLEMENTATION PLAN

This section describes the LUC design and implementation activities for LHAAP-50. The activities will result in a surveyed and recorded groundwater use restriction boundary and an operation and maintenance plan for the LUC.

The objective of the LUC at LHAAP-50 is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until cleanup levels are met. Notification of the groundwater use restriction will accompany all transfer documents. The U.S. Army is responsible for long-term implementation, maintenance, inspection, reporting, and enforcement of the LUC.

The LUC will address the area of LHAAP-50 that includes two groundwater plumes with levels of contamination that require implementation of a remedy (see **Section 1.3**). The Land Use Control Operation and Maintenance Plan (LUC O&M) will identify the measures required for monitoring and enforcement of the groundwater use restriction. Upon review and concurrence of this RD, the LUC O&M Plan will be coordinated with regulators, finalized, and distributed as part of the Comprehensive LUC Management Plan for LHAAP.

6.1 Land Use Control Implementation

The U.S. Army will undertake the following actions to implement the groundwater restriction LUC for LHAAP-50:

- ***Define the Area of the Groundwater Use Restriction.*** The groundwater use restriction boundary will be defined based on the review of the first round of groundwater sampling data in conjunction with historic data. The extent of plume will be bounded by a buffer and may extend to natural groundwater and surface water boundaries.
- ***Survey the LUC Boundary.*** The proposed boundary will be finalized after all wells are installed and sampled. Concurrence by USEPA and TCEQ will be obtained, and the LUC boundary will be surveyed by a State-licensed surveyor. A legal description of the surveyed area will be appended to the survey plat.
- ***Record the LUC in Harrison County.*** The LUC plat, legal description and groundwater use restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566.

- ***Notify the Texas Department of Licensing and Regulation of the LUC.*** The Texas Department of Licensing and Regulation will be notified of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the U.S. Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction, in conjunction with a locator map, will be provided in hard and electronic copy.
- ***Develop the LUC O&M Plan.*** An LUC O&M Plan for LHAAP-50 will be developed. It will include the elements presented in **Section 6.2**, the county recordation of the LUC survey plat, legal description and restriction language, and the inspection/certification form.

6.2 Land Use Control Operation and Maintenance

The U.S. Army or its representatives will be responsible for the operation and maintenance of the LHAAP-50 LUC. This includes certification, reporting, and enforcement activities. The U.S. Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. To facilitate long-term operation and maintenance of the groundwater use restriction LUC remedy, the U.S. Army will develop a plan that will encompass the elements described in the following subsections.

6.2.1 Site Certification and Reporting

Beginning with finalization of this RD and approval of the inspection form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army or the transferee after transfer will retain the LUC Inspection Certification documents in the project files for incorporation into the five-year review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue certifications will be revisited at five year reviews.

6.2.2 Notice of Planned Property Conveyances

The U.S. Army shall provide notice to USEPA and TCEQ of plans to convey the LHAAP-50 acreage. The notice shall describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the U.S. Army shall retain its responsibility for remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objective that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation.

6.2.3 Opportunity to Review Text of Intended Land Use Controls

The U.S. Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. The USEPA will also receive a copy for review. In addition, the U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-50, but before executing transfer, the U.S. Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

6.2.4 Notification Should Action(s) which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objective, the U.S. Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.2.5** below, the U.S. Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.2.5 Land Use Control Enforcement

Should the LUC remedy reflected in this RD fail, the U.S. Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the USFWS or its lessee, to the institution of judicial action against non-federal third parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction; the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

6.2.6 Modification or Termination of Land Use Controls

The U.S. Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate an LUC, or make a land use change inconsistent with the LUC objective. Likewise, the U.S. Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the U.S. Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUC shall remain in effect until such time as the U.S. Army and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

6.2.7 Comprehensive Land Use Control Management Plan

Upon finalization of the LUC O&M Plan, a copy will be inserted into the Comprehensive LUC Management Plan for Longhorn. The Comprehensive LUC Management Plan figure and table will be updated to reflect the inclusion of LHAAP-50.

The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUC being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site-specific LUC are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document will be provided to USEPA and TCEQ and is also accessible to the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record.

The land use assumption of industrial use as part of a national wildlife refuge forms the basis for the remedy at LHAAP-50 and this land use assumption will be included in the Comprehensive LUC Management Plan with supporting documentation.

LHAAP-50, 50-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-50 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2015-000006109

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 06/18/2015 01:32 PM	
Document Number: 2015-000006109	
Receipt No: 1507040	
Amount: $ 50.00	
By: Vickie Gagnard, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AMANDA LAGARDE
112 EAST PECAN ST
SUITE 400
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-50

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-50 (Former Sump Water Tank). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-50 were performed in accordance with the FFA requirements.

The LHAAP-50 site, when operational, contained a 47,000-gallon capacity aboveground storage tank (AST) which received industrial wastewater from various industrial waste production sumps throughout LHAAP from 1955 to 1988. After the solids were filtered, the storage tank contents were discharged up stream of the bridge on Crockett Avenue, south of 51st Street into Goose Prairie Creek. The AST has been removed. A Record of Decision (ROD) for LHAAP-50 was signed by the U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which consists of a land use control (LUC) in conjunction with monitored natural attenuation (MNA) and limited perchlorate-impacted soil removal. The soil was removed to non-residential levels. The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-50 will ensure protection of human health by restricting the use of contaminated groundwater to environmental monitoring and testing only. MNA will be implemented to establish confidence in attenuation trends and verify that the constituents of concern (COCs) are stable or shrinking and will not migrate to nearby surface water at levels that may present an unacceptable risk to human health or the environment. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8:00 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-50 parcel is a 1 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in **Exhibit A**. Within the LHAAP-50 parcel is designated a LUC boundary which is a 23.891-acre tract, more or less, as described in **Exhibit A**. The LUC boundary is also presented in the attached **Figure 1**.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential land use includes, but is not limited to, single family to multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12. The United States Department of the Army has undertaken careful environmental study of the LHAAP-50 site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 23.891-acre tract, more or less. Groundwater underlying this land is contaminated with tetrachloroethylene (PCE), trichloroethylene (TCE), 1,1-dichloroethylene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), cis-1,2-dichloroethylene (cis-1,2-DCE), vinyl chloride and other volatile organic compounds (VOCs) and perchlorate and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

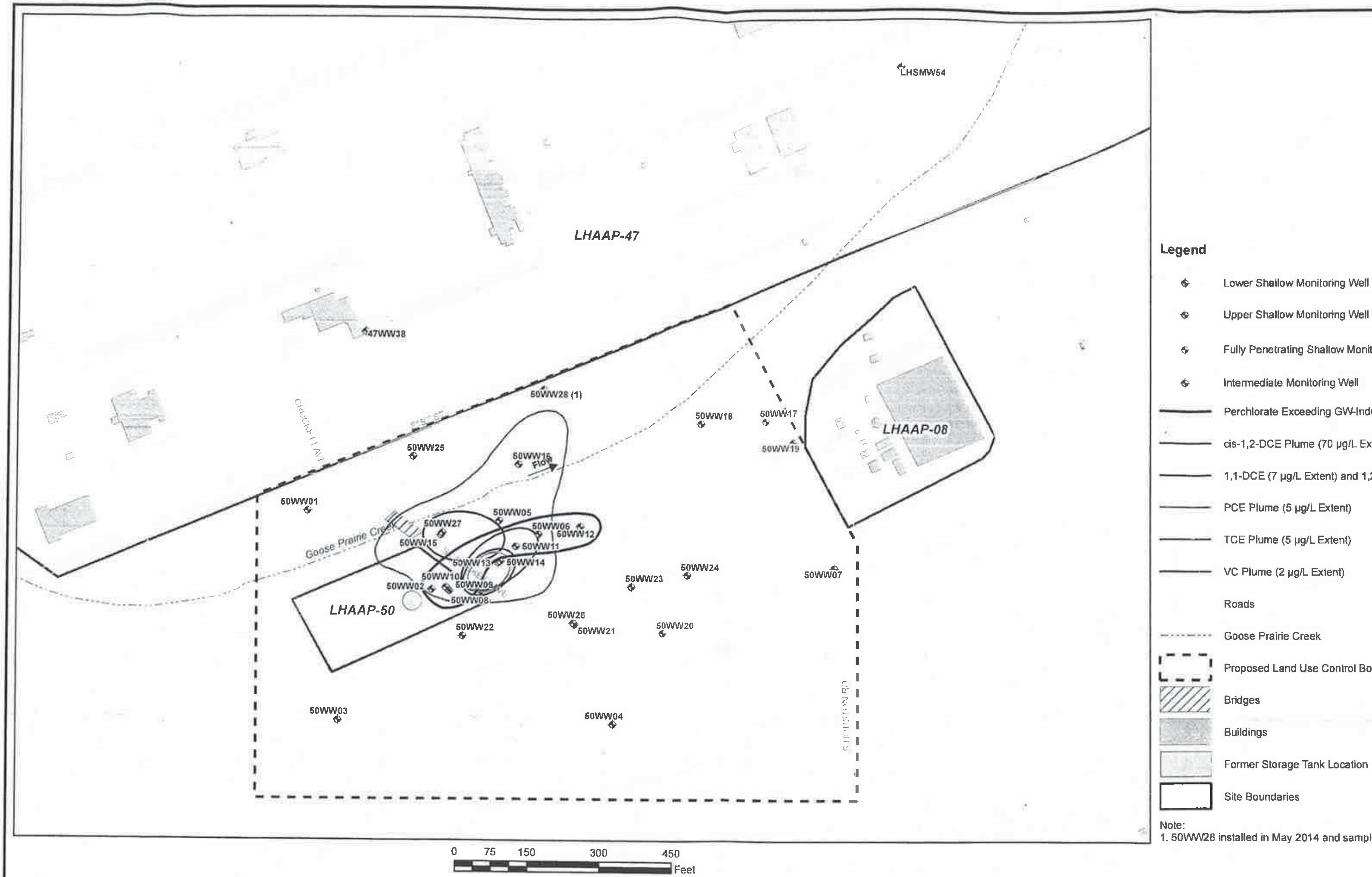
EXECUTED this the 18th day of June, 2015.

BEFORE ME, on this the 18th day of June, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 18th day of June, 2015.

NOTARY PUBLIC STATE OF TEXAS
GENIE WARNER
Notary Public State of Texas
COMM. EXP. 8/1/2018

Genie Warner
Notary Public in and for the State of Texas,
County of Harrison



Note:
1. 50WW28 installed in May 2014 and samplec

AECOM

60256135

Figure 1
Land Use Control Boun
LHAAP-50 Site
Longhorn Army Ammunition Pl
Karnack, Texas

00864004

Path: E:\Group\IT_GIS\GIS Projects\Longhorn\MXDs\LHAAP-50\RAO Report\2015-Jan-20\Figure 2-1_LHAAP50_Land Use Control Boundary.mxd

EXHIBIT A

FIELD NOTES DESCRIPTION OF
"LHAAP-50" LAND USE CONTROL AREA
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-50" Land Use Control Area being 23.891 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-50" Land Use Control Area being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999968791070, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-21" (N=6956579.781 feet E=3308499.969 feet), "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet), and "RACE" (N=6958817.935 feet E=3310081.598 feet). The computed land area is based on State Plane distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" and "RPLS 3940" .

Commencing at monument "C-21" referenced above,

THENCE N 59deg10'26"E 819.91' to an I.R.O.P.C. set for the Southwest corner of this tract and this POINT OF BEGINNING,

THENCE N 00deg00'15"E 644.05' along the W.B.L. of this tract to a concrete nail set in asphalt pavement for this tract's N.W.C.,

THENCE N 67deg57'46"E 1061.76' along the N.W. B.L. of this tract to a 60d nail set in asphalt pavement for the Northmost corner of this tract,

THENCE S 27deg45'58"E 573.94' along the N.E. B.L. of this tract to a 60d nail set for one of this tract's two Eastmost corners,

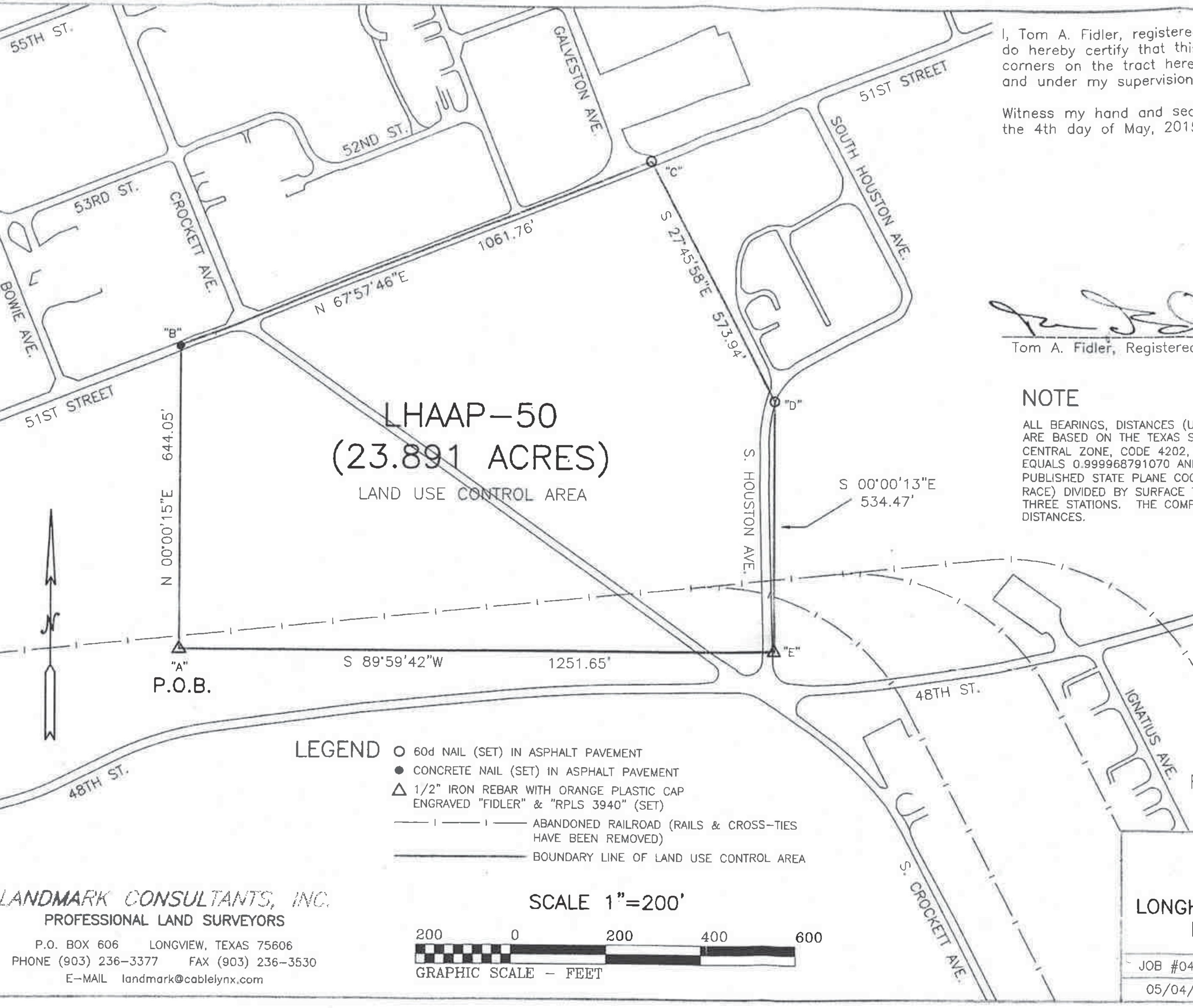
THENCE S 00deg00'13"E 534.47' along the E.B.L. of this tract to an I.R.O.P.C. set for this tract's S.E.C., from which "IGNATIUS-1" referenced above bears N 81deg47'47"E 632.57',

THENCE S 89deg59'42"W 1251.65' along the S.B.L. of this tract to this POINT OF BEGINNING, containing 23.891 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940



LEGEND

- ○ 60d NAIL (SET) IN ASPHALT PAVEMENT
- ● CONCRETE NAIL (SET) IN ASPHALT PAVEMENT
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- —— I —— I —— ABANDONED RAILROAD (RAILS & CROSS-TIES HAVE BEEN REMOVED)
- ———— BOUNDARY LINE OF LAND USE CONTROL AREA

SCALE 1"=200'

200 0 200 400 600

GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor do hereby certify that this plat reflects the location corners on the tract herein described, as surveyed o and under my supervision on April 29 & 30, 2015.

Witness my hand and seal this the 4th day of May, 2015.

STATE OF ... REGIST... TOMA. F... 3940 PROFESS... LAND SU...

Tom A. Fidler, Registered Professional Land Surveyor

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), AND ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACT EQUALS 0.999968791070 AND IS BASED ON CALCULATED DISTAN PUBLISHED STATE PLANE COORDINATES (OF STATIONS C-21, IGN RACE) DIVIDED BY SURFACE TRAVERSE CALCULATED DISTANCE BE THREE STATIONS. THE COMPUTED LAND AREA IS BASED ON STA DISTANCES.

COORDINATE T

	NORTH	
A	6956999.929	3
B	6957643.979	3
C	6958042.360	3
D	6957534.507	3
E	6957000.041	3

FIELD NOTES DESCRI
IS ON SEPARATE SH

LHAAP-50 L.U.C.
(23.891 ACRES)
LONGHORN ARMY AMMUNIT
HARRISON COUNTY

JOB #0407088	0407088.CRD
05/04/2015	1103025W.DWG

00864007

LHAAP-50, 50-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 9/30/11 for LHAAP-50 a certification of site was conducted by ____________________ [indicate transferee] on __________.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-50]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-50.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ______________________________

Name/Title: ____

Signature: ______________________________

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-51

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-51 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005557

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005557	
Receipt No: 1006195	
Amount: $ 36.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-51, is the area of a demolished building location known as Building 60-B, former photographic lab, located within the Plant 3 production area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-51 is not itself considered an NPL site. Environmental activities at LHAAP-51 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-51 (Building 60-B) was constructed in 1945 for the processing of X-ray film. The building had a concrete floor without a floor drain. Spent developing waste was drummed and transferred to another building for disposal. Small quantities of black and white developer and fixer solutions were generated by the X-ray lab. Activities ceased in the late 1970s or early 1980s. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-51 parcel is 5,754 square foot, more or less, or 0.13209 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-51 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-51. Contaminants in soil samples from LHAAP-51 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-51 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-51 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Angela Humphries
Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-51" TRACT
(INCLUDES THE REMAINS OF A DEMOLISHED BUILDING)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-51" including, but not being limited to, the concrete slab of a demolished building in the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-51" being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HORSE" (N=6960008.269 feet E=3309591.340 feet). Said traverse indicates a surface distance of 4895.70 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied (in the form of an Autocad DXF file) by Shaw Environmental & Infrastructure Group.

Commencing at monument "HORSE" referenced above,

THENCE N 86deg33'08"W 1716.42' to a concrete nail with head dimple set for the S.E.C. of this tract and this POINT OF BEGINNING,

THENCE S 68deg51'01"W 68.17' along the S.B.L. of this tract to a 60d nail set for this tract's S.W.C. , THENCE N 21deg08'59"W 84.39' along the W.B.L. of this tract to a 60d nail set for this tract's N.W.C. , said nail being S 79deg23'36"E 3086.37' from said monument "X-11" ,

THENCE N 68deg51'01"E 68.17' along the N.B.L. of this tract to a 60d nail set for this tract's N.E.C. ,

THENCE S 21deg08'59"E 84.39' along the E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 5,754 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

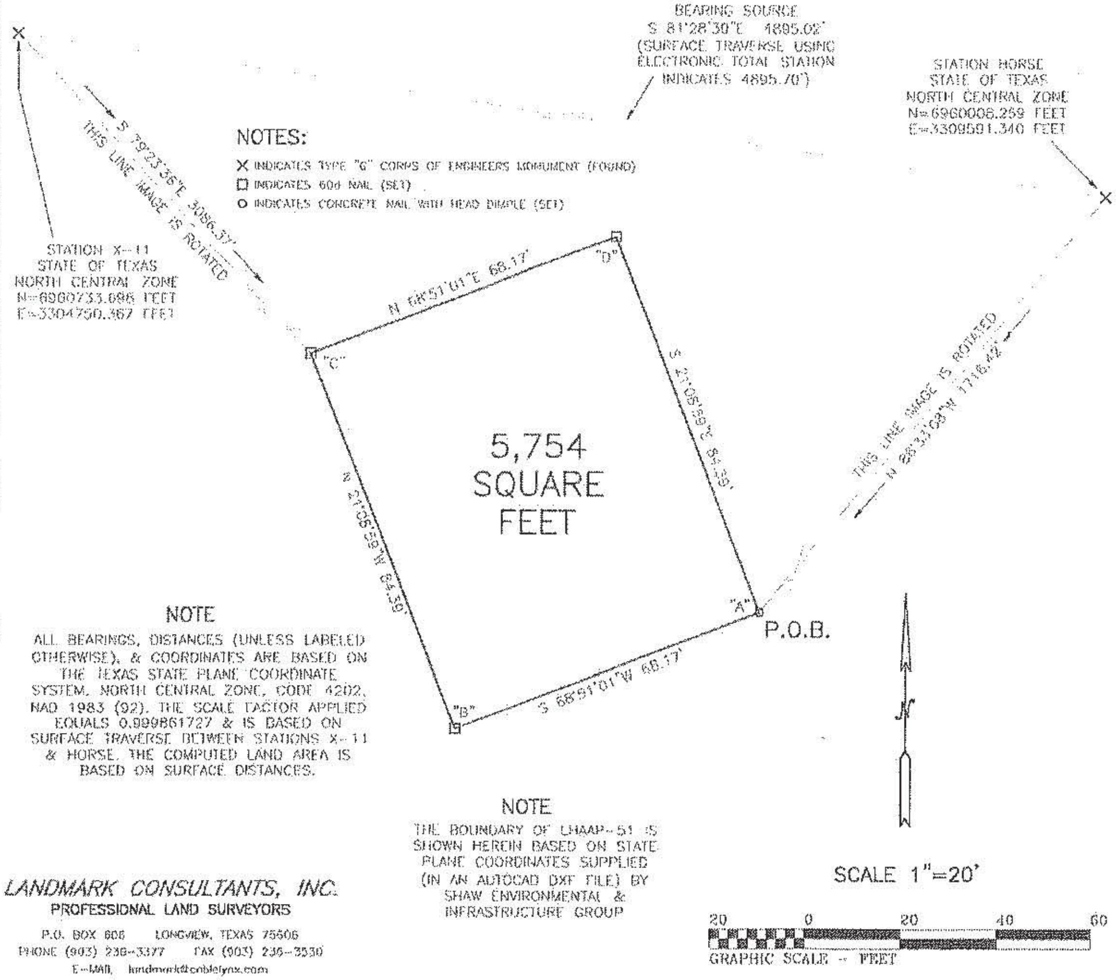
Tom A. Fidler, R.P.L.S. Number 3940

00864017

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940



NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES 60d NAIL (SET)
- O INDICATES CONCRETE NAIL WITH HEAD DIMPLE (SET)

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & HORSE. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTE

THE BOUNDARY OF LHAAP-51 IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP

COORDINATE TABLE

POINT	NORTH	EAST
A	6960111.490	3307878.026
B	6960086.894	3307814.448
C	6960165.600	3307784.000
D	6960190.196	3307847.578

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@coblelynx.com

LHAAP-51
(5,754 SQUARE FEET)
(INCLUDES THE CONCRETE SLAB OF A DEMOLISHED BUILDING)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	D.PTS D.FEG
AUG. 13, 2009	0908074D.DWG	DRAWN BY JTJ

LHAAP-55

NOTICE OF NONRESIDENTIAL LAND USE AT SEPTIC TANK LOCATIONS FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864019

2010-000005562

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

34 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005562	
Receipt No: 1006195	
Amount: $ 144.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-55, consisted of 10 septic tank and leachate field systems that served outlying areas of the former Longhorn Army Ammunition Plant (LHAAP) within or near LHAAP-48 and LHAAP-35C(53). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-55 is not itself considered an NPL site. Environmental activities at LHAAP-55 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-55 consisted of 10 septic tank and leachate field systems that served outlying areas of LHAAP that could not be connected to the plant sanitary sewer system. Although there was no history of industrial waste being placed into these septic tanks, soil samples were collected from borings installed at septic systems that were associated with industrial processes and analyzed for metals, explosives, semi volatile organic compounds, and volatile organic compounds where appropriate. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-55 parcel include: ST-01 with 1,807 square feet, more or less, or 0.04148 acre tract; ST-02 with 1,791 square feet, more or less, or 0.04111 acre tract; ST-03 with 1,784 square feet, more or less, or 0.04095 acre tract; ST-04 with 1,789 square feet, more or less, or 0.04106 acre tract; ST-05 with 1,825 square feet more or less, or 0.04189 acre tract; ST-06 with 1,800 square feet, more or less, or 0.04132 acre tract; ST-07 with 1,865 square feet, more or less, or 0.04281 acre tract; ST-08 with 1,785 square feet, more or less, or 0.04097 acre tract; ST-09 with 2,004 square feet, more or less, or 0.04600 acre tract; and ST-10 with 1,804 square feet, more or less, or 0.04141 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-55 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-55. Contaminants in soil samples from LHAAP-55 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-55 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-55 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Angela Humphries
Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-01, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,807 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998636625, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet) and "IGNATIUS-2" (N=6955582.752 feet E=3311851.704 feet). Said traverse indicates a surface distance of 1693.005 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-01, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "IGNATIUS-1" referenced above,

THENCE S 37deg17'23"E 1017.21' to a 60d nail set for the Westmost N.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 63deg19'52"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Westmost N.E.C. ,

THENCE S 26deg40'08"E 4.90' along an E.B.L. of this tract to a 60d nail set for this tract's Northeast reentrant corner ,

THENCE N 89deg25'37"E 24.40' along a N.B.L. of this tract to a 60d nail set for this tract's Northwest reentrant corner ,

THENCE N 00deg00'00"E 18.03' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C. , THENCE N 90deg00'00"E 46.53' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost N.E.C. ,

THENCE S 00deg00'00"E 32.43' along an E.B.L. of this tract to a 60d nail set for this tract's Eastmost S.E.C. ,

THENCE N 90deg00'00"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Eastmost S.W.C. ,

THENCE N 00deg00'00"E 12.40' along a W.B.L. of this tract to a 60d nail set for this tract's Southwest reentrant corner,

THENCE S 89deg25'37"W 23.40' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

THENCE S 26deg40'08"E 5.57' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. ,

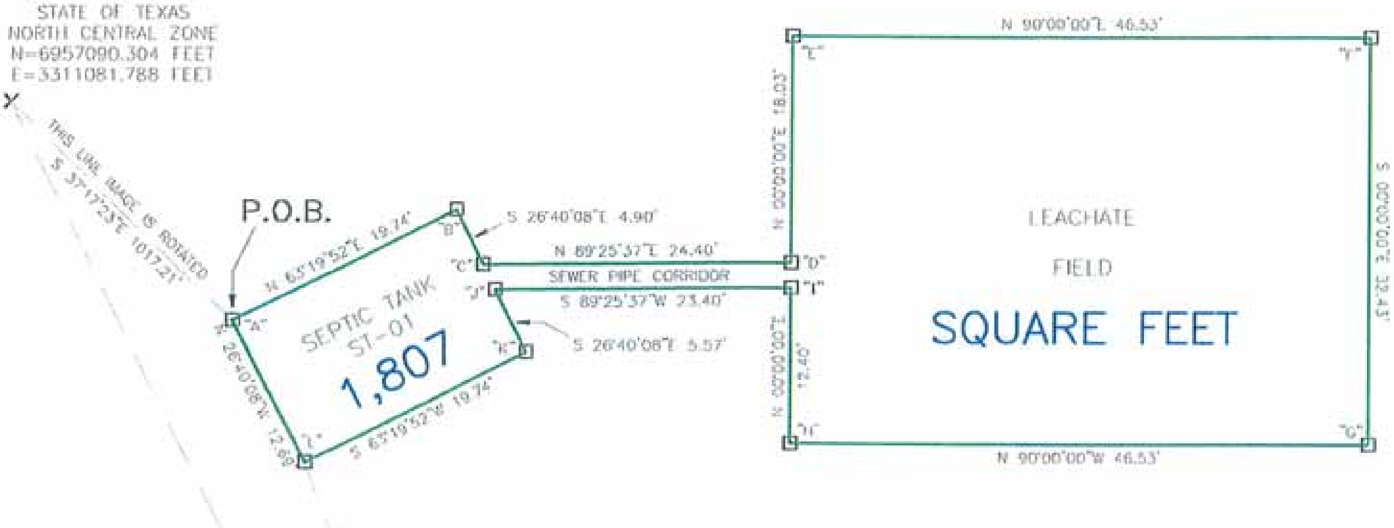
THENCE S 63deg19'52"W 19.74' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C., from which station "IGNATIUS-2" referenced above bears S 12deg09'16"E 702.69' ,

THENCE N 26deg40'08"W 12.69' along a W.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,807 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940



S 12°09'16"E
THIS LINE IMAGE IS ROTATED
702.69'

BEARING SOURCE
S 27°03'13.2"E 1692.774'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1693.005')

N

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

COORDINATE TABLE

Point	North	East
A	6956281.030	3311698.060
B	6956289.890	3311715.700
C	6956285.515	3311717.897
D	6956285.759	3311742.293
E	6956303.788	3311742.293
F	6956303.788	3311788.823
G	6956271.358	3311788.823
H	6956271.358	3311742.293
I	6956283.759	3311742.293
J	6956283.525	3311718.897
K	6956278.550	3311721.396
L	6956269.690	3311703.756

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS-1 & IGNATIUS-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

STATION IGNATIUS-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6955582.752 FEET
E=3311851.704 FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal this the 13th day of August, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTES:

× INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

NOTE

THE BOUNDARY OF ST-01, ITS LEACHATE FIELD, AND THE SEWER PIPE CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-01 WITH LEACHATE FIELD (1,807 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	A.PTS A.LEG
AUG. 13, 2009	0908074A.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-02, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,791 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-02, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-1" referenced above,

THENCE N 05deg57'31"W 746.36' to a 60d nail set for the Eastmost S.E.C. of this tract and this POINT OF BEGINNING,

THENCE N 90deg00'00"W 19.74' along a S.B.L. of this tract to a 60d nail set (in an abandoned utility pole lying on the ground) for this tract's Eastmost S.W.C. ,

THENCE N 00deg00'00"E 5.36' along a W.B.L. of this tract to a 60d nail set for this tract's Southwest reentrant corner,

THENCE N 90deg00'00"W 15.73' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

THENCE S 00deg00'00"W 15.91' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. , THENCE N 90deg00'00"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C. ,

THENCE N 00deg00'00"E 32.43' along a W.B.L. of this tract to a 60d nail set for this tract's Westmost N.W.C. ,

THENCE N 90deg00'00"E 46.53' along a N.B.L. of this tract to a 60d nail set for this tract's Westmost N.E.C. ,

THENCE S 00deg00'00"E 14.52' along an E.B.L. of this tract to a 60d nail set for this tract's Northeast reentrant corner,

THENCE S 90deg00'00"E 15.73' along a N.B.L. of this tract to a 60d nail set for this tract's Northwest reentrant corner,

THENCE N 00deg00'00"W 5.33' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C. ,

THENCE N 90deg00'00"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost N.E.C. ,

THENCE S 00deg00'00"E 12.69' along an E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,791 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

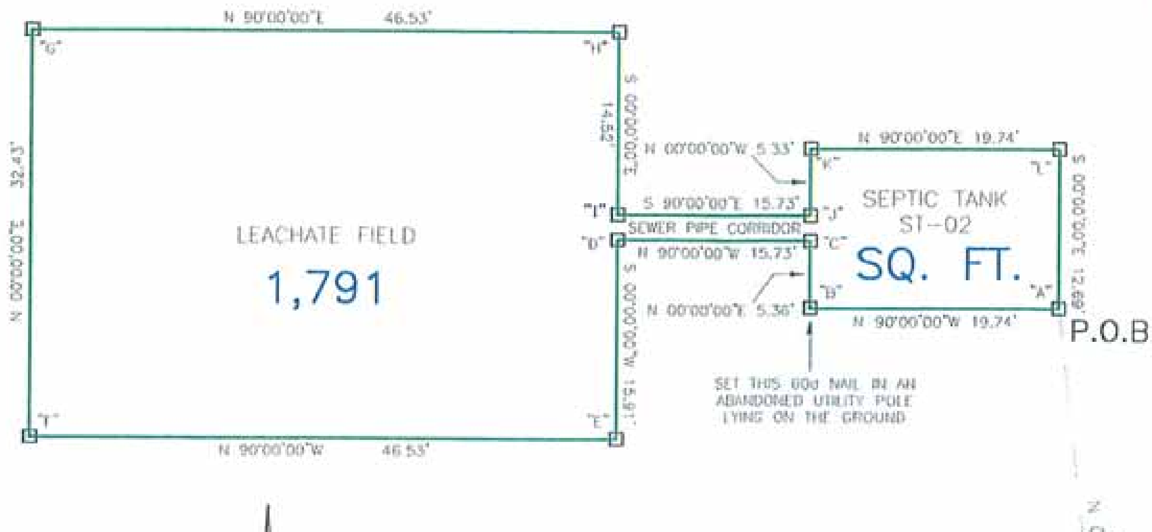
Tom A. Fidler, R.P.L.S. Number 3940

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999895423B & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



COORDINATE TABLE

Point	North	East
A	6959249.790	3314202.020
B	6959249.790	3314182.280
C	6959255.150	3314182.280
D	6959255.150	3314166.552
E	6959239.240	3314166.552
F	6959239.240	3314120.022
G	6959271.670	3314120.022
H	6959271.670	3314166.552
I	6959257.150	3314166.552
J	6959257.150	3314182.280
K	6959262.480	3314182.280
L	6959262.480	3314202.020

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- ☐ INDICATES 60d NAIL (SET)
- O INDICATES UNMARKED POINT

SCALE 1"=10'

NOTE

THE BOUNDARY OF ST-02, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-02
WITH LEACHATE FIELD
(1,791 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	J.PTS J.LEG
10/26/2009	0908074J.DWG	DRAWN BY JTJ

00864028

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-03, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,784 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-03, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-1" referenced above,

THENCE N 24deg50'41"E 537.01' to a 60d nail set for the Southmost South corner of this tract and this POINT OF BEGINNING,

THENCE N 35deg57'31"W 30.43' along a S.W. B.L. of this tract to a 60d nail set for a South reentrant corner of this tract,

THENCE S 54deg02'29"W 1.92' along a S.E. B.L. of this tract to a 60d nail set for a South corner of this tract,

THENCE N 38deg10'26"W 12.26' along a S.W. B.L. of this tract to a 60d nail set for a South reentrant corner of this tract,

THENCE S 50deg49'08"W 5.10' along a S.E. B.L. of this tract to a 60d nail set for this tract's Northmost South corner, THENCE N 39deg10'52"W 19.74' along a S.W. B.L. of this tract to a 60d nail set for this tract's Westmost corner,

THENCE N 50deg49'08"E 12.69' along a N.W. B.L. of this tract to a 60d nail set for this tract's Westmost North corner,

THENCE S 39deg10'52"E 19.74' along a N.E. B.L. of this tract to a 60d nail set for this tract's Westmost East corner,

THENCE S 50deg49'08"W 5.58' along a S.E. B.L. of this tract to a 60d nail set for this tract's East reentrant corner,

THENCE S 38deg10'26"E 10.37' along a N.E. B.L. of this tract to a 60d nail set for this tract's North reentrant corner,

THENCE N 54deg02'29"E 46.53' along a N.W. B.L. of this tract to a 60d nail set for this tract's Eastmost North corner,

THENCE S 35deg57'31"E 32.43' along a N.E. B.L. of this tract to a 60d nail set for this tract's Eastmost East corner,

THENCE S 54deg02'29"W 46.53' along a S.E. B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,784 square feet, more or less.

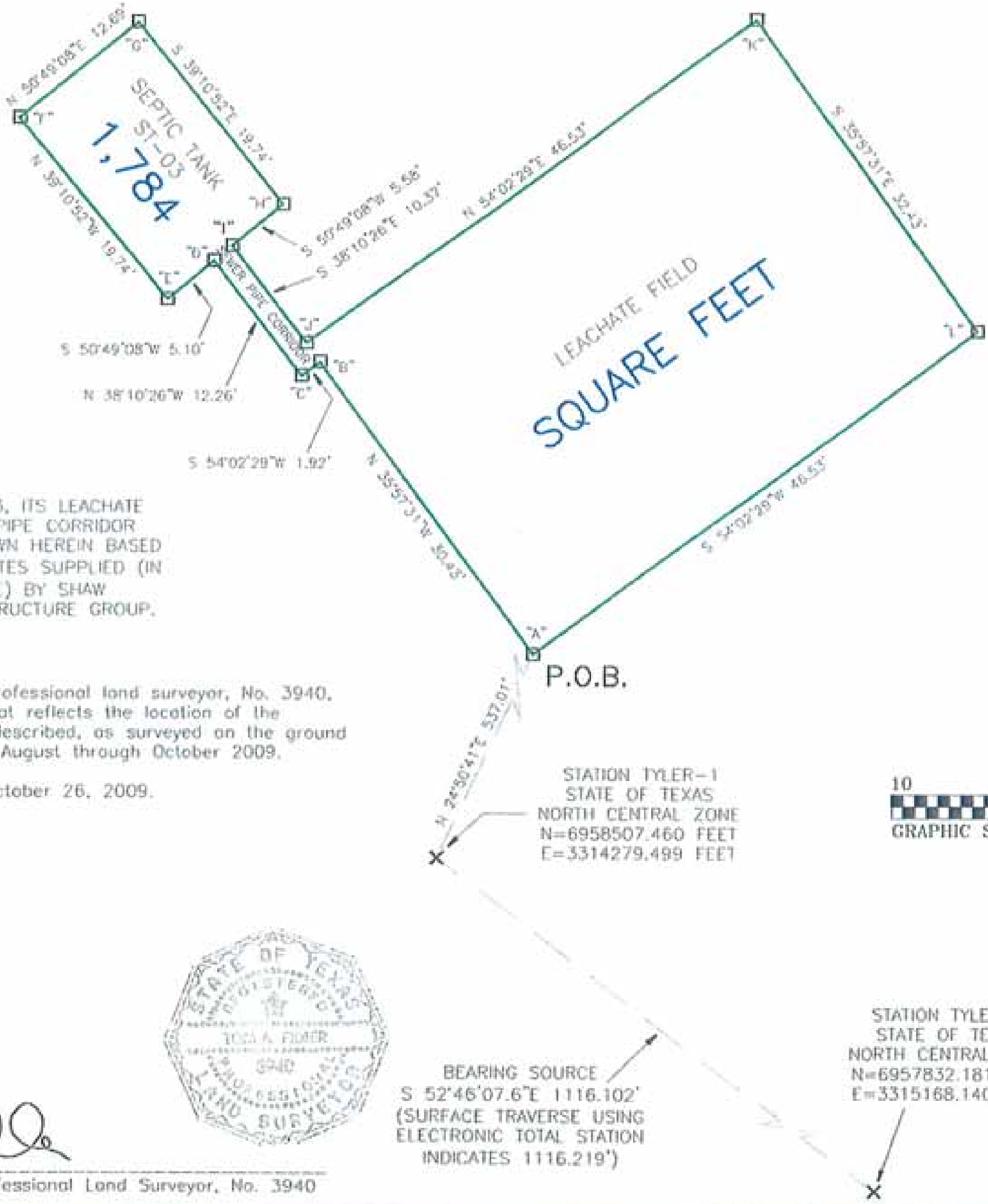
I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



NOTE

THE BOUNDARY OF ST-03, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES:

- X INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
- ☐ INDICATES 60d NAIL (SET)
- o INDICATES UNMARKED POINT

COORDINATE TABLE

Point	North	East
A	6958994.769	3314505.128
B	6959019.400	3314487.259
C	6959018.270	3314485.702
D	6959027.905	3314478.127
E	6959024.680	3314474.170
F	6959039.982	3314461.699
G	6959047.999	3314471.535
H	6959032.697	3314484.007
I	6959029.169	3314479.676
J	6959021.019	3314486.085
K	6959048.342	3314523.748
L	6959022.091	3314542.791

N

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-03
WITH LEACHATE FIELD
(1,784 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	K.PTS K.LEG
10/26/2009	0908074K.DWG	DRAWN BY JTJ

00864031

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-04, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,789 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-04, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-1" referenced above,

THENCE S 64deg44'32"W 426.66' to a 60d nail set for the Southmost S.E.C. of this tract and this POINT OF BEGINNING,

THENCE N 89deg51'08"W 32.43' along a S.B.L. of this tract to a 60d nail set for this tract's Southmost S.W.C. ,

THENCE N 00deg08'52"E 46.53' along a W.B.L. of this tract to a 60d nail set for this tract's Southmost N.W.C. ,

THENCE S 89deg51'08"E 14.56' along a N.B.L. of this tract to a 60d nail set for this tract's Northwest reentrant corner,

THENCE N 00deg00'00"W 14.73' along a W.B.L. of this tract to a 60d nail set for this tract's Southwest reentrant corner, THENCE N 89deg42'35"W 5.65' along a S.B.L. of this tract to a 60d nail set for this tract's Northmost S.W.C. ,

THENCE N 00deg17'25"E 19.74' along a W.B.L. of this tract to a concrete nail with head dimple set (in old asphalt) for this tract's Northmost N.W.C. ,

THENCE S 89deg42'35"E 12.69' along a N.B.L. of this tract to a 60d nail set for this tract's Northmost N.E.C. ,

THENCE S 00deg17'25"W 19.74' along an E.B.L. of this tract to a 60d nail set for this tract's Northmost S.E.C. ,

THENCE N 89deg42'35"W 5.04' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

THENCE S 00deg00'00"E 14.73' along an E.B.L. of this tract to a 60d nail set for this tract's Northeast reentrant corner,

THENCE S 89deg51'08"E 15.87' along a N.B.L. of this tract to a 60d nail set for this tract's Southmost N.E.C. ,

THENCE S 00deg08'52"W 46.53' along an E.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,789 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864034

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS

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PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

NOTE

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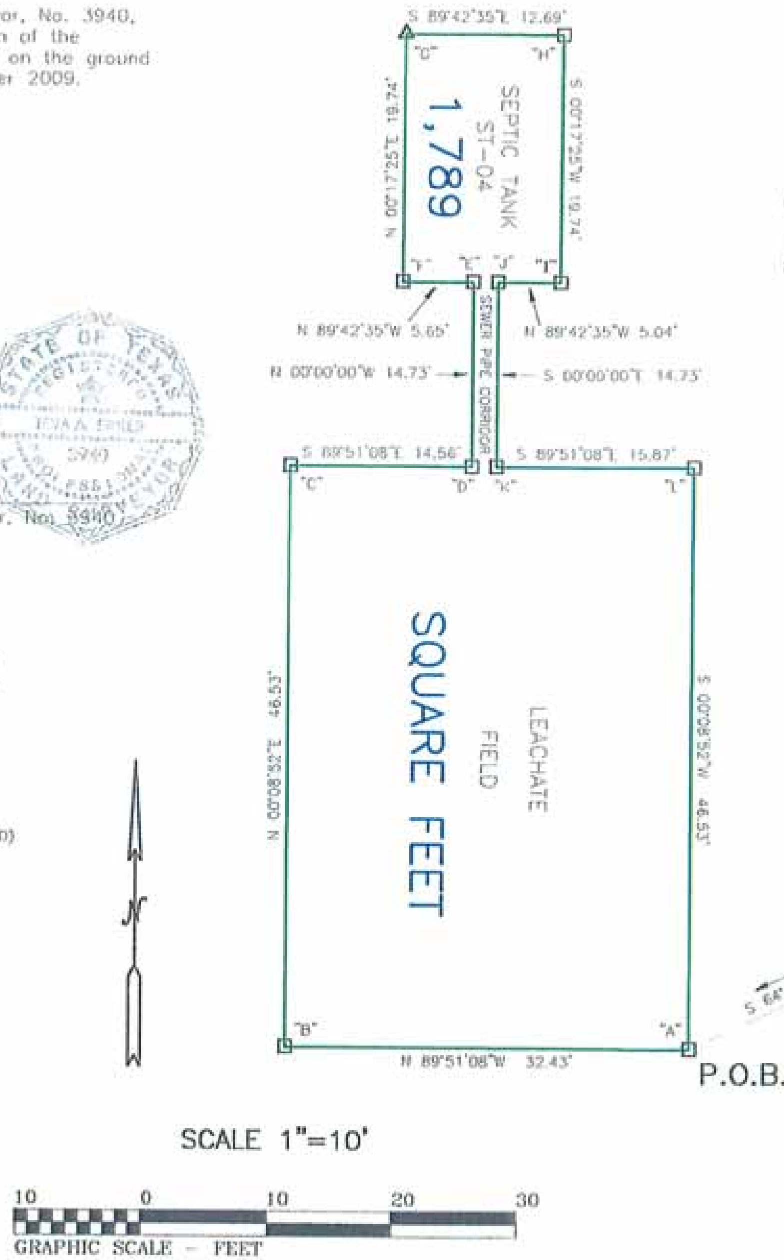
NOTE

THE BOUNDARY OF ST-04, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.



COORDINATE TABLE

Point	North	East
A	6958325.408	3313893.629
B	6958325.492	3313861.199
C	6958372.022	3313861.319
D	6958371.984	3313875.880
E	6958386.716	3313875.880
F	6958386.744	3313870.230
G	6958406.484	3313870.330
H	6958406.420	3313883.020
I	6958386.680	3313882.920
J	6958386.706	3313877.880
K	6958371.979	3313877.880
L	6958371.938	3313893.749

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 1116.219')

NOTES:

- X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES 60d NAIL (SET)
- △ INDICATES CONCRETE NAIL WITH HEAD DIMPLE (SET)

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-04
WITH LEACHATE FIELD
(1,789 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	1.PTS 1.LEG
10/26/2009	09080741.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF SEPTIC TANK ST-05, ITS LEACHATE FIELD, AND A 2' WIDE CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,825 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-05, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE N 52deg46'07.6"W 36.82' to a point, said point being S 52deg46'07.6"E 1079.28' from said monument "TYLER-1" ,

THENCE S 37deg13'52"W 81.68' to a 60d nail set for the Northmost East corner of this tract and this POINT OF BEGINNING ,

THENCE S 33deg39'28"W 12.69' along a S.E. B.L. of this tract to a 60d nail set for this tract's Northmost South corner,

THENCE N 56deg20'32"W 17.74' along a S.W. B.L. of this tract to a chisled "X" set in concrete for this tract's South reentrant corner,

THENCE S 36deg51'06"W 32.79' along a S.E. B.L. of this tract to a 60d nail set for this tract's East reentrant corner, THENCE S 57deg33'12"E 44.52' along a N.E. B.L. of this tract to a 60d nail set for this tract's Southmost East corner,

THENCE S 32deg26'48"W 32.43' along a S.E. B.L. of this tract to a 60d nail set for this tract's Southmost South corner,

THENCE N 57deg33'12"W 46.53' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

THENCE N 32deg26'48"E 32.43' along a N.W. B.L. of this tract to a 60d nail set for deflection corner,

THENCE N 36deg51'06"E 32.84' along a N.W. B.L. of this tract to a chisled "X" set in concrete for deflection corner,

THENCE N 33deg39'28"E 12.69' along a N.W. B.L. of this tract to a 60d nail set for this tract's North corner,

THENCE S 56deg20'32"E 19.74' along a N.E. B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,825 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

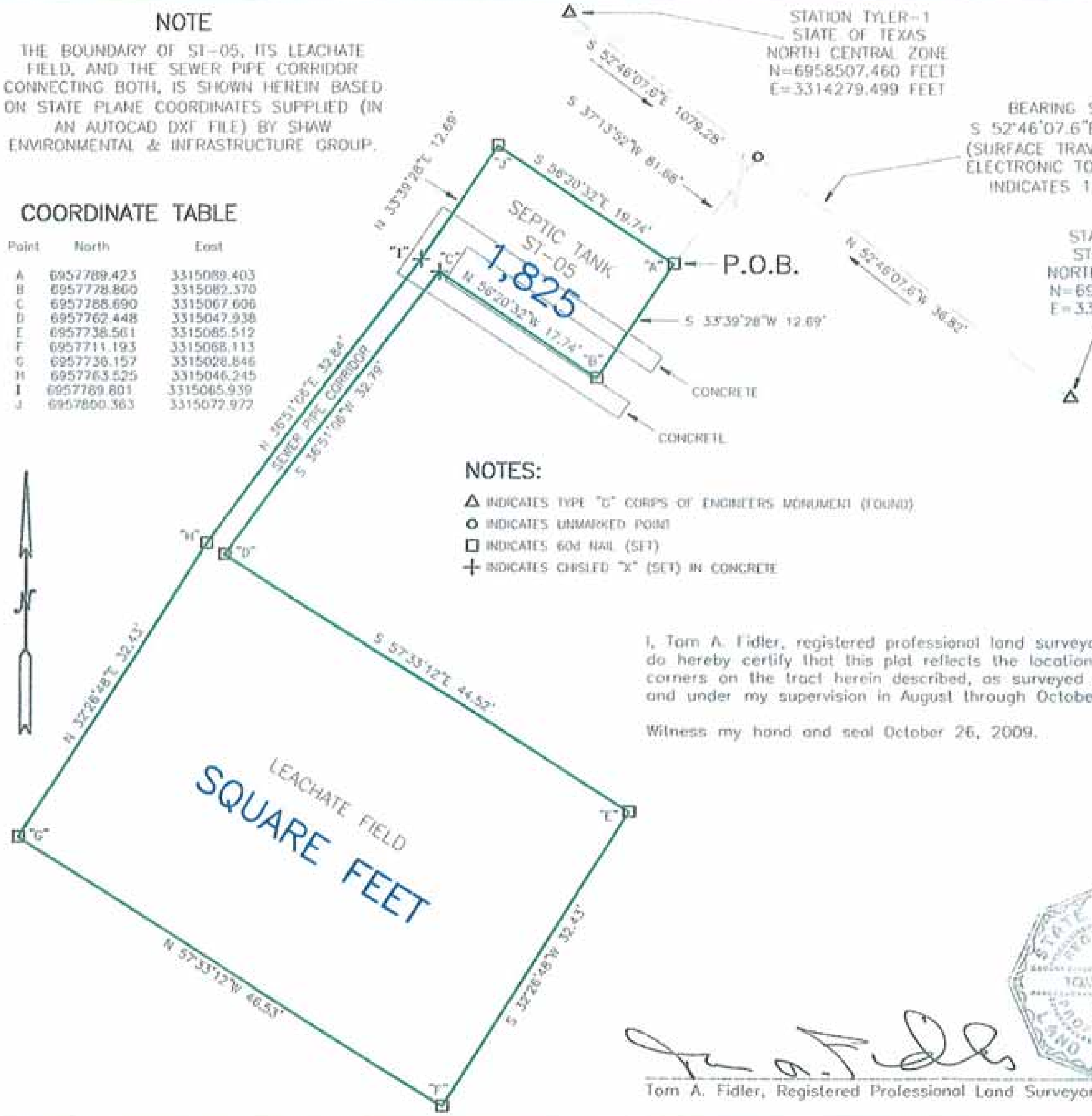
Tom A. Fidler, R.P.L.S. Number 3940

NOTE

THE BOUNDARY OF ST-05, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6957789.423	3315089.403
B	6957778.860	3315082.370
C	6957788.690	3315067.606
D	6957762.448	3315047.938
E	6957738.561	3315085.512
F	6957711.193	3315068.113
G	6957736.157	3315028.846
H	6957763.525	3315046.245
I	6957789.801	3315065.939
J	6957800.363	3315072.977



NOTES:

- △ INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
- O INDICATES UNMARKED POINT
- □ INDICATES 60d NAIL (SET)
- + INDICATES CHISLED "X" (SET) IN CONCRETE

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SEPTIC TANK ST-05
WITH LEACHATE FIELD
(1,825 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	LPTS LLEG
10/26/2009	0908074L.DWG	DRAWN BY JTJ

00864037

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-06, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,800 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-06, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 85deg57'52"E 1425.64' to a 60d nail set for the Northmost N.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 67deg08'12"E 12.69' along a N.B.L. of this tract to a 60d nail set for this tract's Northmost N.E.C. ,

THENCE S 22deg51'48"E 19.74' along an E.B.L. of this tract to a 60d nail set for this tract's Northmost S.E.C. ,

THENCE S 67deg08'12"W 4.97' along a S.B.L. of this tract to a 60d nail set for this tract's S.E. reentrant corner,

THENCE S 22deg49'50"E 19.87' along an E.B.L. of this tract to a 60d nail set for this tract's N.E. reentrant corner,

THENCE N 64deg30'12"E 16.55' along a N.B.L. of this tract to a

60d nail set for this tract's Southmost N.E.C. ,

THENCE S 25deg29'48"E 46.53' along an E.B.L. of this tract to a 60d nail set for this tract's Southmost S.E.C. ,

THENCE S 64deg30'12"W 32.43' along a S.B.L. of this tract to a 60d nail set for this tract's Southmost S.W.C. ,

THENCE N 25deg29'48"W 46.53' along a W.B.L. of this tract to a 60d nail set for this tract's Southmost N.W.C. ,

THENCE N 64deg30'12"E 13.88' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

THENCE N 22deg49'50"W 19.96' along a W.B.L. of this tract to a 60d nail set for this tract's S.W. reentrant corner,

THENCE S 67deg08'12"W 5.72' along a S.B.L. of this tract to a 60d nail set for this tract's Northmost S.W.C. ,

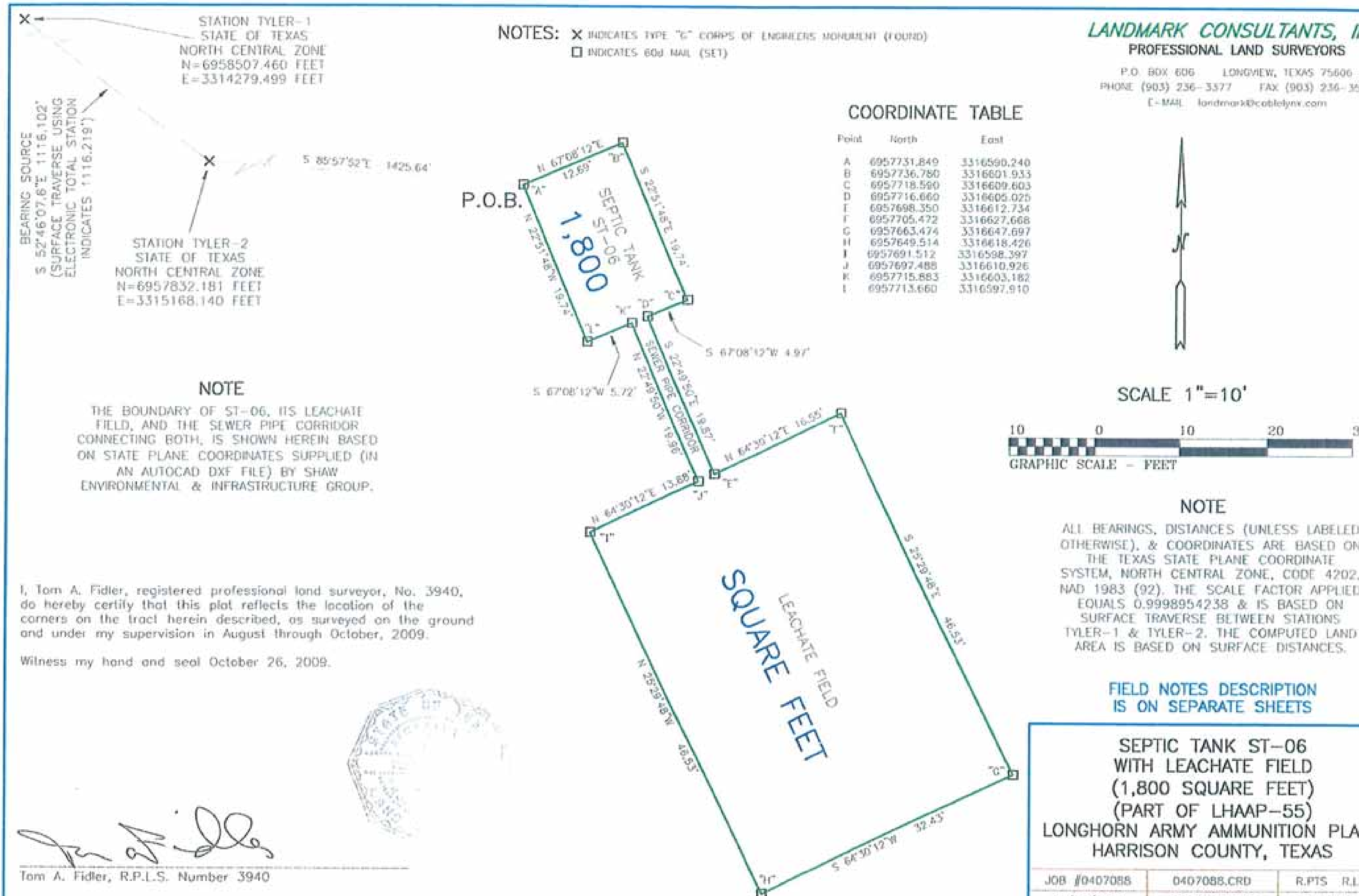
THENCE N 22deg51'48"W 19.74' along a W.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,800 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864040



NOTES: × INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

COORDINATE TABLE

Point	North	East
A	6957731.849	3316590.240
B	6957736.780	3316601.933
C	6957718.590	3316609.603
D	6957716.660	3316605.025
E	6957698.350	3316612.734
F	6957705.472	3316627.668
G	6957663.474	3316647.697
H	6957649.514	3316618.426
I	6957691.512	3316598.397
J	6957697.488	3316610.926
K	6957715.883	3316603.182
L	6957713.660	3316597.910

NOTE

THE BOUNDARY OF ST-06, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, R.P.L.S. Number 3940

SEPTIC TANK ST-06
WITH LEACHATE FIELD
(1,800 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	R.PTS R.LEG
10/26/2009	0908074R.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-07, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,865 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-07, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 20deg14'47"E 467.25' to a 60d nail set for the N.E.C. corner of this tract and this POINT OF BEGINNING ,

THENCE S 13deg37'37"E 32.43' along an E.B.L. of this tract to a 60d nail set for this tract's S.E.C. ,

THENCE S 76deg22'23"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's S.W.C. ,

THENCE N 13deg37'37"W 14.74' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost reentrant corner,

THENCE S 77deg04'57"W 23.21' along a S.B.L. of this tract to a 60d nail set for a somewhat reentrant corner of this tract,

THENCE S 29deg56'20"W 28.62' along a S.E. B.L. of this tract to a 60d nail set for this tract's Southmost reentrant corner,

THENCE S 54deg24'06"E 5.82' along a N.E. B.L. of this tract to a 60d nail set for this tract's East corner,

THENCE S 35deg35'54"W 19.74' along a S.E. B.L. of this tract to a 60d nail set for this tract's South corner,

THENCE N 54deg24'06"W 12.69' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

THENCE N 35deg35'54"E 19.74' along a N.W. B.L. of this tract to a 60d nail set for this tract's North corner,

THENCE S 54deg24'06"E 4.86' along a N.E. B.L. of this tract to a 60d nail set for this tract's Westmost reentrant corner,

THENCE N 29deg56'20"E 29.29' along a N.W. B.L. of this tract to a 60d nail set for this tract's Southmost N.W.C. ,

THENCE N 77deg04'57"E 24.06' along a N.B.L. of this tract to a 60d nail set for this tract's Northmost reentrant corner,

THENCE N 13deg37'37"W 15.69' along a W.B.L. of this tract to a 60d nail set for this tract's Northmost N.W.C. ,

THENCE N 76deg22'23"E 46.53' along a N.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,865 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864043

LANDMARK CONSULTANTS, INC.

PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES: X INDICATES TYPE "D" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

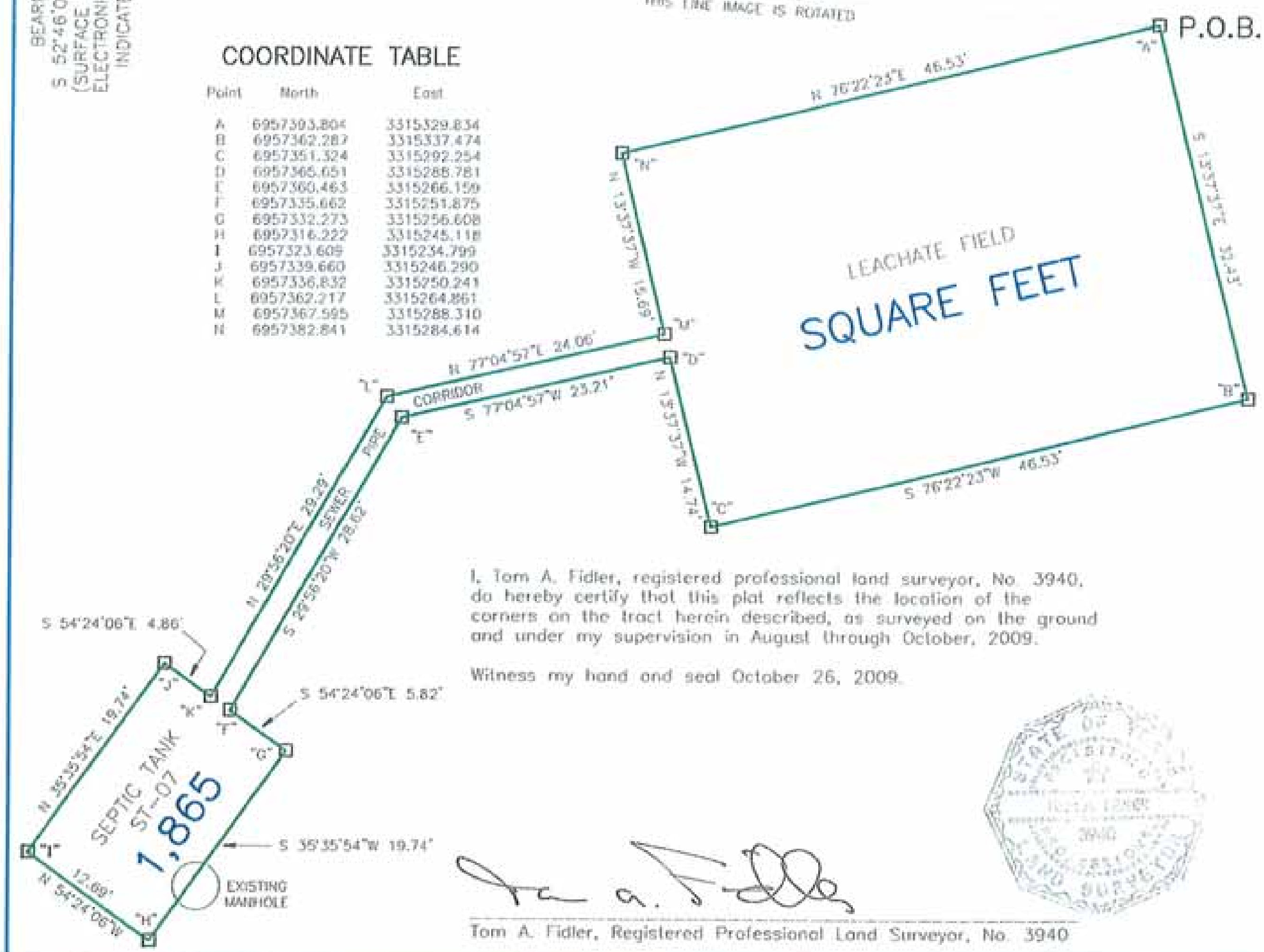
BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

NOTE

THE BOUNDARY OF ST-07, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6957393.804	3315329.834
B	6957362.287	3315337.474
C	6957351.324	3315292.254
D	6957365.651	3315288.781
E	6957360.463	3315266.159
F	6957335.662	3315251.875
G	6957332.273	3315256.608
H	6957316.222	3315245.118
I	6957323.609	3315234.799
J	6957339.660	3315246.290
K	6957336.832	3315250.241
L	6957362.217	3315264.861
M	6957367.595	3315288.310
N	6957382.841	3315284.614



SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

SEPTIC TANK ST-07
WITH LEACHATE FIELD
(1,865 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	M.PTS M.LEG
10/26/2009	0908074M.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF SEPTIC TANK ST-08, ITS LEACHATE FIELD, AND A 2' WIDE CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,785 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-08, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 37deg52'57"E 620.24' to a 60d nail set for the Northmost N.E.C. corner of this tract and this POINT OF BEGINNING,

THENCE S 16deg08'12"E 46.53' along an E.B.L. of this tract to a 60d nail set for this tract's Eastmost S.E.C. ,

THENCE S 73deg51'48"W 32.43' along a S.B.L. of this tract to a 60d nail set for slight deflection corner,

THENCE S 70deg49'57"W 12.79' along a S.B.L. of this tract to a 60d nail set for this tract's Southmost reentrant corner,

THENCE S 17deg16'09"E 6.37' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. , THENCE S 72deg43'51"W 19.74' along a S.B.L. of this tract to a 60d nail set for this tract's only S.W.C. ,

THENCE N 17deg16'09"W 12.69' along a W.B.L. of this tract to a chisled "X" set in concrete for this tract's Southmost N.W.C. ,

THENCE N 72deg43'51"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Southmost N.E.C. ,

THENCE S 17deg16'09"E 4.32' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost reentrant corner,

THENCE N 70deg49'57"E 12.83' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost reentrant corner,

THENCE N 16deg08'12"W 44.52' along a W.B.L. of this tract to a 60d nail set for this tract's Northmost N.W.C. ,

THENCE N 73deg51'03"E 32.43' along a N.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,785 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864046

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
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PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

S 37°52'57"E 620.24'
THIS LINE IMAGE IS ROTATED

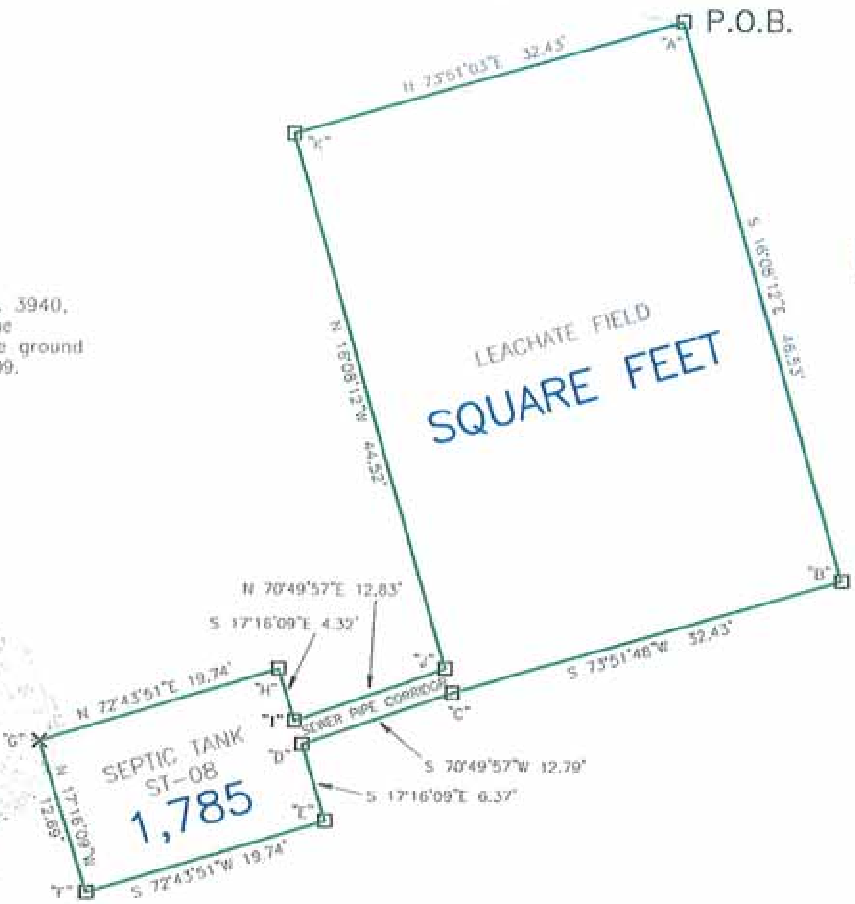
NOTES:
- o INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
- □ INDICATES 60d NAIL (SET)
- X INDICATES CHISLED "X" SET IN CONCRETE

NOTE

THE BOUNDARY OF ST-08, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6957342.644	3315548.994
B	6957297.947	3315561.926
C	6957288.934	3315530.774
D	6957284.733	3315518.689
E	6957278.050	3315520.580
F	6957272.790	3315501.730
G	6957284.908	3315497.983
H	6957290.768	3315516.813
I	6957286.644	3315518.095
J	6957290.858	3315530.217
K	6957333.624	3315517.844



SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, R.P.L.S. Number 3940

SEPTIC TANK ST-08
WITH LEACHATE FIELD
(1,785 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	N.PTS N.LEG
10/26/2009	0908074N.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-09, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 2,004 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-09, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 03deg30'04"E 1101.12' to a 60d nail set for the North corner of this tract and this POINT OF BEGINNING,

THENCE S 47deg56'14"E 12.69' along a N.E. B.L. of this tract to a 60d nail set for this tract's East corner,

THENCE S 42deg03'46"W 19.74' along a S.E. B.L. of this tract to a 60d nail set for this tract's South corner,

THENCE N 47deg56'14"W 4.08' along a S.W. B.L. of this tract to a 60d nail set for this tract's S.E. reentrant corner,

THENCE S 18deg07'53"E 120.09' along an E.B.L. of this tract to a 60d nail set for this tract's N.E. reentrant corner,

THENCE N 67deg40'46"E 15.01' along a N.B.L. of this tract to a

60d nail set for this tract's N.E.C. ,

THENCE S 22deg19'14"E 46.53' along an E.B.L. of this tract to a 60d nail set for this tract's S.E.C. ,

THENCE S 67deg40'46"W 32.43' along a S.B.L. of this tract to a 60d nail set for this tract's S.W.C. ,

THENCE N 22deg19'14"W 46.53' along a W.B.L. of this tract to a 60d nail set for this tract's N.W.C. ,

THENCE N 67deg40'46"E 15.42' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

THENCE N 18deg07'53"W 123.73' along a W.B.L. of this tract to a 60d nail set for this tract's S.W. reentrant corner,

THENCE N 47deg56'14"W 4.59' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

THENCE N 42deg03'46"E 19.74' along a N.W. B.L. of this tract to this POINT OF BEGINNING. This tract contains 2,004 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

SEPTIC TANK ST-09
WITH LEACHATE FIELD
(2,004 SQUARE FEET)
(PART OF LHAAP-55)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

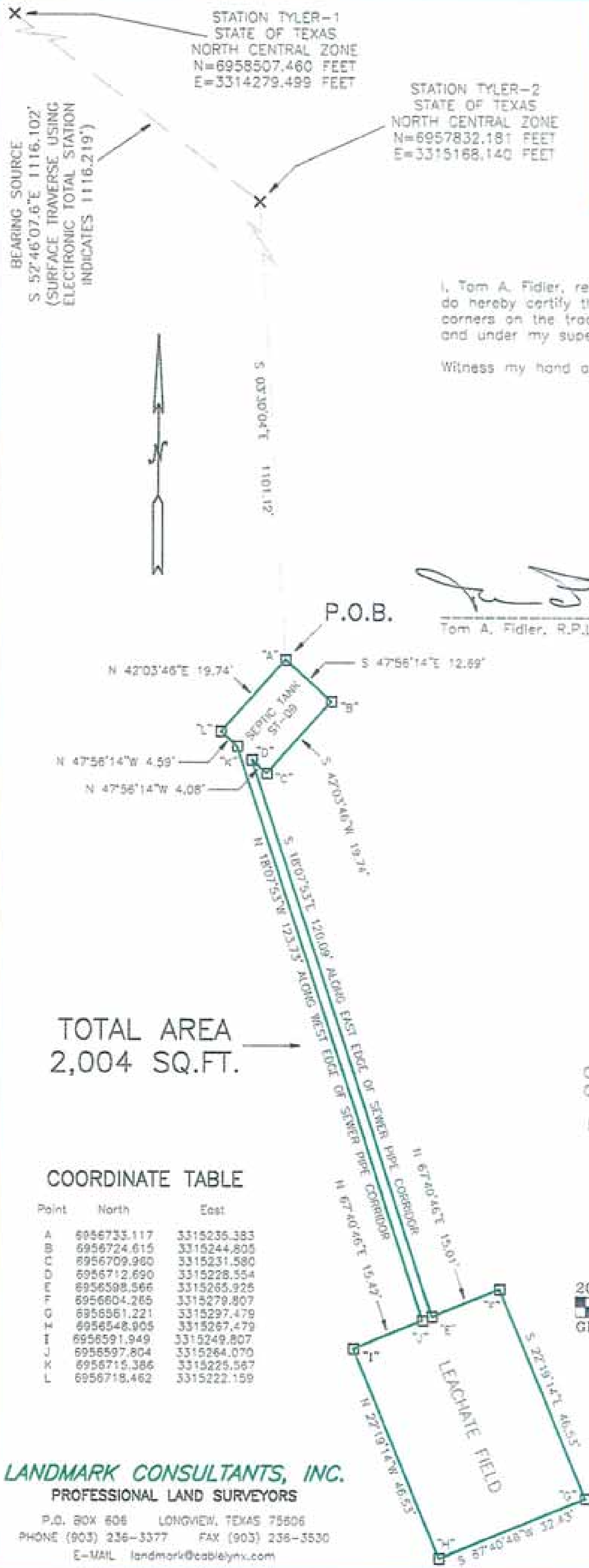
JOB #0407088	0407088.CRD	P.PTS P.LEG
10/26/2009	0908074P.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, R.P.L.S. Number 3940



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

NOTE

THE BOUNDARY OF ST-09, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

COORDINATE TABLE

Point	North	East
A	6956733.117	3315235.383
B	6956724.615	3315244.805
C	6956709.960	3315231.580
D	6956712.690	3315228.554
E	6956598.566	3315265.925
F	6956604.265	3315279.807
G	6956561.221	3315297.479
H	6956548.905	3315267.479
I	6956591.949	3315249.807
J	6956597.804	3315264.070
K	6956715.386	3315225.567
L	6956718.462	3315222.159

SCALE 1"=20'

20 0 20 40 60
GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

NOTES: X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
☐ INDICATES 60d NAIL (SET)

00864049

FIELD NOTES DESCRIPTION OF
SEPTIC TANK ST-10, ITS LEACHATE FIELD, AND A 2' WIDE
CORRIDOR CENTERED ON THE SEWER PIPE CONNECTING THE TWO

CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 1,804 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note #1: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998954238, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "TYLER-1" (N=6958507.460 feet E=3314279.499 feet) and "TYLER-2" (N=6957832.181 feet E=3315168.140 feet). Said traverse indicates a surface distance of 1116.219 feet between said monuments. The computed land area is based on surface distances.

Surveyor's Note #2: This field notes description is based on State Plane coordinates supplied by Shaw Environmental & Infrastructure Group. Landmark Consultants, Inc. has not probed the ground surface in this area in an attempt to determine the location of Septic Tank ST-10, its leachate field, or the sewer pipe connecting the two.

Commencing at monument "TYLER-2" referenced above,

THENCE S 34deg34'49"E 861.93' to a 60d nail set for the Westmost N.W.C. of this tract and this POINT OF BEGINNING,

THENCE S 81deg33'36"E 46.53' along a N.B.L. of this tract to a 60d nail set for this tract's Westmost N.E.C. ,

THENCE S 08deg26'24"W 13.21' along an E.B.L. of this tract to a 60d nail set for this tract's N.E. reentrant corner,

THENCE S 82deg30'08"E 21.87' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

THENCE N 08deg55'06"E 4.34' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C. ,

00864051

THENCE S 81deg04'54"E 19.74' along a N.B.L. of this tract to a 60d nail set for this tract's Eastmost N.E.C. ,

THENCE S 08deg55'06"W 12.69' along an E.B.L. of this tract to a 60d nail set for this tract's Eastmost S.E.C. ,

THENCE N 81deg04'54"W 19.74' along a S.B.L. of this tract to a 60d nail set for this tract's Eastmost S.W.C. ,

THENCE N 08deg55'06"E 6.34' along a W.B.L. of this tract to a 60d nail set for this tract's S.W. reentrant corner,

THENCE N 82deg30'08"W 21.85' along a S.B.L. of this tract to a 60d nail set for this tract's S.E. reentrant corner,

THENCE S 08deg26'24"W 17.22' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C. ,

THENCE N 81deg33'36"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C. ,

THENCE N 08deg26'24"E 32.43' along a W.B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,804 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

STATION TYLER-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6958507.460 FEET
E=3314279.499 FEET

STATION TYLER-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6957832.181 FEET
E=3315168.140 FEET

BEARING SOURCE
S 52°46'07.6"E 1116.102'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1116.219')

S 34°34'49"E 861.93'
THIS LINE IMAGE IS ROTATED

NOTES: X INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
□ INDICATES 60d NAIL (SET)

NOTE

THE BOUNDARY OF ST-10, ITS LEACHATE FIELD, AND THE SEWER PIPE CORRIDOR CONNECTING BOTH, IS SHOWN HEREIN BASED ON STATE PLANE COORDINATES SUPPLIED (IN AN AUTOCAD DXF FILE) BY SHAW ENVIRONMENTAL & INFRASTRUCTURE GROUP.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

COORDINATE TABLE

Point	North	East
A	6957122.525	3315657.339
B	6957115.696	3315703.365
C	6957102.631	3315701.420
D	6957099.778	3315723.106
E	6957104.070	3315723.780
F	6957101.010	3315743.281
G	6957088.473	3315741.314
H	6957091.533	3315721.813
I	6957097.802	3315722.796
J	6957100.653	3315701.133
K	6957083.617	3315698.605
L	6957090.446	3315652.579

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

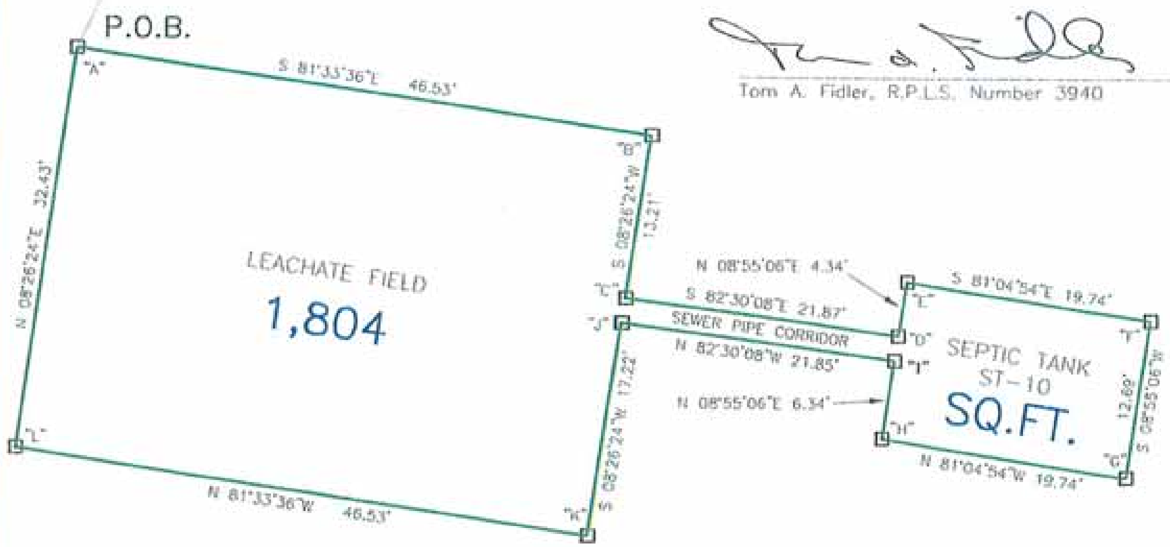
Tom A. Fidler, R.P.L.S. Number 3940

SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE - FEET

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.



FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

SEPTIC TANK ST-10 WITH LEACHATE FIELD (1,804 SQUARE FEET) (PART OF LHAAP-55) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS		
JOB #0407088	0407088.CRD	0.PTS 0.LEG
10/26/2009	09080740.DWG	DRAWN BY JTJ

00864052

LHAAP-35A(58), 58-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

00864054

Final
Remedial Design
LHAAP-35A(58), Shops Area, Group 4
Longhorn Army Ammunition Plant
Karnack, Texas

Prepared for U.S. Army Corps of Engineers – Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128

Prepared by Shaw Environmental, Inc.
1401 Enclave Parkway, Suite 250
Houston, Texas 77077

Contract No. W912QR-04-D-0027, Task Order No. DS02
Project No. 117591
Rev 0
September 2011

Shaw® a world of Solutions™

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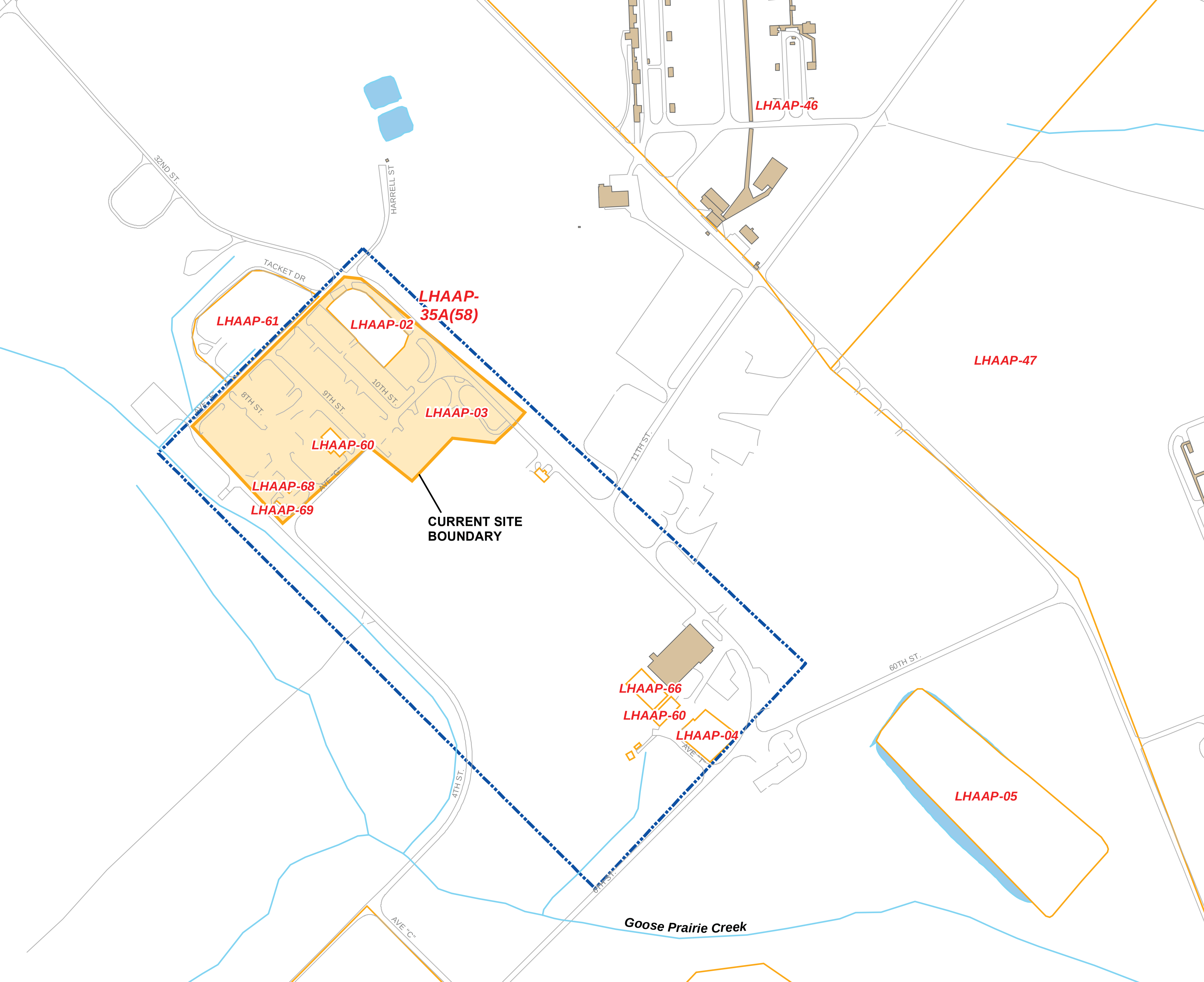

LHAAP-46
LHAAP-47
LHAAP-35A(58)
LHAAP-61
LHAAP-02
LHAAP-03
LHAAP-60
LHAAP-68
LHAAP-69
CURRENT SITE BOUNDARY
LHAAP-66
LHAAP-60
LHAAP-04
LHAAP-05
Goose Prairie Creek
32ND ST.
HARRELL ST
TACKET DR
10TH ST.
9TH ST.
8TH ST.
11TH ST.
60TH ST.
4TH ST.
6TH ST.
AVE "C"
0

00864056

2.0 LAND USE CONTROL

The objective of the LUC at LHAAP-35A(58) is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until cleanup goals are met. Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566. **Appendix A** provides sample LUC compliance certification documentation.

The LUC addresses the two groundwater plumes at LHAAP-35A(58) with levels of contamination that require implementation of a remedy (see **Section 1.3**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and Texas Commission on Environmental Quality (TCEQ) concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-35A(58) forms the basis for the remedy. The future use of the site as part of a national wildlife refuge is consistent with the industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation and will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566. Compliance with the use assumption will be documented in the five-year review reports.

4.0 LAND USE CONTROL DESIGN AND IMPLEMENTATION PLAN

This section describes the LUC design and implementation activities for LHAAP-35A(58). The activities will result in a surveyed and recorded groundwater use restriction boundary and an operation and maintenance plan for the LUC.

The objective of the LUC at LHAAP-35A(58) is to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health and ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until cleanup goals are met. Notification of the groundwater use restriction will accompany all transfer documents. The U.S. Army is responsible for long-term implementation, maintenance, inspection, reporting, and enforcement of the LUC.

The LUC will address the area of LHAAP-35A(58) that includes two groundwater plumes with levels of contamination that require implementation of a remedy (see **Section 1.3**). The Land Use Control Operation and Maintenance (LUC O&M) Plan will identify the measures required for monitoring and enforcement of the groundwater use restriction. Upon review and concurrence of this RD, the LUC O&M Plan will be coordinated with regulators, finalized, and distributed as part of the Comprehensive LUC Management Plan.

4.1 Land Use Control Implementation

The U.S. Army will undertake the following actions to implement the groundwater restriction LUC for LHAAP-35A(58):

- <u>Define the Area of the Groundwater Use Restriction.</u> The groundwater use restriction boundary will be defined based on the review of the first round of groundwater sampling data in conjunction with historic data. The extent of plume will be bounded by a buffer and may extend to natural groundwater and surface water boundaries.

- <u>Survey the LUC Boundary.</u> The proposed boundary will be finalized after all wells are installed and sampled. Concurrence by USEPA and TCEQ will be obtained, and the LUC boundary will be surveyed by a State-licensed surveyor. A legal description of the surveyed area will be appended to the survey plat.

- <u>Record the LUC in Harrison County.</u> The LUC plat, legal description and groundwater use restriction language will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566.

- Notify the Texas Department of Licensing and Regulation of the LUC. The Texas Department of Licensing and Regulation will be notified of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The survey plat, legal boundary and description of the groundwater restriction, in conjunction with a locator map, will be provided in hard and electronic copy.

- Develop the LUC O&M Plan. A LUC O&M Plan for LHAAP-35A(58) will be developed. It will include the elements presented in **Section 4.2**, the county recordation of the LUC survey plat, legal description and restriction language, and the inspection/certification form.

4.2 Land Use Control Operation and Maintenance

The U.S. Army or its representatives will be responsible for the operation and maintenance of the LHAAP-35A(58) LUC. This includes certification, reporting and enforcement activities. The U.S. Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable. To facilitate long-term operation and maintenance of the groundwater use restriction LUC remedy, the U.S. Army will develop a plan that will encompass the elements described in the following subsections.

4.2.1 Site Certification and Reporting

Beginning with finalization of this RD and approval of the inspection form, the U.S. Army will undertake inspections and certify continued compliance with the LUC objectives. The U.S. Army, or the transferee after transfer, will retain the LUC Inspection Certification documents in the project files for incorporation into the five-year review reports, and these documents will be made available to USEPA and TCEQ upon request. In addition, should any violations be found during the certification, the U.S. Army will provide to USEPA and TCEQ, along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. The need to continue certifications will be revisited at five year reviews.

4.2.2 Notice of Planned Property Conveyances

The U.S. Army shall provide notice to USEPA and TCEQ of plans to convey the LHAAP-35A(58) acreage. The notice shall describe the mechanism by which the LUC will continue to be implemented, maintained, inspected, reported, and enforced. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental document for transfer. Although the U.S. Army may transfer responsibility for various implementation actions, the U.S. Army shall retain its responsibility for remedy integrity. This means that the U.S. Army is responsible for addressing substantive violations of the LUC performance objective that would undermine the U.S. Army's CERCLA remedy. The U.S. Army also will be responsible for incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation.

4.2.3 Opportunity to Review Text of Intended Land Use Controls

U.S. Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. USEPA will also receive a copy for review. In addition, the U.S. Army will produce an ECP or other environmental document for transfer of LHAAP-35A(58), but before executing transfer, the U.S. Army will provide USEPA and TCEQ with a copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before transfer, to review all LUC-related provisions.

4.2.4 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness be Discovered Subsequent to Conveyance

Should the U.S. Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objective, the U.S. Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 4.2.5** below, the U.S. Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the U.S. Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

4.2.5 Land Use Control Enforcement

Should the LUC remedy reflected in this RD fail, the U.S. Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the United States Fish and Wildlife Service (USFWS) or its lessee, to the institution of judicial action against non-federal third-parties. Alternatively, should the circumstances warrant such, the U.S. Army could choose to exercise its response authorities under CERCLA. Should the U.S. Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the U.S. Army may notify those agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUC.

4.2.6 Modification or Termination of Land Use Controls

The U.S. Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objective. Likewise, the U.S. Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the U.S. Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

The LUC shall remain in effect until such time as the U.S. Army and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUC will be terminated as needed. The decision to terminate the LUC will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the U.S. Army and USEPA has been made to terminate the LUC, the U.S. Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

4.2.7 Comprehensive Land Use Control Management Plan

Upon finalization of the LUC O&M Plan, a copy will be inserted into the Comprehensive LUC Management Plan for Longhorn. The Comprehensive LUC Management Plan figure and table will be updated to reflect the inclusion of LHAAP-35A(58).

The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document will be provided to USEPA and TCEQ, and is also accessible to the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record.

The land use assumption of industrial use as part of a national wildlife refuge forms the basis for the remedy at LHAAP-35A(58) and this land use assumption will be included in the Comprehensive LUC Management Plan with supporting documentation.

00864062

LHAAP-35A(58), 58-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-35A (58) FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864063

2015-000002402

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 03/16/2015 11:17 AM	
Document Number: 2015-000002402	
Receipt No: 1502837	
Amount: $ 50.00	
By: Denise Kio, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT · COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
112 E. PECAN ST,STE 400
FED-EX ENVELOPE
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-35A (58)

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-35A (58) (Shops Area). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-35A (58) were performed in accordance with the FFA requirements.

The Shops Area now designated as LHAAP-35A (58) was established in 1942 as part of the installation's initial construction (Shaw, 2011). The facility was used to provide plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical services. The site was active throughout LHAAP's mission and was deactivated along with the rest of the installation in 1996-1997. A Record of Decision (ROD) for LHAAP-35A (58) was signed by the U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which is separated into two areas: 1) eastern plume; and 2) western plume. The eastern plume remedy includes land use control (LUC); enhanced in-situ bioremediation (EISB) in the area of highest levels of constituents of concern (COCs) followed by monitored natural attenuation (MNA). The western plume remedy consists of LUC and MNA. The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-35A (58) is required to prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-35A (58) parcel is a 11-acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Associated with the LHAAP-35A (58) parcel is designated a LUC boundary which is a 46.524-acre tract, more or less, as described in Exhibit A. The LUC boundary is also presented in the attached Figure 1. Contained within the LHAAP-35A (58) LUC boundary are sites LHAAP-02, LHAAP-03, LHAAP-56, LHAAP-59, LHAAP-60, LHAAP-65, LHAAP-68 and LHAAP-69.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12. The United States Department of the Army has undertaken careful environmental study of the LHAAP-35A (58) site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 46.524-acre tract, more or less. Groundwater underlying this land is contaminated with tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE), trans-1,2-DCE, and vinyl chloride (VC) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

00864066

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the ____th day of ___________, 2015.

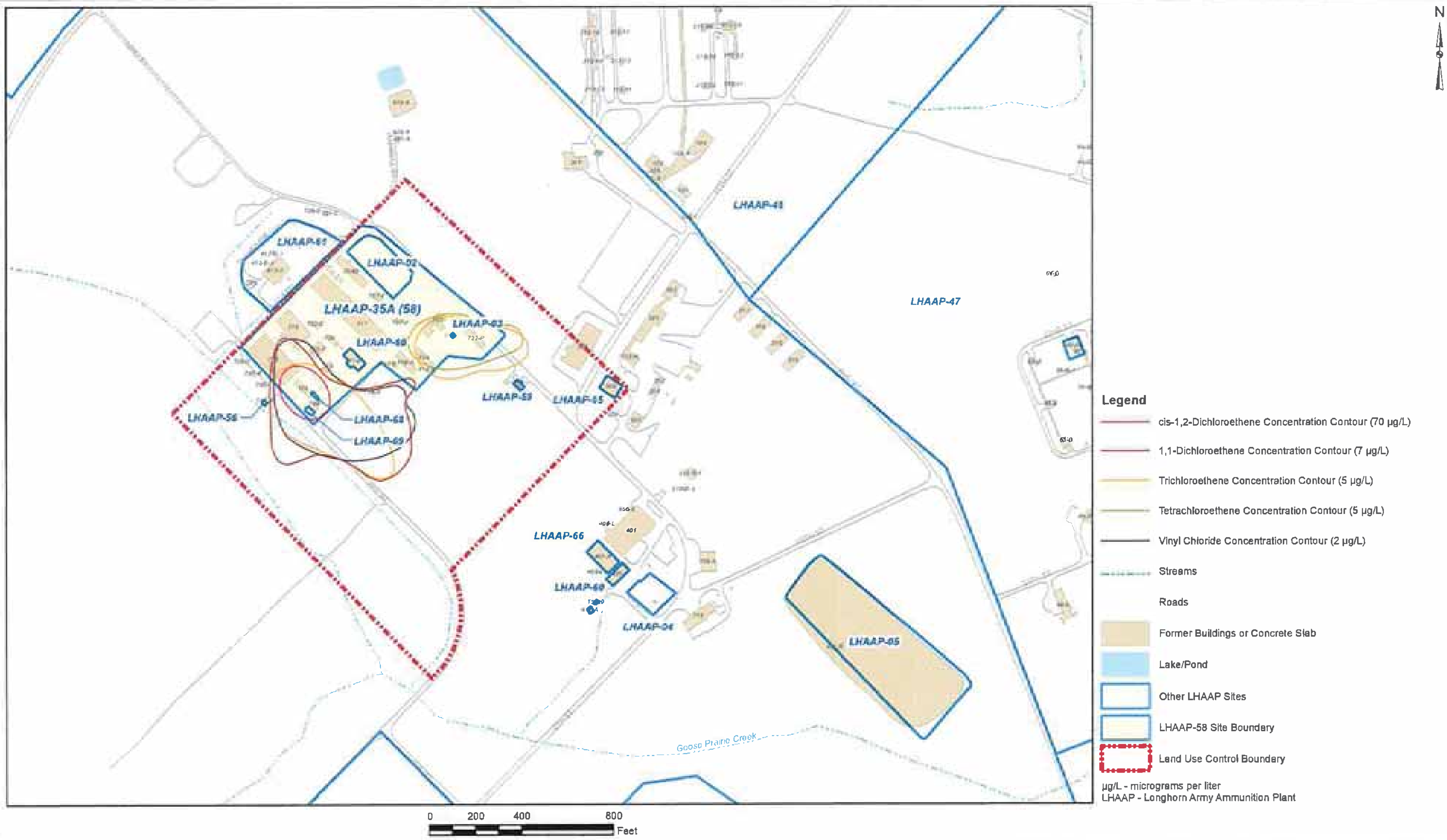
BEFORE ME, on this the 19 th day of February 2015, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 19th day of February, 2015.

Genie Warner

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
GENIE WARNER
Notary Public State of Texas
COMM. EXP. 8/1/2018



AECOM

Figure 1
Land Use Control Boundary
Remedial Action Completion Report
LHAAP-35A (58)
Longhorn Army Ammunition Plant
Karnack, Texas

60256135

January 2015

00864067

EXHIBIT A
SURVEY PLAT

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-35A(58)" Land Use Control Area being 46.524 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-35A(58)" Land Use Control Area being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.99991470929, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "HMX-5" (N=6958206.213 feet E=3305201.721 feet). Said traverse indicates a surface distance of 2567.689 feet between said monuments. The computed land area is based on State Plane distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" and "RPLS 3940" .

Commencing at monument "X-11" referenced above,

THENCE N 52deg16'47"E 216.98' to an I.R.O.P.C. set for the North corner of this tract and this POINT OF BEGINNING,

THENCE S 47deg09'34"E 1327.84' along the N.E. B.L. of this tract to an I.R.O.P.C. set for this tract's East corner,

THENCE S 44deg05'45"W 1089.57' along a S.E. B.L. of this tract to a 60d nail set (near the Easterly edge of the asphalt pavement of "4th Street") for this tract's only reentrant corner,

THENCE along a curve to the right (having a radius of 397.10' and an arc length of 496.33', being subtended by a chord of S 09deg27'29"W 464.64') defining this tract's E.B.L., said curve approximating the curved Easterly edge of the asphalt pavement of "4th Street", to a 60d nail found for the South end of said curve,

THENCE S 45deg14'57"W 21.48' along a S.E. B.L. of this tract to a point for this tract's Southmost corner, said point being N 17deg16'14"W 525.07' from the aforementioned "HMX-5" monument and S 44deg25'14"E 8.86' from a concrete nail set for reference near the centerline of the asphalt pavement of "4th Street",

THENCE N 44deg25'14"W 1614.70' along the S.W. B.L. of this tract to an I.R.O.P.C. set for this tract's West corner,

THENCE N 45deg01'15"E 1422.64' along the N.W. B.L. of this tract to this POINT OF BEGINNING, containing 46.524 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940

Witness my hand and seal this
the 21st day of January, 2015.

Tom A. Fidler, Registered Professiona

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHEF
ARE BASED ON THE TEXAS STATE PLANE COORDINA
CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE
EQUALS 0.99991470929 & IS BASED ON CALCULAT
PUBLISHED STATE PLANE COORDINATES (OF STATION
DIVIDED BY SURFACE TRAVERSE CALCULATED DISTAN
STATIONS. THE COMPUTED LAND AREA IS BASED C

COORDIN

	NORTH
A	6960866.4
B	6959963.5
C	6959181.0
D	6958722.7
E	6958707.6
F	6959860.8

LEGEND

- ○ NAIL (SET); SIZE OR TYPE AS LABELED
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- ✕ UNMARKED BOUNDARY CORNER
- —— BOUNDARY LINE OF LAND

FIELD NOT
IS ON SI

00864070

LHAAP-3
(46.5

LHAAP-35A(58), 58-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 9/30/11 for LHAAP-35A (58) a certification of site was conducted by _____________________ [indicate transferee] on __________.

A summary of land use control mechanisms is as follows:

- Groundwater restriction – A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-35A (58)]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-35A (58).

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ______________________________

Name/Title: ____

Signature: ______________________________

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-59

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-59 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2011-000003378

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

NOTICE

6 Pages

FILED AND RECORDED – OPR	**CLERKS NOTES**
On: 03/24/2011 03:52 PM	
Document Number: 2011-000003378	
Receipt No: 1103745	
Amount: $ 32.00	
By: Lauren Boyd, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AARON WILLIAMS EC-ER
1645 SOUTH 101ST EAST AVENUE

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remedial investigation of the land described herein. The site, LHAAP-59, the former Pesticide Storage Building 725, was constructed in 1984 to support maintenance activities at the plant as a pesticide storage building. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-59 is not itself considered an NPL site. Environmental activities at LHAAP-59 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-59 consists of a Building 725 and the surrounding area. The building, now removed, contained a concrete floor with floor drains that discharged to two nearby sumps. Soil samples were collected near the building and sumps and analyzed for metals, semivolatile organic compounds, volatile organic compounds, dioxins and furans in the 1990s and in 2007 additional samples were collected and analyzed for pesticides and herbicides near the sumps and at the building. Low levels of pesticides were detected. An analysis demonstrated that these chemicals in soil did not exhibit a potential for release to the groundwater in excess of the groundwater MSC (GW-Ind) and were considered to be protective for nonresidential worker exposure, as specified in 30 TAC §335.559(g)(2)(B). Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-59 parcel is a 0.2537 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-59 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-59. Contaminants in soil samples from LHAAP-59 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-59 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-59 is consistent with the non-residential use scenario evaluated in the risk screening. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

00864077

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

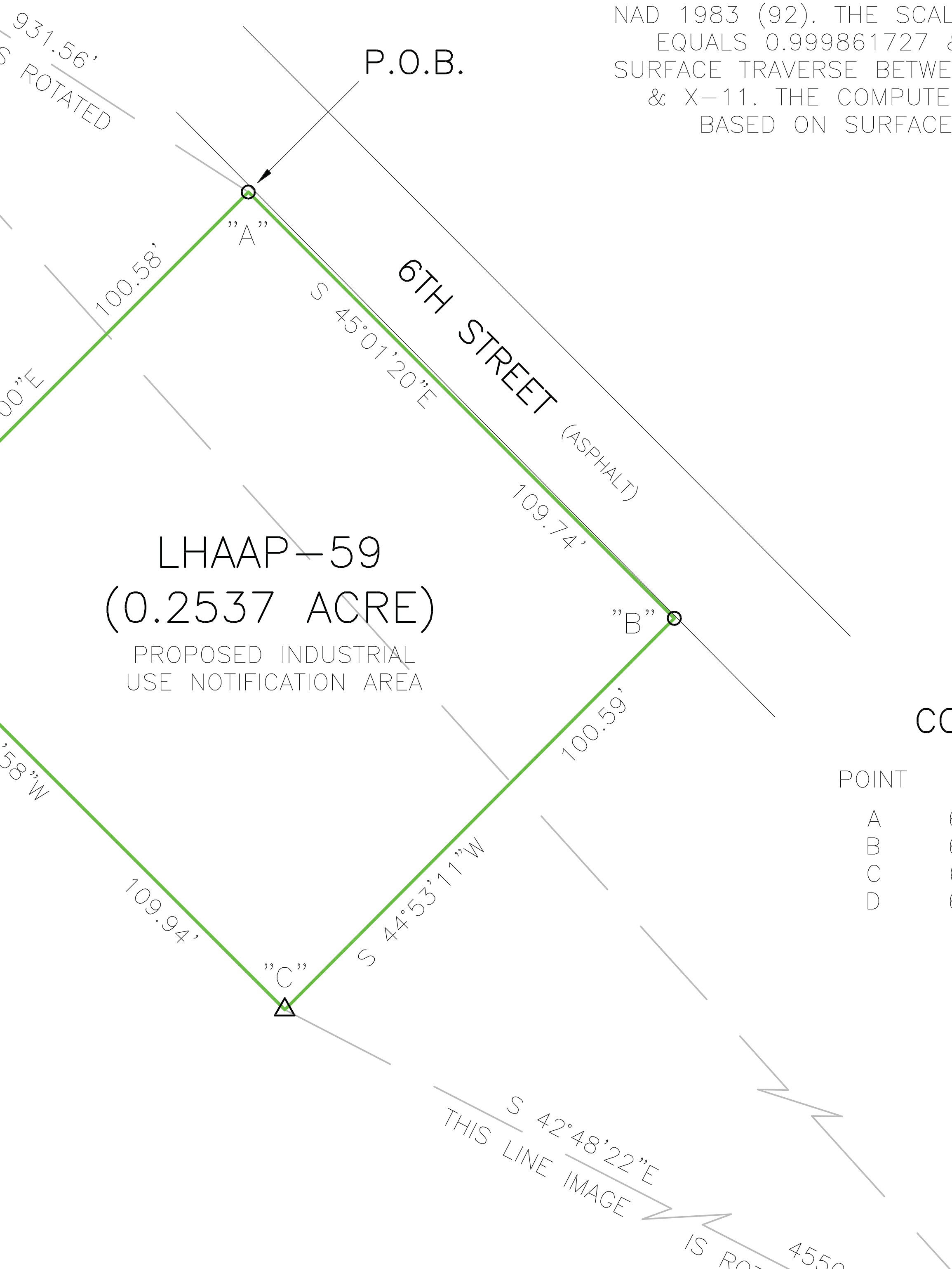
EXECUTED this the 25 th day of January, ~~2010~~ 2011.

BEFORE ME, on this the 25 th day of Jan, 2011, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 25 day of January, ~~2010~~ 2011.

Angela Humphries
Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011



OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS C-21 & X-11. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

Witness my hand and seal this the

Tom A. Fidler, Registered Professio

COORDINATE TABLE

POINT	NORTH	EAST
A	6960067.154	3305401.154
B	6959989.588	3305478.780
C	6959918.320	3305407.794
D	6959996.035	3305330.035

NOTES:

X INDICATES TYPE "G" CORPS

O INDICATES CONCRETE NAIL

△ INDICATES 1/2" IRON REB
ENGRAVED "FIDLER" & "RP

FIELD
IS ON

00864078

(

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-59" being 0.2537 acre of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-59" being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940", and the abbreviation C.N.I.B.C. indicates concrete nail in bottle cap.

Commencing at monument "X-11" referenced above,

THENCE S 44deg18'53"E 931.56' to a C.N.I.B.C. set (in the asphalt pavement of the road known as 6th Street) for the North corner of this tract and this POINT OF BEGINNING,

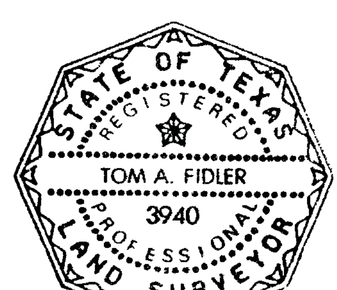
THENCE S 45deg01'20"E 109.74' along the N.E. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of the road known as 6th Street) for this tract's East corner,

THENCE S 44deg53'11"W 100.59' along the S.E. B.L. of this tract to an I.R.O.P.C. set for this tract's South corner, from which the monument "C-21" referenced above bears S 42deg48'22"E 4550.54',

THENCE N 45deg00'58"W 109.94' along the S.W. B.L. of this tract to an I.R.O.P.C. set for this tract's West corner,

THENCE N 45deg00'00"E 100.58' along the N.W. B.L. of this tract to this POINT OF BEGINNING, containing 0.2537 acre, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



LHAAP-60

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-60 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

2010-000005561

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

16 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005561	
Receipt No: 1006195	
Amount: $ 72.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-60, consisted of four pesticide storage buildings located in the steam plant and shops area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-60 is not itself considered an NPL site. Environmental activities at LHAAP-60 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-60 consisted of buildings 411, 411-A, 714, and shed TS-80, which were located in the northwestern portion of LHAAP near the steam plant and shops area in the general vicinity of sites LHAAP-02, LHAAP-04, LHAAP-35A(58), and LHAAP-66. Pesticides and herbicides were stored in the now demolished buildings. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-60 parcels include: Building 411 with 4,242 square feet, more or less, or 0.09738 acre tract; Building TS-80 with 186 square feet, more or less, or 0.00426 acre tract; Building 411-A with 484 square feet, more or less, or 0.01111 acre tract; and Building 714 with 4,468 square feet, more or less, or 0.10463 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-60 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-60. Contaminants in soil samples from LHAAP-60 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-60 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-60 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10 th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Angela Humphries

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-60A" TRACT
(FOUNDATION SLAB OF DEMOLISHED BUILDING 411)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-60A" being the concrete foundation slab of demolished Building 411, "LHAAP-60A" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60A" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1875.89' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3720.05',

(as used below, the abbreviation C.C.F.S. indicates corner of concrete foundation slab)

THENCE S 47deg55'43"W 188.47' to a C.C.F.S. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 45deg09'46"E 41.80' along the Northeast B.L. of this tract to a C.C.F.S. found for this tract's Eastmost corner,

THENCE S 44deg51'53"W 101.29' along the Southeast B.L. of this tract to a C.C.F.S. found for this tract's Southmost corner,

THENCE N 45deg07'02"W 41.95' along the Southwest B.L. of this tract to a C.C.F.S. found for this tract's Westmost corner,

THENCE N 44deg56'57"E 101.25' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 4,242 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

COORDINATE TABLE

POINT	NORTH	EAST
A	6959214.922	3305867.424
B	6959185.451	3305897.062
C	6959113.662	3305825.611
D	6959143.261	3305795.890

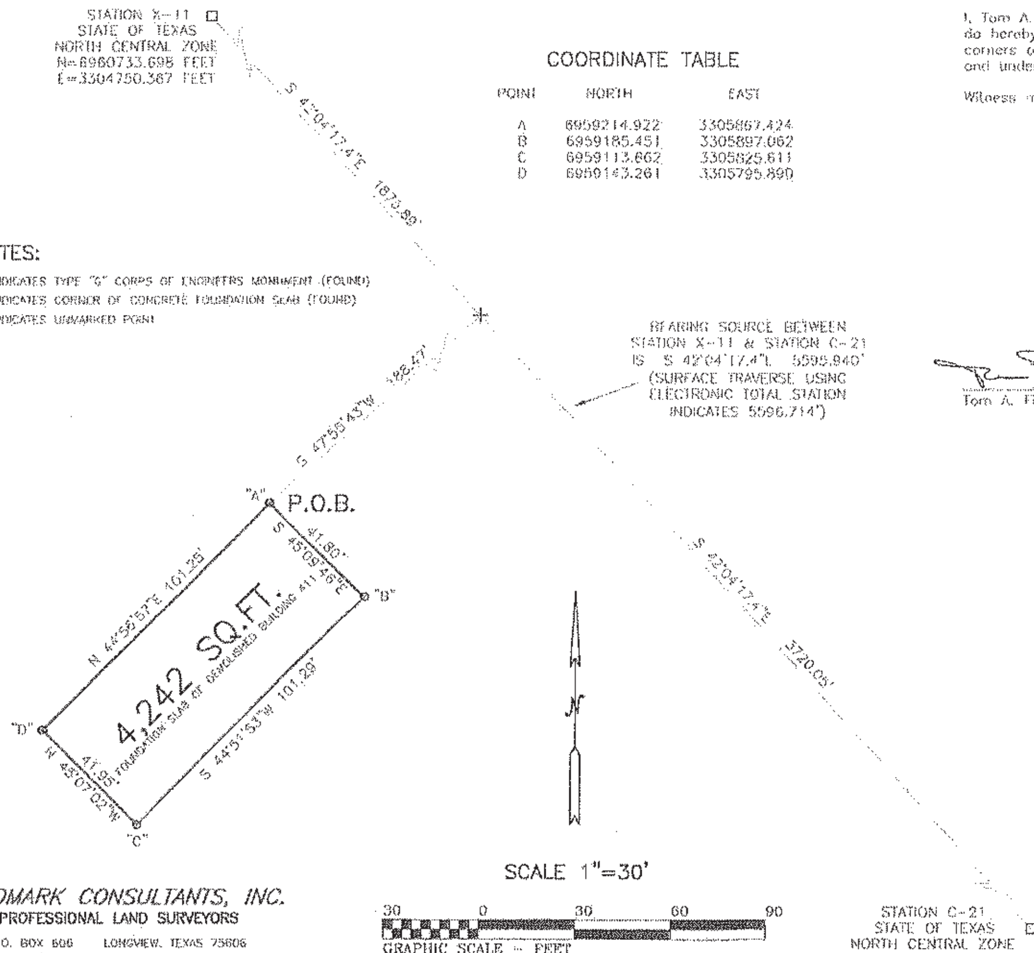
I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal September 8, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTES:

- ☐ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- o INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- + INDICATES UNMARKED POINT



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-60A
(REMAINS OF BUILDING 411)
(4,242 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	F.PTS F.LEG
SEPT. 8, 2009	0908074F.DWG	DRAWN BY JTJ

"LHAAP-60B" TRACT
(BUILDING TS-80)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, the perimeter of tract "LHAAP-60B" being defined by the four corners of the external face of the exterior walls of Building TS-80 (said Building is constructed of galvanized corrugated sheet metal), tract "LHAAP-60B" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60B" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1919.72' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3676.22',

(as used below, the abbreviation C.E.F.E.W. indicates Corner of the External Face of the Exterior Walls of Building TS-80)

THENCE S 47deg55'43"W 378.14' to a C.E.F.E.W. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 41deg54'33"E 8.55' along the Northeast B.L. of this tract to a C.E.F.E.W. found for this tract's Eastmost corner, THENCE S 48deg12'22"W 22.54' along the Southeast B.L. of this tract to a C.E.F.E.W. found for this tract's Southmost corner,

THENCE N 43deg05'46"W 7.91' along the Southwest B.L. of this tract to a C.E.F.E.W. found for this tract's Westmost corner,

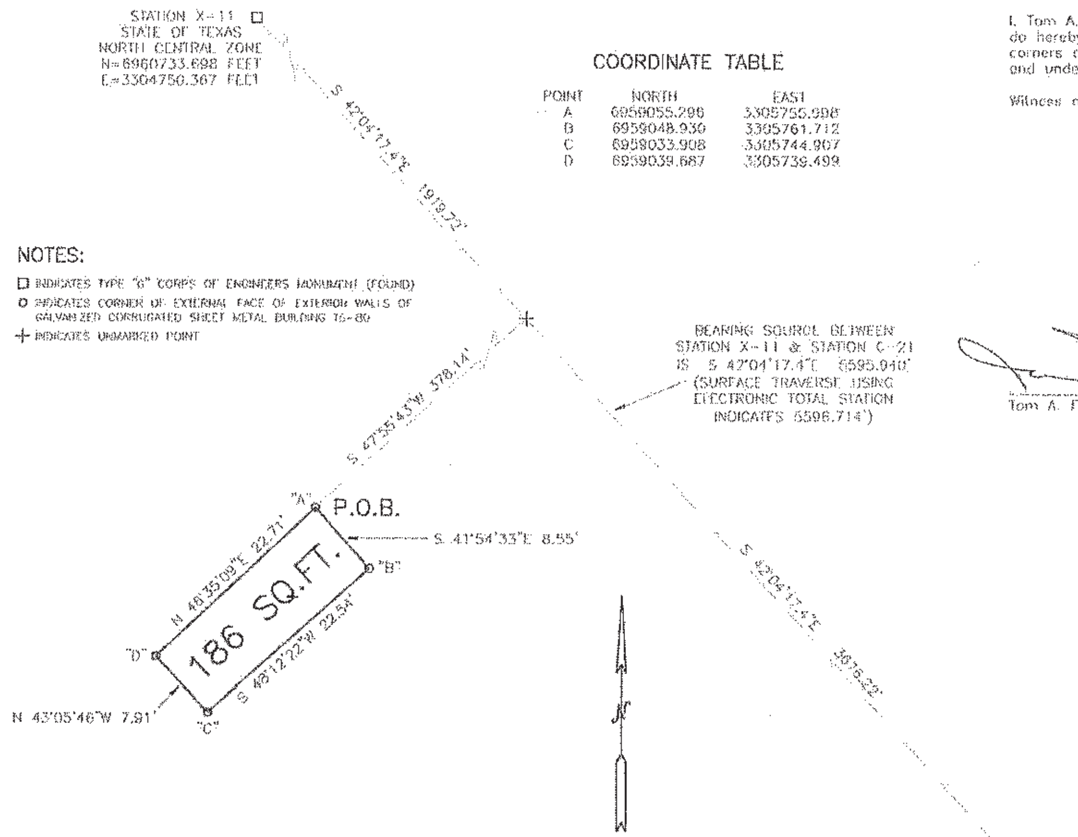
THENCE N 46deg35'09"E 22.71' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 186 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864090



SCALE 1"=10'

10 0 10 20 30
GRAPHIC SCALE – FEET

COORDINATE TABLE

POINT	NORTH	EAST
A	6959055.296	3305756.998
B	6959048.930	3305761.712
C	6959033.908	3305744.907
D	6959039.687	3305739.499

NOTES:

- ☐ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- o INDICATES CORNER OF EXTERNAL FACE OF EXTERIOR WALLS OF GALVANIZED CORRUGATED SHEET METAL BUILDING TS-80
- + INDICATES UNMARKED POINT

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal September 8, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940.

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-60B
(BUILDING TS-80)
(186 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	G.PTS G.LEG
SEPT. 8, 2009	09080746.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
"LHAAP-60C" TRACT
(FOUNDATION SLAB OF DEMOLISHED BUILDING 411-A)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-60C" being the concrete foundation slab of demolished Building 411-A, tract "LHAAP-60C" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60C" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1924.12' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3671.82',

(as used below, the abbreviation C.C.F.S. indicates corner of concrete foundation slab)

THENCE S 47deg55'43"W 418.77' to a C.C.F.S. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 28deg26'16"E 24.08' along the Northeast B.L. of this tract to a C.C.F.S. found for this tract's Eastmost corner,

00864092

THENCE S 61deg38'48"W 20.15' along the Southeast B.L. of this tract to a C.C.F.S. found for this tract's Southmost corner,

THENCE N 28deg13'40"W 24.07' along the Southwest B.L. of this tract to a C.C.F.S. found for this tract's Westmost corner,

THENCE N 61deg37'50"E 20.07' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 484 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

Tom A. Fidler, R.P.L.S. Number 3940

COORDINATE TABLE

POINT	NORTH	EAST
A	6959024.810	3305728.779
B	6959003.636	3305740.245
C	6958994.065	3305722.510
D	6959015.276	3305711.123

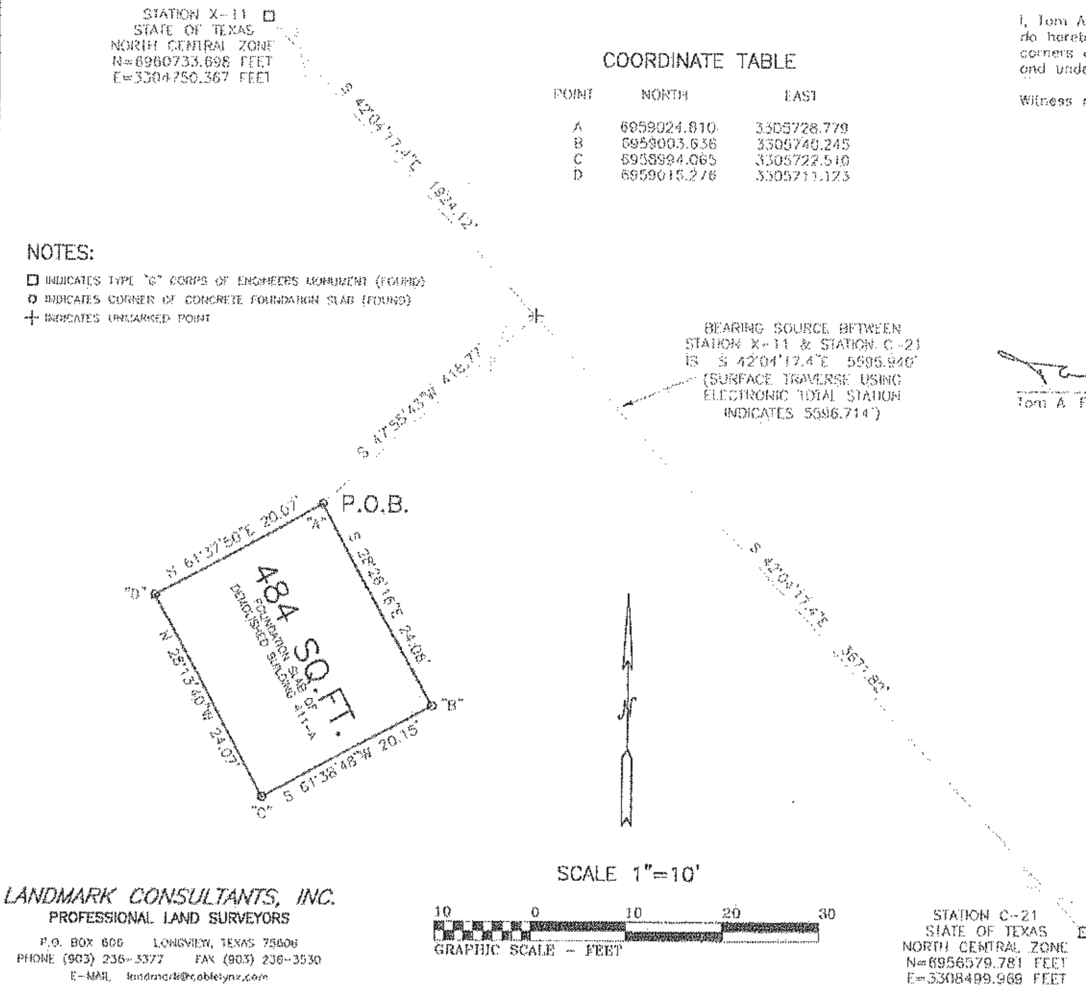
I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal September 8, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTES:

- ☐ INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
- ○ INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- + INDICATES UNMARKED POINT



NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-60C
(REMAINS OF BUILDING 411-A)
(484 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	H.PTS H.LEG
SEPT. 8, 2009	0908074H.DWG	DRAWN BY JTJ

FIELD NOTES DESCRIPTION OF
"LHAAP-60D" TRACT
(INCLUDES FOUNDATION SLAB OF DEMOLISHED BUILDING #714)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-60D" including the concrete foundation slab of demolished Building #714 plus an area adjacent to the Southwest edge of said slab, "LHAAP-60D" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-60D" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 395.512' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 5200.428'

(as used below, the abbreviation C.C.F.S. indicates corner of concrete foundation slab)

THENCE S 47deg55'43"W 442.92' to a C.C.F.S. found for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 44deg51'26"E 91.43' along the Northeast B.L. of this tract, and generally along the Northeast edge of said concrete slab, to a C.C.F.S. found for this tract's Eastmost corner,

THENCE S 44deg50'54"W 44.35' along a Southeast B.L. of this tract, and generally along the Southeast edge of said concrete slab, to a C.C.F.S. found for this tract's Southmost corner,

THENCE N 44deg59'57"W 29.43' along a Southwest B.L. of this tract, and generally along the Southwest edge of said concrete slab, to a point for this tract's Southmost reentrant corner, THENCE S 45deg00'03"W 14.90' along a Southeast B.L. of this tract to a 60d nail set for this tract's Westmost South corner,

THENCE N 44deg59'57"W 32.36' along a Southwest B.L. of this tract to a 60d nail set for this tract's Southmost West corner,

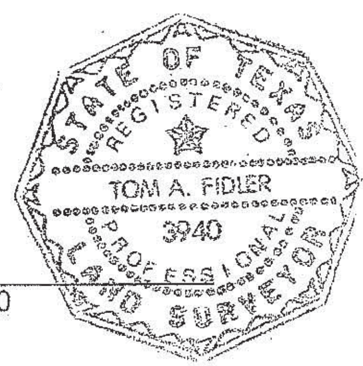
THENCE N 45deg00'03"E 14.90' along a Northwest B.L. of this tract to a point for this tract's Northmost reentrant corner,

THENCE N 44deg59'57"W 30.02' along a Southwest B.L. of this tract, and generally along the Southwest edge of said concrete slab, to a C.C.F.S. found for this tract's Northmost West corner,

THENCE N 45deg20'52"E 44.58' along a Northwest B.L. of this tract, and generally along the Northwest edge of said concrete slab, to this POINT OF BEGINNING. This tract contains 4,558 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

Tom A. Fidler, R.P.L.S. Number 3940



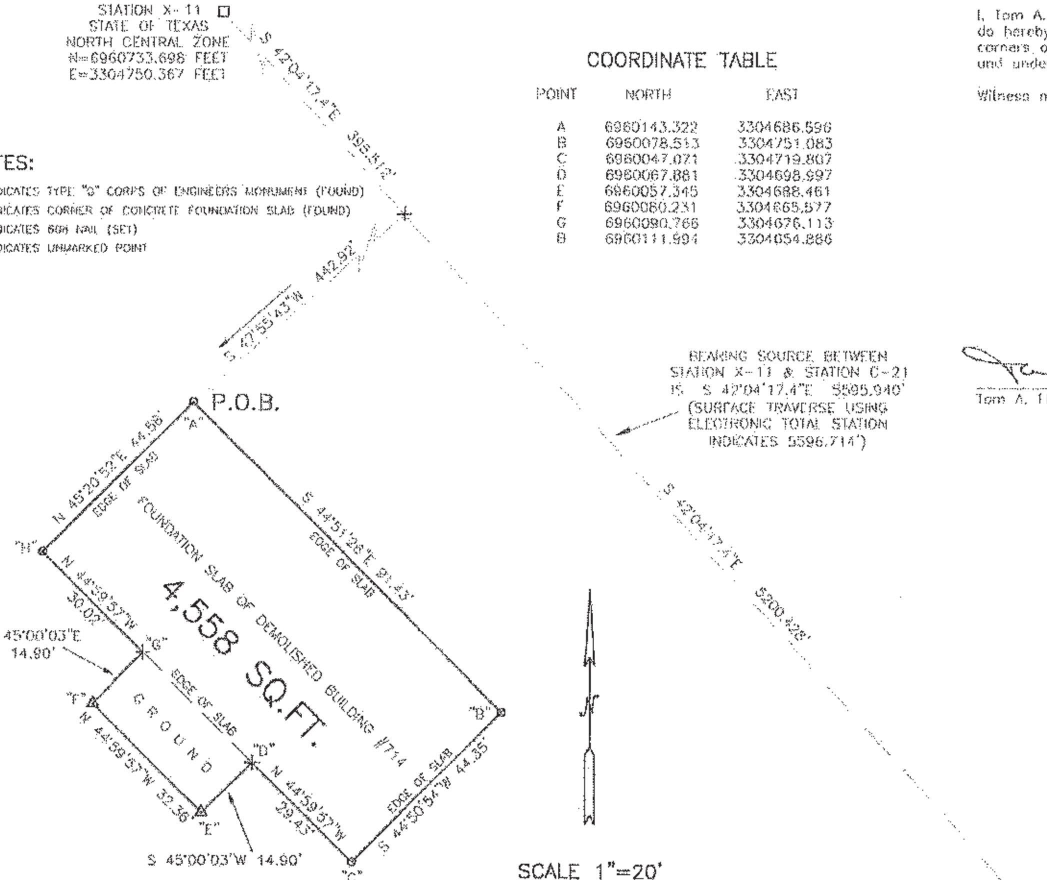
STATION X-11
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6960733.698 FEET
E=3304750.367 FEET

NOTES:

- ☐ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- o INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- △ INDICATES 60d NAIL (SET)
- + INDICATES UNMARKED POINT

COORDINATE TABLE

POINT	NORTH	EAST
A	6960143.322	3304686.596
B	6960078.513	3304751.083
C	6960047.071	3304719.807
D	6960067.881	3304698.997
E	6960057.345	3304688.461
F	6960080.231	3304665.577
G	6960090.766	3304676.113
H	6960111.994	3304654.886



BEARING SOURCE BETWEEN STATION X-11 & STATION C-21 IS S 42°04'17.4"E 5595.940' (SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 5596.714')

SCALE 1"=20'

20 0 20 40 60
GRAPHIC SCALE - FEET

STATION C-21
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6956579.781 FEET
E=3308499.969 FEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October, 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-60D
(4,558 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	T.PTS T.LEG
10/26/2009	09080741.DWG	DRAWN BY JTJ

00864096

LHAAP-64

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-64 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864098

2010-000005558

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005558	
Receipt No: 1006195	
Amount: $ 36.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-64, is the location of a former transformer storage area located in the western portion of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-64 is not itself considered an NPL site. Environmental activities at LHAAP-64 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-64 is located next to site LHAAP-29. Polychlorinated biphenyl (PCB)-containing transformers were stored on a pad on Zeugner Drive immediately southwest of Building 707-B. Approximately 20 out-of-service non-PCB transformers were stored on pallets with no curbs or other containment. The site was used for the storage of transformer oil. The contaminants of concern were petroleum and oil lubricants and PCBs. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas

75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-64 parcel is 847 square feet, more or less, or 0.01944 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-64 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-64. Contaminants in soil samples from LHAAP-64 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-64 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-64 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Angela Humphries
Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-64" TRACT
(ADJACENT TO FOUNDATION SLAB OF DEMOLISHED BUILDING #707-B)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-64" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), tract "LHAAP-64" being adjacent to the Southwest edge of the concrete foundation slab of demolished Building #707-B, tract "LHAAP-64" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998463585, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-1" (N=6955947.067 feet E=3305400.600 feet) and "C-22" (N=6955892.461 feet E=3307823.958 feet). Said traverse indicates a surface distance of 2424.346 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "C-1" referenced above,

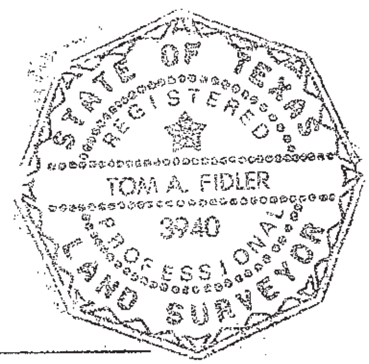
THENCE S 32deg52'16"W 338.58' to the West corner of the concrete slab of demolished building 707-B, said slab corner marking the North corner of this tract and this POINT OF BEGINNING,

THENCE S 45deg00'47"E 29.76' along the N.E. B.L. of this tract, and generally along the Southwest edge of said concrete slab, to the South corner of said concrete slab, said slab corner marking the East corner of this tract,

THENCE S 44deg55'45"W 28.44' along the S.E. B.L. of this tract to a concrete nail with head dimple set (in asphalt) for the South corner of this tract, THENCE N 45deg00'47"W 29.75' along the S.W. B.L. of this tract to a concrete nail with head dimple set (in asphalt) for the West corner of this tract,

THENCE N 44deg54'27"E 28.44' along the N.W. B.L. of this tract to this POINT OF BEGINNING. This tract contains 847 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.



Tom A. Fidler, R.P.L.S. Number 3940

00864104

NOTES:

- □ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- ○ INDICATES CORNER OF CONCRETE FOUNDATION SLAB (FOUND)
- △ INDICATES 60d NAIL (SET)
- + INDICATES CONCRETE NAIL WITH HEAD DIMPLE (SET)

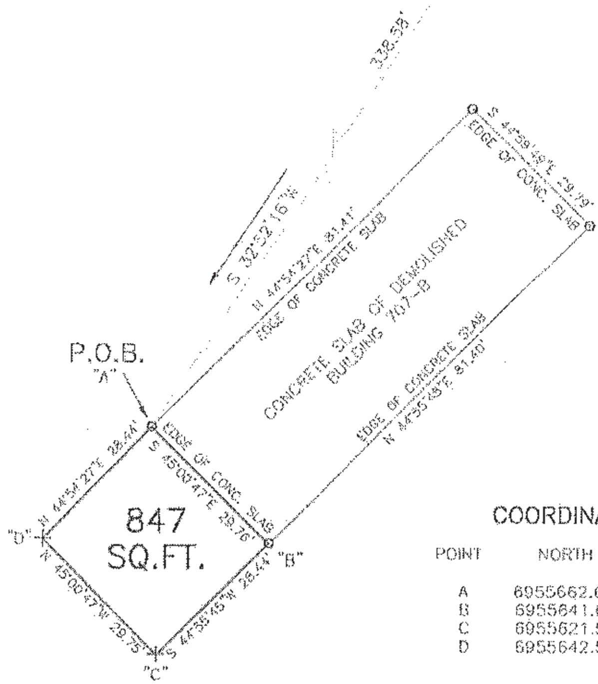
I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through November, 2009.

Witness my hand and seal November 12, 2009.

STATION C-1
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6955947.067 FEET
E=3305400.600 FEET

BEARING SOURCE BETWEEN STATION C-1 & STATION C-22 IS S 88°42'33.0"E 2423.973' (SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION INDICATES 2424.346')

STATION C-22
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6955892.461 FEET
E=3307823.958 FEET



Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

COORDINATE TABLE

POINT	NORTH	EAST
A	6955662.694	3305216.833
B	6955641.654	3305237.884
C	6955621.519	3305217.798
D	6955642.552	3305196.756

N

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998463585 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS C-1 & C-22. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

SCALE 1"=20'

20 0 20 40 60
GRAPHIC SCALE - FEET

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-64
(847 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	U.PTS U.LEG
NOV. 12, 2009	0908074U.DWG	DRAWN BY JTJ

LHAAP-66

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-66 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864106

2010-000005559

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005559	
Receipt No: 1006195	
Amount: $ 36.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT
COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-66, is the location of a leaking transformer from the electric power substation and transformer area, near Building 401. Building 401 housed gas-fired boilers that generated steam for distribution throughout the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-66 is not itself considered an NPL site. Environmental activities at LHAAP-66 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-66 is located at the electric power substation and includes several transformers. One of these transformers was reported to be leaking, but subsequent environmental activities confirmed there was no release to the soil from polychlorinated biphenyls. The electric power substation still provides power to parts of LHAAP. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-66 parcel is 8,616 square foot, more or less, or 0.19779 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-66 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-66. Contaminants in soil samples from LHAAP-66 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-66 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-66 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or
Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-66" TRACT
(CONTAINS AN ELECTRIC POWER SUBSTATION)
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-66" containing an electric power substation, including transformers, "LHAAP-66" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-66" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 1722.19' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 3873.75',

(as used below, the abbreviation F.C.P. indicates 2-1/2" diameter chain link fence corner pipe)

THENCE S 47deg55'43"W 210.22' to an F.C.P. found (leaning approximately 15 degrees) for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 45deg10'23"E 130.14' along a chain link fence found for the Northeast B.L. of this tract to an F.C.P. found for this tract's Eastmost corner,

THENCE S 44deg46'19"W 65.93' along a chain link fence found for the Southeast B.L. of this tract to an F.C.P. found for this tract's Southmost corner,

THENCE N 45deg18'44"W 130.52' along a chain link fence found for the Southwest B.L. of this tract to an F.C.P. found for this tract's Westmost corner,

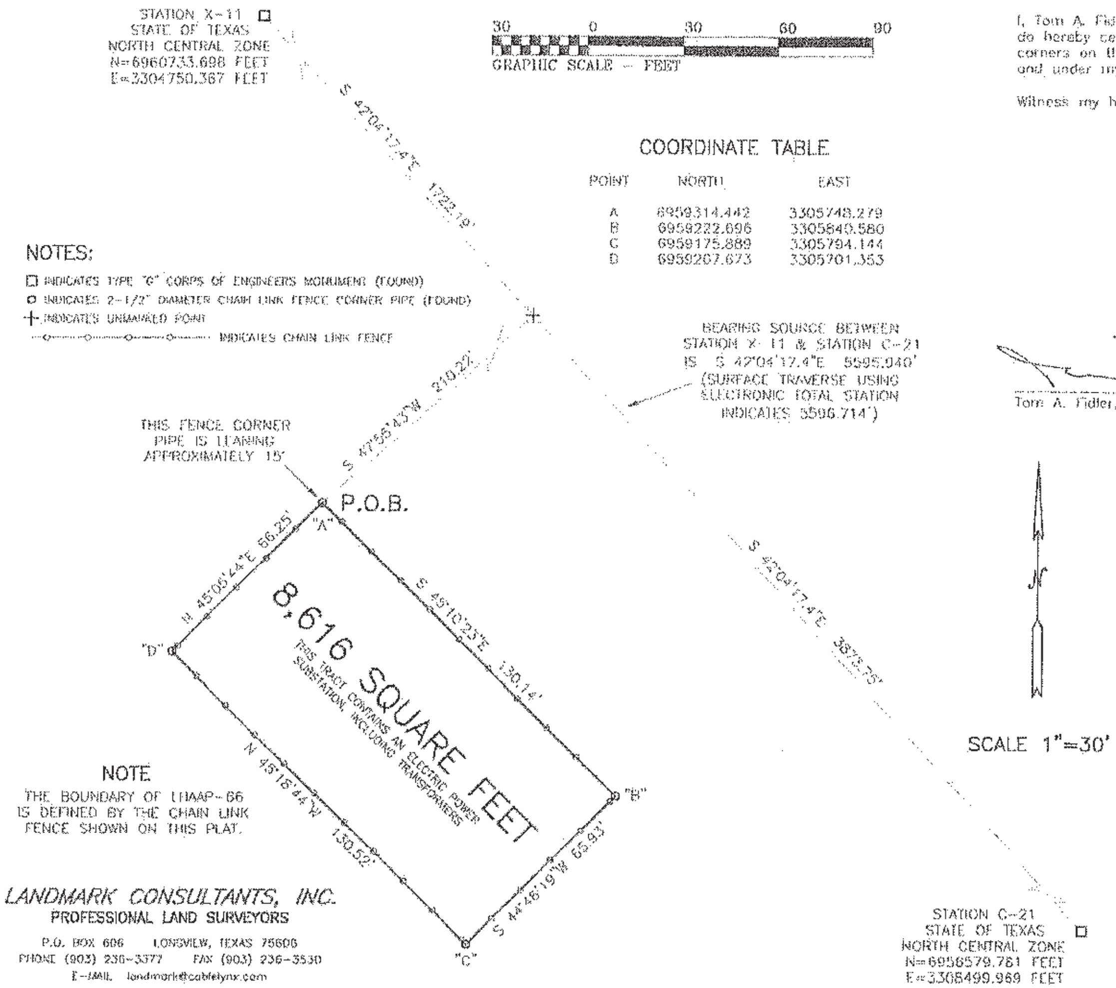
THENCE N 45deg05'44"E 66.25' along a chain link fence found for the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 8,616 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864112



COORDINATE TABLE

POINT	NORTH	EAST
A	6959314.442	3305748.279
B	6959222.096	3305840.580
C	6959175.889	3305794.144
D	6959267.673	3305701.353

NOTES:

- □ INDICATES TYPE "C" CORPS OF ENGINEERS MONUMENT (FOUND)
- o INDICATES 2-1/2" DIAMETER CHAIN LINK FENCE CORNER PIPE (FOUND)
- + INDICATES UNMARKED POINT
- —o——o——o— INDICATES CHAIN LINK FENCE

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August 2009.

Witness my hand and seal November 12, 2009.

STATE OF TEXAS REGISTERED TOM A. FIDLER 3940 PROFESSIONAL LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

NOTE

THE BOUNDARY OF LHAAP-66 IS DEFINED BY THE CHAIN LINK FENCE SHOWN ON THIS PLAT.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

LHAAP-66
(8,616 SQUARE FEET)
(CONTAINS AN ELECTRIC POWER SUBSTATION)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	E.PTS E.LEG
NOV. 12, 2009	0908074E.DWG	DRAWN BY JTJ

LHAAP-67, 67-1

LUCs FROM FINAL REMEDIAL DESIGN

September 14, 2015

00864114

FINAL
REMEDIAL DESIGN
LHAAP-35B (37), CHEMICAL LABORATORY AND LHAAP-67, ABOVEGROUND STORAGE TANK FARM
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

ON THE LINE

Prepared by

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

August 1, 2011

Table of Contents

4.0 Land Use Controls for the Site

The LUCs to be implemented by the Army or its representatives for LHAAP-35B(37) and LHAAP-67 to prevent human exposure to residual groundwater contamination presenting an unacceptable risk to human health include:

- Ensure no withdrawal or use of groundwater beneath the sites for anything other than environmental monitoring and testing until cleanup goals are met

Notification of the groundwater use restriction will accompany all transfer documents and will be recorded at the Harrison County Courthouse in accordance with Texas Administrative Code (TAC) Title 30, §335.566.The LUC addresses the areas of LHAAP-35B(37) and LHAAP-67 that include groundwater plumes at LHAAP-35B(37) and LHAAP-67 with levels of contamination that require implementation of a remedy (see **Section 2.0**). The U.S. Army is responsible for implementing, maintaining, monitoring, reporting on, and enforcing the LUC.

U.S. Army and regulators will consult to determine appropriate enforcement actions should there be a failure of an LUC objective at this site after it has transferred. U.S. Army shall obtain USEPA and TCEQ concurrence prior to termination or significant modification of the LUC, or implementation of a change in land use inconsistent with the LUC objectives and use assumptions of the remedy. Although not a remedy, the land use assumption for LHAAP-35B(37) and LHAAP-67 forms the basis for the remedy. The reasonably anticipated future use of the site as part of a national wildlife refuge is consistent with an industrial risk exposure scenario. Notification of the land use assumption of this site will be made in transfer documentation, will be recorded in the Harrison County Courthouse in accordance with TAC Title 30, §335.566 and compliance with the use assumption will be documented in the Five-Year Review reports.

6.2 Land Use Control Implementation Actions

The Army or its representatives will be responsible for LUC implementation and certification, reporting and enforcement. The Army shall address LUC problems within its control that are likely to impact remedy integrity and shall address problems as soon as practicable.

As a condition of property transfer, the Army may require the transferee to assume responsibility for various implementation actions, as indicated below. Although the Army may transfer responsibility for various implementation actions, the Army shall retain its responsibility for remedy integrity. This means that the Army is responsible for addressing substantive violations of performance objectives that would undermine the Army's CERCLA remedy. The Army also will be responsible for: 1) incorporating RD information and outlining the transferee's LUC obligations into property transfer documentation; 2) recording groundwater use restriction and survey plat at the Harrison County Courthouse; and 3) notifying Texas Department of Licensing and Regulation of the groundwater restriction which includes the prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval from the Army, the USEPA, and the TCEQ. The following LUC implementation actions shall be undertaken by the Army in order to ensure that the aforementioned LUC performance objectives for LHAAP-35B(37) and LHAAP-67 are met and maintained:

6.2.1 Comprehensive Land Use Control Management Plan

Within 30 days of receiving USEPA and TCEQ approval of this RD, the Army will incorporate this document into the Comprehensive LUC Management Plan. The Comprehensive LUC Management Plan consists of LHAAP RD documents and a survey plat showing the locations where LUCs being implemented at LHAAP are applied. The purpose of this Comprehensive LUC Management Plan is to ensure all site specific LUCs are compiled into one comprehensive location for both pre-transfer use by the installation and for post-transfer use by the transferee. This document is also accessible to regulators, the local government and the public. The Comprehensive LUC Management Plan is located in the Marshall Public Library to accompany LHAAP's Administrative Record. As LUC RD documents for additional environmental sites are approved by USEPA and TCEQ, the Army shall likewise add those documents and survey plats to the Comprehensive LUC Management Plan as well as update the previous copy of the plan placed in the Marshall Public Library.

6.2.2 Site Certifications and Reporting

Beginning with finalization of this RD, the Army will undertake annual certifications to confirm continued compliance with the LUC objectives. The Army will retain the annual LUC Compliance Certification documents in the project files for incorporation into the Five-Year Review Reports, and these documents will be made available to USEPA and TCEQ upon request. The certification form will be consistent with the form attached as **Appendix B**. In addition, should any violations be found during the annual certification, the Army will provide to USEPA and TCEQ along with the document, a separate written explanation indicating the specific violations found and what efforts or measures have or will be taken to correct those violations. Upon transfer, such responsibilities may shift to the transferee via appropriate provisions placed in the Environmental Condition of Property (ECP) or other environmental transfer document. The need to continue annual certifications will be revisited at Five-Year Reviews.

6.2.3 Notice of Planned Property Conveyances

The Army shall provide notice to USEPA and TCEQ of plans to convey LHAAP-35B(37) and LHAAP-67 acreage. The notice shall describe the mechanism by which LUCs will continue to be implemented, maintained, inspected, reported, and enforced.

6.2.4 Opportunity to Review Text of Intended Land Use Controls

Army will provide a copy of the groundwater use restriction notification to TCEQ for review and approval prior to its recordation in Harrison County. In addition, the Army will produce an ECP or other environmental document for transfer of LHAAP-35B(37) and LHAAP-67, but before executing transfer, the Army will provide USEPA and TCEQ with a draft copy of the ECP or other environmental document for transfer so that they may have reasonable opportunity, before document execution, to review all LUC-related provisions.

6.2.5 Notification Should Action(s) Which Interfere with Land Use Control Effectiveness Be Discovered Subsequent to Conveyance

Should the Army discover after conveyance of the site any activity on the property inconsistent with the LUC performance objectives, the Army shall notify USEPA and TCEQ within 72 hours of such discovery. Consistent with **Section 6.2.6** below, the Army will then work with USEPA, TCEQ and the transferee to correct the problem(s) discovered. This reporting requirement does not preclude the Army from taking immediate action pursuant to its CERCLA authorities to prevent any perceived risk(s) to human health or the environment.

6.2.6 Land Use Control Enforcement

Should the LUC remedy reflected in this LUC RD fail, the Army will coordinate with USEPA and TCEQ to ensure that appropriate actions are taken to reestablish its protectiveness. These actions may range from informal resolutions with the owner or violator, to the institution of judicial action under the auspices of Texas property law or CERCLA. Alternatively, should the circumstances warrant such, the Army could choose to exercise its response authorities under CERCLA, and then seek cost recovery after the fact from the person(s) or entity(ies) who violated a given LUC. Should the Army become aware that any future owner or user of the property has violated any LUC requirement over which a local agency may have independent jurisdiction, the Army will notify these agencies of such violation(s) and work cooperatively with them to re-achieve owner/user compliance with the LUCs.

6.2.7 Modification or Termination of Land Use Controls

The Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA and TCEQ concurrence before commencing actions that may impact remedy integrity. In the case of an emergency action, the Army shall obtain prior USEPA and TCEQ concurrence as appropriate to the exigencies of the situation.

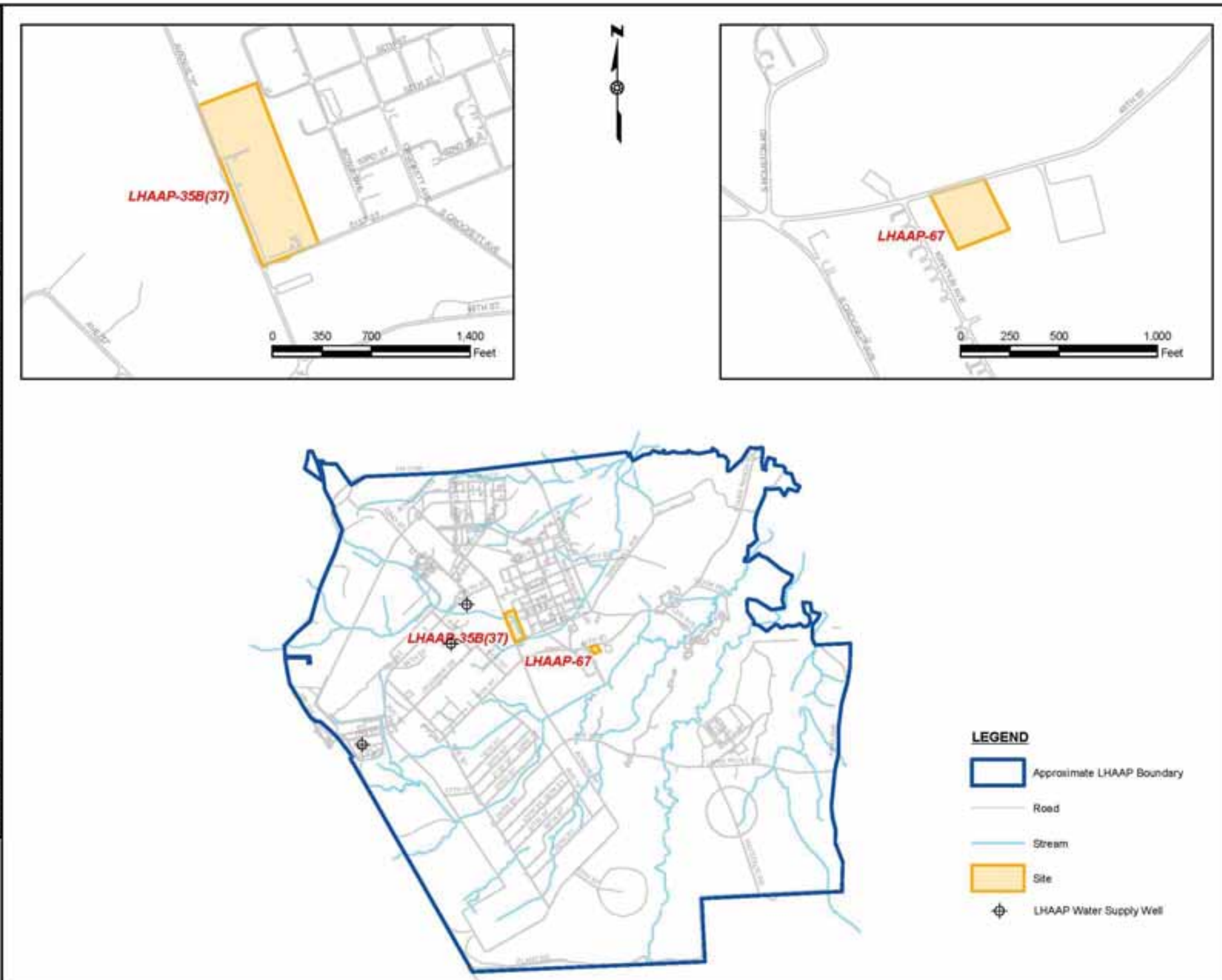
The LUCs shall remain in effect until such time as the Army, TCEQ and USEPA agree that the concentrations of COCs have met cleanup levels. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will be documented consistent with the NCP process for post-ROD changes, potentially including an explanation of significant differences or a remedial action completion report. If the property has been transferred and a determination by the Army, TCEQ and USEPA has been made to terminate one or more of the LUCs, the Army shall provide to the owner of the property an appropriate release for recordation pertaining to the site and will also timely advise other local stakeholders of the action.

6.3 Monitored Natural Attenuation Implementation Actions

Implementation actions include installation of additional monitoring wells, plugging and abandonment of monitoring wells not designated for long-term monitoring, implementation of a groundwater monitoring plan, monitoring, and reporting. The project schedule and cost summary for implementation actions are provided in **Appendix H**. Groundwater monitoring will be conducted to monitor the effectiveness of MNA in reducing contaminant concentrations over time. Monitoring will also be conducted to evaluate plume migration and ensure that chlorinated solvents-contaminated groundwater does not impact nearby surface water at unacceptable levels. Surface water sampling will be conducted to confirm contaminated groundwater is not migrating to surface water. The Groundwater Monitoring Plan, attached as **Appendix A**, describes the wells, their locations, analytical parameters, the frequency of the monitoring, surface water sampling, and presents a list of the monitored constituents and their respective MCLs. Groundwater monitoring and surface water sampling conducted at LHAAP-35B(37) and LHAAP-67 will follow the Health and Safety Plan (**Appendix E**), the Contractor Quality Control Plan (**Appendix F**), the Chemical Data Acquisition Plan (**Appendix G**), Field Activities (**Appendix C**) and Field Procedures (**Appendix D**) as contained in the appendices of the Remedial Design LHAAP-35B(37) and LHAAP-67.

Annual reports will be prepared for any year in which sampling occurs to document the monitoring program. The first year's annual report will include a review of the first four quarters of data, which include natural attenuation parameters and provide an evaluation for the evidence of MNA as a remedial method and a review of the first year's surface water sample data. The TCEQ provides guidance for MNA as a remedial action in *Monitored Natural Attenuation Demonstrations* (Texas Natural Resource Conservation Commission [TNRCC], RG-366/TRRP-33, October 2001). Although LHAAP is being addressed under the Risk Reduction Standards rather than Texas Risk Reduction Program (TRRP), this guidance is comparable to USEPA guidance and may be used as a guideline for the evaluation of the groundwater data. TRRP guidance specifies recommended lines of evidence to document the occurrence of natural attenuation at a site. For the first annual report, primary and secondary lines of evidence will be evaluated to document that attenuation is occurring at LHAAP-35B(37) and LHAAP-67. The primary line

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		FILE PATH
Houston, TX	B. Lu	10/12/07	N. Olson	10/31/07	P. Srivastav	10/31/07	T:\GIS\Longhorn\MXD\ST35B67\ROD\SiteLocs.mxd



LEGEND

Road

Stream

Site

Approximate LHAAP Boundary

LHAAP Water Supply Well

Shaw

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

FIGURE 2-2
SITE LOCATION MAP
REMEDIAL DESIGN
LHAAP-35B(37) AND LHAAP-67, GROUP 4
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00864120

LHAAP-67, 67-2

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-67 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864122

2014-000013308

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

NOTICE

8 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 12/09/2014 10:42 AM	
Document Number: 2014-000013308	
Receipt No: 1415412	
Amount: $ 50.00	
By: Pam Rockwell, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

AECOM
ATTN: AMANDA LAGARDE (FEDEX ENV)
112 E PECAN ST., SUITE 400
SAN ANTONIO, TX 78205

STATE OF TEXAS HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF LAND USE CONTROL AT LHAAP-67

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed remedial activities at the land described herein. The remediation site is in a former industrial area, located on the Former Longhorn Army Ammunition Plant (LHAAP) and is designated as LHAAP-67 (Underground Storage Tank Farm Area). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Remedial activities at LHAAP-67 were performed in accordance with the FFA requirements.

The LHAAP-67 site, when operational, consisted of seven aboveground storage tanks used for storage of No. 2 fuel oil, kerosene, and solvents. The tanks were surrounded by earthen dikes designed to contain potential spills. A Record of Decision (ROD) for LHAAP-67 was signed by the U.S. Army and USEPA with TCEQ concurrence in 2010 establishing the final remedy which consists of a land use control (LUC) in conjunction with monitored natural attenuation (MNA). The site was not remediated to levels suitable for unrestricted use. The LUC at LHAAP-67 is required to prevent human exposure to contaminated groundwater. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public

Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-67 parcel is a 4 acre tract, more or less, located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A. Within the LHAAP-67 parcel is designated a LUC boundary which is a 6.088-acre tract, more or less, as described in Exhibit A. The LUC boundary is also presented in the attached Figure 1.

Future use of the parcel is intended as a national wildlife refuge consistent with non-residential use. For purposes of this certification, residential use includes, but is not limited to, single family or multifamily residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.The United States Department of the Army has undertaken careful environmental study of the LHAAP-67 site and concluded that the LUC set forth below is required to ensure protection of human health and the environment.

(1) Groundwater Restriction. The groundwater use restriction boundary consists of the 6.088-acre tract, more or less. Groundwater underlying this land is contaminated with trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethane (1,2-DCA), 1,1,1-trichloroethane (1,1,1-TCA), and 1,1,2-trichloroethane (1,1,2-TCA), and other volatile organic compounds (VOCs) and shall not be accessed or used for any purpose without the prior written approval of the U.S. Army, the USEPA, and the TCEQ. A LUC restricting the use of groundwater has been established for the protection of human health. The U.S. Army will notify the Texas Department of Licensing and Regulation of the groundwater restriction which includes prohibition of water well installation for any purpose other than environmental monitoring and testing without prior approval by the U.S. Army, the USEPA, and the TCEQ. A restriction against the residential use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE).

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 20 th day of November, 2014.

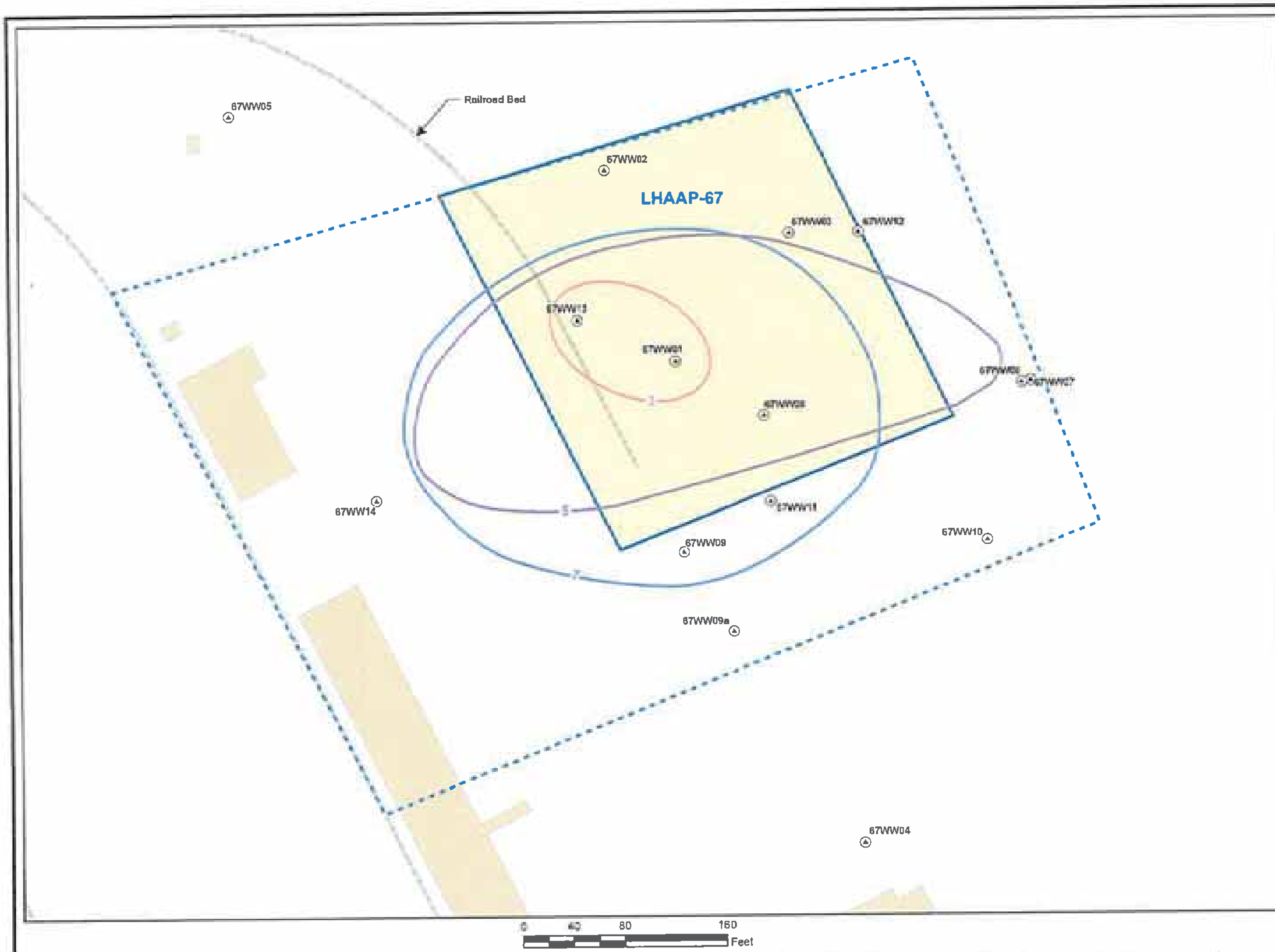
BEFORE ME, on this the 20 th day of November, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 20 day of November, 2014.

Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

EXHIBIT A
SURVEY PLAT



Legend

- Shallow Monitoring Well Location
- 1,1-DCE Concentration Contour exceeding its MCL (7 micrograms per liter)
- 1,2-DCA Concentration Contour exceeding its MCL (5 micrograms per liter)
- VC Concentration Contour exceeding its MCL (2 micrograms per liter)
- Roads
- Surveyed Land Use Control Boundary
- Buildings
- LHAAP-67 Site Boundary

Notes:
1. 1,2-DCA - 1,2-dichloroethane.
2. VC - Vinyl Chloride.
3. 1,1-DCE - 1,1-dichloroethene.
4. Wells 67WW03 and 67WW04 were not sampled during baseline event.
5. MCL - Maximum Contaminant Level

AECOM

Figure 1
Land Use Control Boundary
Remedial Action Completion Report
LHAAP-67 Site
Longhorn Army Ammunition Plant
Karnack, Texas

60256135

October 2014

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-67" Land Use Control Area being 6.088 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-67" Land Use Control Area being more particularly described as follows :

Surveyor's Note: All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9998636625, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "IGNATIUS-1" (N=6957090.304 feet E=3311081.788 feet) and "IGNATIUS-2" (N=6955582.752 feet E=3311851.704 feet). Said traverse indicates a surface distance of 1693.005 feet between said monuments. The computed land area is based on grid distances. As used herein, the abbreviation I.R.O.P.C. indicates 1/2" iron rebar with orange plastic cap engraved "Fidler" & "RPLS 3940" .

Commencing at monument "IGNATIUS-1" referenced above,

THENCE S 32deg49'15"W 145.39' to an I.R.O.P.C. set for the N.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 74deg08'33"E 654.97' along the N.B.L. of this tract to an I.R.O.P.C. set for this tract's N.E.C. ,

THENCE S 21deg34'17"E 390.25' along the E.B.L. of this tract to an I.R.O.P.C. set for this tract's S.E.C. ,

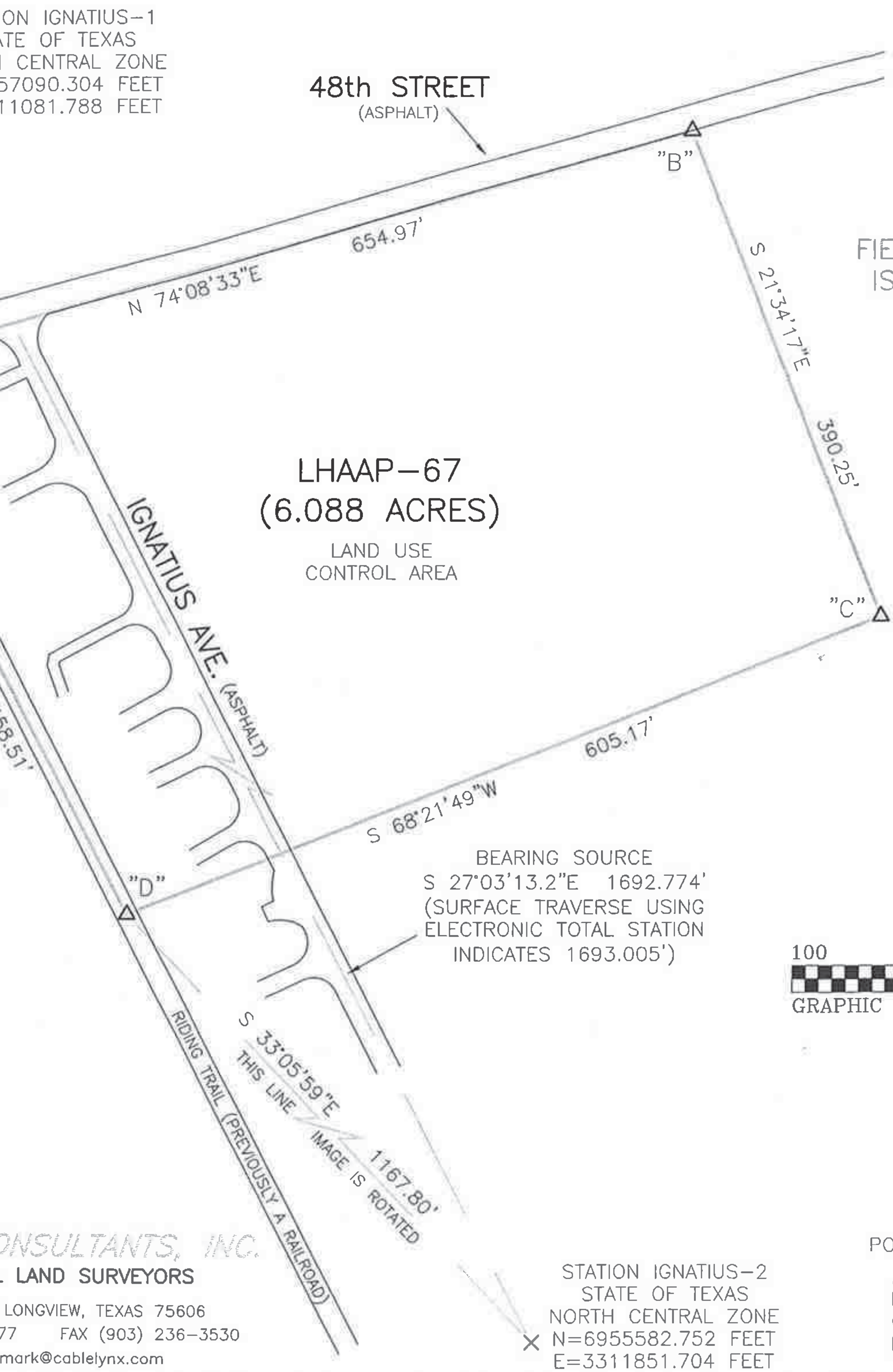
THENCE S 68deg21'49"W 605.17' along the S.B.L. of this tract to an I.R.O.P.C. set for this tract's S.W.C., from which monument "IGNATIUS-2" referenced above bears S 33deg05'59"E 1167.80' ,

THENCE N 27deg23'51"W 458.51' along the W.B.L. of this tract to this POINT OF BEGINNING, containing 6.088 acres, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940



FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in October, 2014.

Witness my hand and seal this the 16th day of October, 2014.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

N

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998636625 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS IGNATIUS-1 & IGNATIUS-2. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.

SCALE 1"=100'

100 0 100 200 300

GRAPHIC SCALE – FEET

LEGEND

- X TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
- O CONCRETE NAIL IN BOTTLE CAP (SET IN ASPHALT)
- △ 1/2" IRON REBAR WITH ORANGE PLASTIC CAP ENGRAVED "FIDLER" & "RPLS 3940" (SET)
- BOUNDARY LINE OF LAND USE CONTROL AREA

COORDINATE TABLE

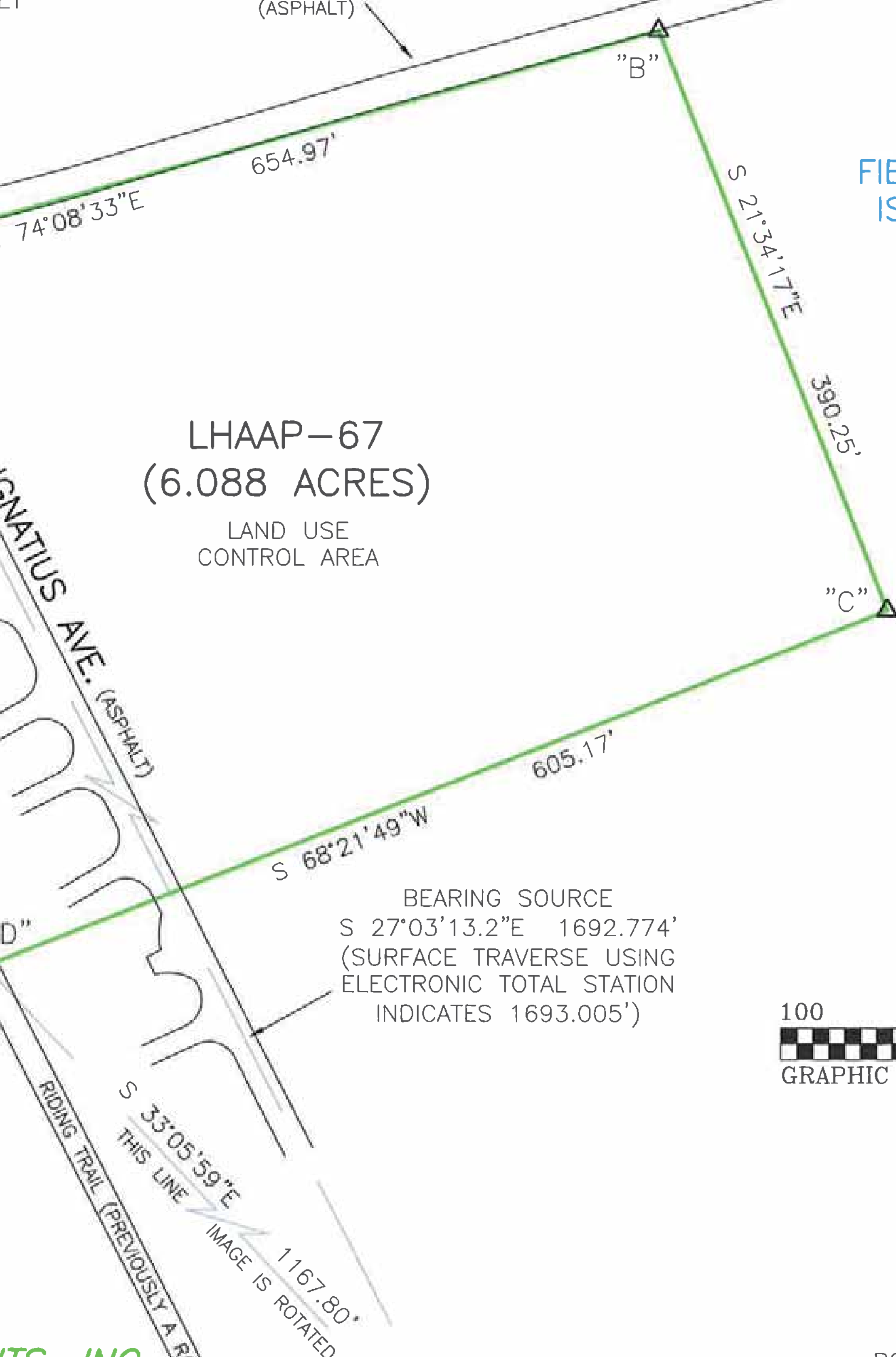
POINT	NORTH	EAST
A	6956968.123	3311002.985
B	6957147.091	3311633.031
C	6956784.178	3311776.509
D	6956561.041	3311213.974

ONSULTANTS, INC.
L LAND SURVEYORS
LONGVIEW, TEXAS 75606
77 FAX (903) 236-3530
mark@cablelynx.com

LHAAP-67 L.U.C.A.
(6.088 ACRES)
LONGHORN ARMY AMMUNITION PLAN
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	H.PTS LE
10/16/2014	0605063H.DWG	DRAWN BY J

00864129



Witness my hand and seal this
the 16th day of October, 2014.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEET

Tom A. Fidler, Registered Professiona

NOTE

ALL BEARINGS, DISTANCE
OTHERWISE), & COORDIN
THE TEXAS STATE PLANE
SYSTEM, NORTH CENTRAL
NAD 1983 (92). THE SC
EQUALS 0.9998636625 &
SURFACE TRAVERSE BETW
IGNATIUS–1 & IGNATIUS–
LAND AREA IS BASED ON

SCALE 1"=100'

100 0 100 200 300
GRAPHIC SCALE – FEET

LEGEND

X TYPE "G" CORPS O
O CONCRETE NAIL IN
△ 1/2" IRON REBAR
ENGRAVED "FIDLER"

COORDINATE TABLE

00864130

LHAAP
(6.0

LHAAP-67, 67-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

September 14, 2015

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the Remedial Design dated 8/1/11 for LHAAP-67, a certification of site was conducted by ____________________ [indicate transferee] on __________.

A summary of land use control mechanisms is as follows:

- Groundwater restriction - A restriction against use of groundwater will remain in effect until the levels of the COCs in groundwater and soil allow unrestricted use and unlimited exposure (UUUE). [Indicate whether groundwater restrictions are still required at LHAAP-67]

A summary of compliance with land use and restriction covenants is as follows:

- No use of groundwater, installation of new groundwater wells, or tampering with existing wells at LHAAP-67.

I, the undersigned, do document that the certification was performed as indicated above, and that the above information is true and correct to the best of my knowledge, information, and belief.

Date: ______________________________

Name/Title: ____

Signature: ______________________________

Annual compliance certification forms shall be completed no later than March 1 of each year for the previous calendar year.

LHAAP-68

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-68 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864134

2010-000005560

*****DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT*****

MISCELLANEOUS

7 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 04/27/2010 04:08 PM	
Document Number: 2010-000005560	
Receipt No: 1006195	
Amount: $ 36.00	
By: Ann Turner, **Deputy**	
Patsy Cox, County Clerk **Harrison County, Texas**	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW E & I
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, LHAAP-68, is located near the service station in the maintenance shops and power area of the former Longhorn Army Ammunition Plant (LHAAP). LHAAP-68 consisted of two mobile 600-gallon storage tanks on trucks that were parked on the asphalt surface at the service station of the maintenance complex. LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as the Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA), became effective on December 30, 1991. Although there are many sites at LHAAP that are specifically NPL listed, LHAAP-68 is not itself considered an NPL site. Environmental activities at LHAAP-68 progressed through the site investigation, at which point it was agreed by the Army and the TCEQ as the lead regulatory agency that no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard 2.

LHAAP-68 is located at the maintenance complex next to the service station. Two mobile 600-gallon storage tanks on trucks were parked on the asphalt surface with no curb or other containment present. The mobile storage tanks contained No. 2 diesel and gasoline fuel. In 2006, six soil samples were collected, two from each of three borings that were installed at the site, and analyzed for semi volatile organic compounds, volatile organic compounds, and total petroleum hydrocarbons. Further information may be found by examination of the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The LHAAP-68 parcel is 426 square foot, more or less, or 0.00977 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the LHAAP-68 site and USEPA and TCEQ concluded that no further investigation or action is required for LHAAP-68. Contaminants in soil samples from LHAAP-68 meet non-residential soil criteria in accordance with 30TAC§335.560(b).

Limited monitoring of LHAAP-68 will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of LHAAP-68 is consistent with the non-residential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; and nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951
or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-BDO (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of March, personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 10 day of March, 2010.

Angela Humphries
Notary Public in and for the State of Texas,
County of Harrison

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 3-17-2011

FIELD NOTES DESCRIPTION OF
"LHAAP-68" TRACT
CADDO LAKE NATIONAL WILDLIFE REFUGE
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, tract "LHAAP-68" being located within the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract "LHAAP-68" being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.999861727, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "X-11" (N=6960733.698 feet E=3304750.367 feet) and "C-21" (N=6956579.781 feet E=3308499.969 feet). Said traverse indicates a surface distance of 5596.714 feet between said monuments. The computed land area is based on surface distances.

Commencing at monument "X-11" referenced above,

THENCE S 42deg04'17.4"E 428.46' to a point, from which point monument "C-21" referenced above bears S 42deg04'17.4"E 5167.48',

THENCE S 47deg55'43"W 686.07' to a concrete nail (with head dimple) set in asphalt for the Northmost corner of this tract and this description's POINT OF BEGINNING,

THENCE S 44deg35'24"E 41.58' along the Northeast B.L. of this tract to an "X" set (chisled in concrete) for this tract's Eastmost corner,

THENCE S 41deg38'18"W 9.34' along the Southeast B.L. of this tract to an "X" set (chisled in concrete) for this tract's Southmost corner,

THENCE N 46deg59'28"W 41.90' along the Southwest B.L. of this tract to a concrete nail (with head dimple) set in asphalt for this tract's Westmost corner,

THENCE N 43deg41'50"E 11.08' along the Northwest B.L. of this tract to this POINT OF BEGINNING. This tract contains 426 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

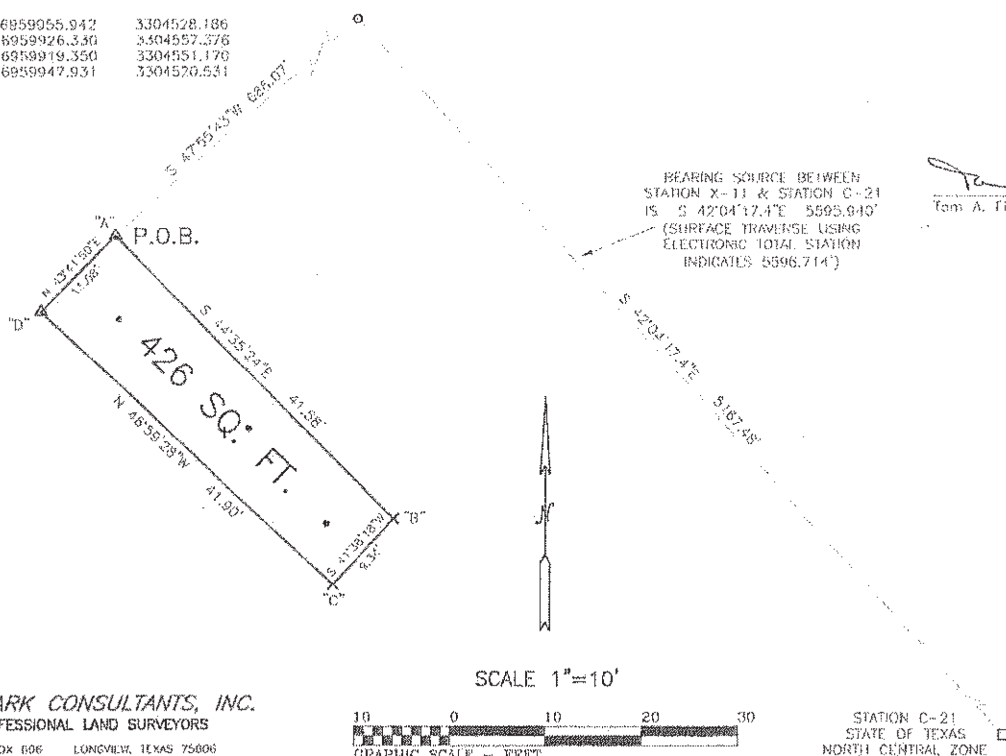
STATION X-11 □
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6960733.696 FEET
E=3304750.367 FEET

COORDINATE TABLE

POINT	NORTH	EAST
A	6959955.942	3304528.186
B	6959926.330	3304557.376
C	6959919.350	3304551.170
D	6959947.931	3304520.531

NOTES:

□ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
△ INDICATES CONCRETE NAIL WITH HEAD DIMPLE (SET)
X INDICATES X CHISLED IN CONCRETE (SET)
O INDICATES UNMARKED POINT
* INDICATES BORE HOLE AS MARKED BY SHAW ENVIRONMENTAL



I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in August through October 2009.

Witness my hand and seal October 26, 2009.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.999861727 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS X-11 & C-21. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES.

FIELD NOTES DESCRIPTION
IS ON SEPARATE SHEETS

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

STATION C-21 □
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6956579.781 FEET
E=3308499.969 FEET

LHAAP-68
(426 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #0407088	0407088.CRD	S.PTS S.LEG
10/26/2009	09080745.DWG	DRAWN BY JTJ

00864140

PISTOL RANGE

NOTICE OF NONRESIDENTIAL LAND USE AT PISTOL RANGE FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

00864142

2012-000000705

DO NOT REMOVE THIS PAGE – IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED – OPR	CLERKS NOTES
On: 01/19/2012 10:41 AM	
Document Number: 2012-000000705	
Receipt No: 1200645	
Amount: $ 32.00	
By: Ann Turner, Deputy	
Patsy Cox, County Clerk Harrison County, Texas	

COUNTY COURT COUNTY OF HARRISON, TEXAS

STATE OF TEXAS
COUNTY OF HARRISON
I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Harrison County, Texas.

Patsy Cox

Patsy Cox, Harrison County Clerk

Record and Return To:

SHAW ENVIRONMENTAL & INFRASTRUCTION GROUP
1401 ENCLAVE PARKWAY, SUITE 250

HOUSTON, TX 77077

STATE OF TEXAS

HARRISON COUNTY

INDUSTRIAL SOLID WASTE
NOTICE OF NONRESIDENTIAL LAND USE

KNOW ALL MEN BY THESE PRESENTS THAT:

Pursuant to the Rules of the Texas Commission on Environmental Quality (TCEQ) pertaining to Industrial Solid Waste Management, this document is hereby filed in the Public Records of Harrison County, Texas, in compliance with the recordation requirements of said rules:

I

The U.S. Army, Department of Defense, has performed a remediation of the land described herein. The site, the former Pistol Range is located at the former Longhorn Army Ammunition Plant (LHAAP). LHAAP was placed on the National Priorities List (NPL) during August 1990. After its listing on the NPL, the U.S. Army, United States Environmental Protection Agency (USEPA), and TCEQ (formerly known as Texas Water Commission) entered into an agreement under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) Section 120 for remedial activities. The CERCLA Section 120 Agreement, referred to as the Federal Facility Agreement (FFA) became effective on December 30, 1991. The former Pistol Range is an NPL site and a removal action was performed in 2009 in accordance with the FFA requirements. As a result of the removal action, the lead agency has determined that no further CERCLA action is necessary at the former Pistol Range to protect public health, welfare or the environment.

The former Pistol Range is located in the southeastern portion of LHAAP, approximately 280 feet south of Avenue Q at the end of Robert Avenue. The site is the eastern portion of a rectangular field and is approximately 110 feet north to south by 150 feet east to west. The former Pistol Range was known to have been used by LHAAP security personnel for small arms target qualification and recertification. The former Pistol Range was established in the 1950s and was used intermittently through 2004. A no further action Record of Decision for the former Pistol Range was signed by USEPA in 2010 establishing no remedy was required. Further information may be found in the Notice of Registration No. 30990 files, which are available for inspection upon request at TCEQ, Central File Room Customer Service Center, Building E, 12100 Park 35 Circle, Austin, Texas, 78753, (512) 239-2900, Monday through Friday 8:00 a.m. to 5:00 p.m. or in the Administrative Record available at the Marshall Public Library, 300 S. Alamo Blvd, Marshall, Texas 75670, (903) 935-4465, Monday through Thursday 10:00 a.m. to 8 p.m., Friday and Saturday 10:00 a.m. to 5:30 p.m.

The TCEQ requires certain persons to provide recordation in the real property records to notify the public of the conditions of the land and/or the occurrence of remediation. This notification is not a representation or warranty by the TCEQ of the suitability of this land for any purpose.

II

The former Pistol Range is a 0.3879 acre tract located in Harrison County, Texas, near the town of Karnack, being more particularly described with survey plat and metes and bounds established in Exhibit A.

The United States Department of the Army has undertaken careful environmental study of the former Pistol Range and USEPA and TCEQ concluded that no further investigation or action is required.

Limited monitoring of the former Pistol Range will take place in the form of Letters of Certification from the Army or the Transferee to TCEQ every five years to document that the use of the former Pistol Range is consistent with the nonresidential use scenarios evaluated in the risk assessment. Future use of the parcel is intended as a national wildlife refuge consistent with industrial or recreational activities and not for residential purposes. For purposes of this certification, residential use includes, but is not limited to, single family or multi-family residences; child care facilities; nursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

III

The owner of the site is the Department of the Army, and its address where more specific information may be obtained is as follows:

ATTN: DAIM-ODB-LO (R. Zeiler)
Post Office Box 220
Ratcliff, AR 72951

or

Assistant Chief of Staff for Installation Management
ATTN: DAIM-ODB (T. Lederle)
600 Army Pentagon
Washington D.C. 20310-0600

Rose M. Zeiler
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 21 th day of July, 2011.

BEFORE ME, on this the 21 th day of July, personally appeared Rose M. Zeiler, of the United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 21 day of July, 2011.

NOTARY PUBLIC STATE OF TEXAS
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Angela Humphries
Notary Public in and for the State of Texas,
County of Harrison

00864146

FIELD NOTES DESCRIPTION OF
FORMER PISTOL RANGE
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, being 16,897 square feet of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), said tract being more particularly described as follows :

Surveyor's Note : All bearings and distances herein (unless labeled surface distance) are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92). The scale factor applied equals 0.9999146277, and is based on surface traverse using electronic total station between type "G" Corps of Engineers monuments "C-19-2" (N=6952844.320 feet E=3312839.019 feet) and "3-95" (N=6952411.298 feet E=3314136.438 feet). Said traverse indicates a surface distance of 1367.890 feet between said monuments. The computed land area is based on grid (State Plane) distances.

Commencing at monument "3-95" referenced above,

(As used herein, the abbreviation I.R.C. indicates 1/2" iron rod with R.P.L.S. #3940 orange plastic cap)

THENCE S 45deg51'27"E 855.98' to an I.R.C. set for the S.W.C. of this tract and this POINT OF BEGINNING,

THENCE N 00deg00'20"W 107.99' along the W.B.L. of this tract to an I.R.C. set for this tract's N.W.C. ,

THENCE N 89deg59'47"E 155.96' along the N.B.L. of this tract to an I.R.C. set for this tract's N.E.C. ,

THENCE S 00deg32'56"E 107.99' along the E.B.L. of this tract to an I.R.C. set for this tract's S.E.C. ,

THENCE S 89deg59'43"W 156.98' along the S.B.L. of this tract to this POINT OF BEGINNING.

This tract contains 16,897 square feet, more or less.

I, Tom A. Fidler, registered professional land surveyor No. 3940 in the State of Texas, do hereby certify that this field notes description is the result of a survey made on the ground and under my supervision.

STATE OF TEXAS
REGISTERED
TOM A. FIDLER
3940
PROFESSIONAL
LAND SURVEYOR

Tom A. Fidler, R.P.L.S. Number 3940

00864147

COORDINATE TABLE

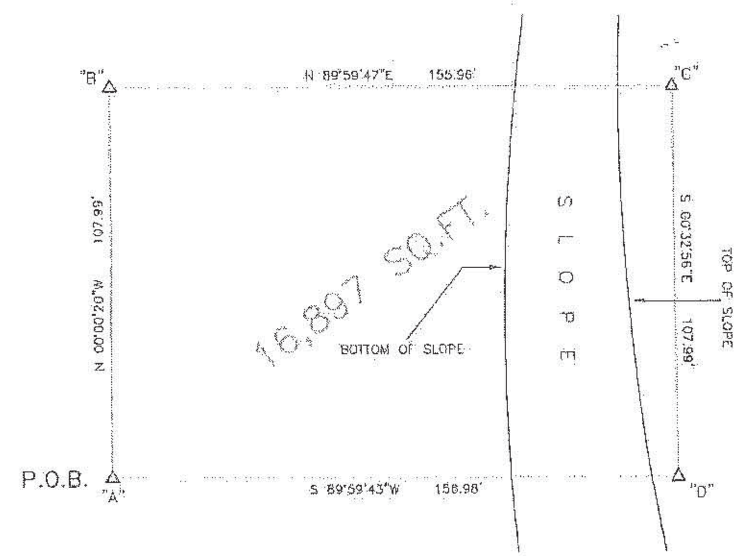
POINT	NORTH	EAST
A	6951923.143	3314750.686
B	6951815.153	3314750.697
C	6951815.166	3314907.681
D	6951923.153	3314906.647

STATION C-19-2
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6952844.320 FEET
E=3312839.019 FEET

BEARING SOURCE BETWEEN
STATION C-19-2 & STATION 3-95
IS S 71°32'35.6"E 1367.773'
(SURFACE TRAVERSE USING
ELECTRONIC TOTAL STATION
INDICATES 1367.890')

STATION 3-95
STATE OF TEXAS
NORTH CENTRAL ZONE
N=6952411.298 FEET
E=3314136.438 FEET

S 45°51'27"E 855.98'



LEGEND

□ INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)
△ INDICATES 1/2" IRON ROD WITH R.P.L.S. #3940 CAP (SET)

NOTE

ALL BEARINGS, DISTANCES (UNLESS LABELED OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, NORTH CENTRAL ZONE, CODE 4202, NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9999146277 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS C-19-2 AND 3-95. THE COMPUTED LAND AREA IS BASED ON GRID DISTANCES.

LANDMARK CONSULTANTS, INC.
PROFESSIONAL LAND SURVEYORS
P.O. BOX 606 LONGVIEW, TEXAS 75606
PHONE (903) 236-3377 FAX (903) 236-3530
E-MAIL landmark@cablelynx.com

I, Tom A. Fidler, registered professional land surveyor, No. 3940, do hereby certify that this plat reflects the location of the corners on the tract herein described, as surveyed on the ground and under my supervision in April 2011.

Witness my hand and seal May 2, 2011.

Tom A. Fidler, Registered Professional Land Surveyor, No. 3940

SCALE 1"=30'

30 0 30 60 90
GRAPHIC SCALE - FEET

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

FORMER PISTOL RANGE
(16,897 SQUARE FEET)
LONGHORN ARMY AMMUNITION PLANT
HARRISON COUNTY, TEXAS

JOB #1104040	040708B.CRD	L.PTS L.LEG
MAY 2, 2011	1103025L.DWG	DRAWN BY JTJ

00864148

LHAAP-001-R-01 AND LHAAP-003-R-01, MMRP-1

LUC INSPECTION AND MAINTENANCE LOG

September 14, 2015

Draft LUC Inspection and Maintenance Log – LHAAP-001-R-01 and LHAAP-003-R-01

Date	Inspected by:	Inspection/Maintenance Activities				Corrective action or repairs required?	Repairs/Action Taken
		Maintain Land Use Controls		Prohibit residential development/use	Prevent explosive safety risks		
		Signage maintained e.g. replace damaged or weathered signs to the full count of signs	Signage visible from one sign to the next: i.e. grass mowed around signage	Verified no residential development/use	Verified no intrusive activities i.e. digging		

LHAAP-001-R-01 AND LHAAP-003-R-01, MMRP-2

LUCs FROM FINAL REMEDIAL DESIGN PENDING

September 14, 2015

LHAAP-001-R-01 AND LHAAP-003-R-01, MMRP-3

NOTICE OF LAND USE CONTROLS AND NONRESIDENTIAL LAND USE AT LHAAP-001-R-01 AND LHAAP-003-R-01 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

September 14, 2015

APPENDIX A

GSA TRANSFER LETTERS

00864153

GSA

GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

February 21, 2014

Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

Dear Mr. Lederle:

Your report of excess dated July 29, 2002, covered 8,492.02 acres of land (later corrected to 8,416 acres), more or less, and improvements at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. GSA Control No. 7-D-TX-0692.

As set forth in the enclosed letter, an additional 50.54 acres of land, more or less, of the LHAAP property known as Tract No. 7 – Landfill 12 Area, described in Attachment 1 of the transfer letter has been transferred without reimbursement to the U.S. Department of the Interior, Fish and Wildlife Service (FWS) under the authority of 16 U.S.C. 667b. Additional transfers will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for transfers will identify requested land by legal description or map overlay.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

Custody and accountability of the property identified by legal description in Attachment 1 to the transfer letter, together with any necessary documentation, should be transferred to FWS by your agency as soon as practicable. We will appreciate your prompt advice as to the date such action is accomplished. We understand that the FWS, Region 2 Acting Regional Director, Ms. Joy Nicholopoulos, P.O. Box 1306, Albuquerque, NM 87103 will represent the FWS in this matter.

Please acknowledge receipt of this communication in the space provided on the enclosed copy of this letter and return it to this office. You may contact Veronica Capron Vorva, Realty Specialist at telephone 817-978-4246 if there are questions.

Sincerely,

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name THOMAS E LEDERLE

Title Chief, ACSIM BRAC DIV

Date 03/07/2014

cc: Ms. Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

February 21, 2014

Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

RE: Transfer of 50.54 acres of land at the Longhorn Army Ammunition Plant, Harrison County, Texas

Dear Ms. Nicholopoulos:

Your letter of April 27, 2004, requested transfer to the U.S. Department of the Interior, Fish and Wildlife Service (FWS), under the authority of P.L. 80-537, 16 U.S.C. 667b, a total of 8,404 acres of land (later corrected to 8,416 acres, more or less), at the Longhorn Army Ammunition Plant (LHAAP), City of Karnack, Harrison County, State of Texas, together with all the improvements found on the real estate, and all related personal property located thereon (hereinafter referred to as the "Property"), reported July 29, 2002, as excess to the needs of the U.S. Army. The first transfer of 5,031.75 acres was accepted into primary jurisdiction by FWS on April 30, 2004. It was agreed that as parcels met the specifications of transfer, additional parcels would be transferred by means of a letter request, a map, and a legal description to GSA.

All the rights to be transferred herein have heretofore been declared excess to the needs of the United States Department of the Army. The respective interests to be transferred hereby have been reported to the General Services Administration (GSA) and have been determined to be excess for disposal pursuant to P.L. 107-217, (40 U.S.C. §§550, et. seq.) as amended.

In accordance with your subsequent letter of February 4, 2014, an additional 50.54 acres, more or less, known as Tract No. 7 – Landfill 12 Area (hereinafter referred to as the "Property") are now suitable for transfer to add to the 6,364.35 acres, more or less, previously transferred on nine separate occasions. A true and complete legal description of Tract No. 7 – Landfill 12 Area is included in **Attachment 1**.

Accordingly, pursuant to 40 U.S.C. 501, et seq. and Public Law 80-537, 16 U.S.C. 667b, and acting under authority delegated to me, I hereby transfer 50.54 acres, more

U.S. General Services Administration
Real Property Utilization and Disposal
Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

or less, as described in **Attachment 1** to the custody and accountability of the U.S. Department of Interior, Fish and Wildlife Service.

Additional transfers covering the remainder of the real estate comprising the LHAAP will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for other transfers will specifically identify such requested land by legal description and/or map overlay.

This transfer is expressly made subject to all environmental notices, exceptions, restrictions, agreements, and covenants affecting the Property identified in the Environmental Condition of Property V, Longhorn Army Ammunition Plant, Karnack, Texas, dated September 2007 and revised December 6, 2013, (hereinafter referred to as the "ECOP V") which is incorporated herein by reference and amends the "ECOP" previously described in and made a part of the original transfer of April 26, 2004, and subsequent transfers, and the "ECOP II" dated October 2004, "ECOP III" dated August 2005, and "ECOP IV" dated March 2007 to the extent and only to the extent the same are valid and affect the Property conveyed herein. FWS covenants and agrees that the Property is hereby transferred subject to the use restrictions and covenants which run with the land as identified in Attachment 2 of the ECOP V previously described. FWS further covenants and agrees that in the event that the Property, or any part thereof, is sold, conveyed, transferred, leased, or otherwise disposed of, the following notices, covenants, and restrictions shall be inserted in any instrument of conveyance.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

The property transferred is subject to compliance by the FWS with the provisions of the National Environmental Policy Act of 1969, as amended, including the preparation of an environmental impact statement if required. The Property is transferred subject to compliance by the FWS with Section 106 of the National Historic Preservation Act of 1966, and Executive Order 11593.

Mr. Thomas E. Lederle, Chief, ACSIM BRAC Division, U.S. Army, 600 Army Pentagon, Washington D.C. 20310 will act for the U.S. Army in arranging for the transfer of custody and accountability of the Property and in other matters related to the transfer.

A copy of our letter of same date to the U.S. Army is enclosed for your information. It is requested that you acknowledge receipt of this communication on the enclosed copy of this letter in the space provided, return it to this office, and that such steps as necessary be taken by your Agency to consummate the transaction.

Sincerely,

Melvin E. Freeman

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name Wesley R. Arter

Title Realty Officer

Date 3-3-2014

cc: Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

00864158

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
DIVISION OF REALTY

TRACT REPORT

OF THE

UNITED STAES OF AMERICA

TRACT (100q)

CONTAINING 50.54 ACRES

CADDO LAKE NATIONAL WILDLIFE REFUGE

HARRRISON COUNTY, TEXAS

Report Prepared By

Louis J. duBois, Jr.
Land Surveyor

January 2014

Tract Description of the
United States of America Tract (100q)
Caddo Lake National Wildlife Refuge
Harrison County, Texas

The hereinafter described tract of land is located in Harrison County, Texas, near the town of Karnack, tract (100q) being 50.54 acres of land out of the Longhorn Ordnance Works Reservation, also known as the Longhorn Army Ammunition Plant, Karnack, Texas, said 50.54 acres of land being that certain 50.54 acre tract described as Parcel No. 7 – Landfill 12 Area excepted from United States of America tract (100a) as surveyed by Entz Engineering and Associates, Inc. & Huffman Surveying Company, A Joint Venture, of Muskogee, Oklahoma, delineated on a map tracing designated "United States of America Tracts (100a,b)" bearing the date of May, 2004, of record in the files of the United States Department of the Interior, Fish and Wildlife Service, Region 2, Albuquerque, New Mexico, said tract (100q) being more particularly described by metes and bounds as follows:

SURVEYOR'S NOTE:

All bearings and distances are based on the Texas State Plane Coordinate System, North Central Zone, Code 4202, NAD 1983 (92), Survey Feet. The average Combined Scale Factor applied equals 0.99988410; Convergence equals 02° 21' 53". The computed land area is based on surface distances.

Parcel No. 7 - Landfill 12 Area

BEGINNING at the southwest corner of the Landfill 12 Area, described as Parcel No. 7, said point being described as "Landfill 12 Area Point No. 1" and having a coordinate value of N=6953300.238, E=3311087.540;

THENCE, along the boundary line of said Parcel No. 7,

N. 03°15'36" W., 1741.41 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 2";

THENCE, along the boundary line of said Parcel No. 7,

N. 62°03'32" E., 1151.75 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 3";

THENCE, along the boundary line of said Parcel No. 7,

S. 15°55'59" E., 1311.85 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 4";

THENCE, along the boundary line of said Parcel No. 7,

S. 35°09'33" W., 1306.48 feet

to a point for a corner of this tract, said point being described as "Landfill 12 Area Point No. 5";

THENCE, along the boundary line of said Parcel No. 7,

N. 84°25'54" W., 528.74 feet

to the **POINT OF BEGINNING**, and containing 50.54 acres, more or less.

Bounded on the north, east, south and west by USA tract (100a).

The hereinbefore-described tract of land is delineated on a plat designated "United States of America Tract (100q)" bearing the date of January 15, 2014, of record in the files of the United States Department of the Interior, Fish and Wildlife Service.

GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

January 29, 2015

Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

Dear Mr. Lederle:

Your report of excess dated July 29, 2002, covered 8,492.02 acres of land (later corrected to 8,416 acres), more or less, and improvements at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. GSA Control No. 7-D-TX-0692.

As set forth in the enclosed letter, an additional 109.91 acres of land, more or less, in five parcels of the LHAAP property, described in Attachment 1 and Attachment 2 of the transfer letter, including: three portions of the "Production Area Parcel," consisting of Tract 100r, containing 31.73 acres in and around the Former Acid Storage Area, Tract 100s, containing 18.80 acres in and around the Former TNT Waste Disposal Plant, and Tract 100t, containing 3.82 acres in and around the Former Sewage Treatment Plant; the "Y-Area Parcel," Tract 100u, containing 17.24 acres; and a portion of the 40.37 acre "Static Test Area Parcel," Tract 100v, containing 38.32 acres, have been transferred without reimbursement to the U.S. Department of the Interior, Fish and Wildlife Service (FWS) under the authority of 16 U.S.C. 667b. Additional transfers will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for transfers will identify requested land by legal description or map overlay.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

Custody and accountability of the property identified by legal description in Attachment 1 and Attachment 2 to the transfer letter, together with any necessary documentation, should be transferred to FWS by your agency as soon as practicable. We will appreciate your prompt advice as to the date such action is accomplished. We understand that the FWS, Region 2 Acting Regional Director, Ms. Joy Nicholopoulos, P.O. Box 1306, Albuquerque, NM 87103 will represent the FWS in this matter.

U.S. General Services Administration
Real Property Utilization and Disposal
Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

Please acknowledge receipt of this communication in the space provided on the enclosed copy of this letter and return it to this office. You may contact Veronica Vorva, Realty Specialist, at telephone 817-978-4246 if there are questions.

Sincerely,

Melvin E. Freeman

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name THOMAS E LEDERLE

Title Chief, ACSIM BRAC DIV

Date 20 APR 2015

cc: Ms. Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

00864163

GSA

GSA Public Buildings Service
Tel: (817) 978-3856
Fax: (817) 978-2063
melvin.freeman@gsa.gov

January 29, 2015

Joy Nicholopoulos, Acting Regional Director
U.S. Fish and Wildlife Service, Region 2
Division of Realty
P.O. Box 1306
Albuquerque, NM 87103-1306

RE: Transfer of 109.91 acres of land at the Longhorn Army Ammunition Plant, Karnack, Harrison County, Texas

Dear Ms. Nicholopoulos:

Your letter of April 27, 2004, requested transfer to the U.S. Department of the Interior, Fish and Wildlife Service (FWS), under the authority of P.L. 80-537, 16 U.S.C. 667b, a total of 8,404 acres of land (later corrected to 8,416 acres, more or less), at the Longhorn Army Ammunition Plant (LHAAP), City of Karnack, Harrison County, State of Texas, together with all the improvements found on the real estate, and all related personal property located thereon (hereinafter referred to as the "Property"), reported July 29, 2002, as excess to the needs of the U.S. Army. The first transfer of 5,031.75 acres was accepted into primary jurisdiction by FWS on April 30, 2004. It was agreed that as parcels met the specifications of transfer, additional parcels would be transferred by means of a letter request, a map, and a legal description to GSA.

All the rights to be transferred herein have heretofore been declared excess to the needs of the United States Department of the Army. The respective interests to be transferred hereby have been reported to the General Services Administration (GSA) and have been determined to be excess for disposal pursuant to P.L. 107-217, (40 U.S.C. §§550, et. seq.) as amended.

In accordance with your subsequent letter of December 2, 2014, an additional 109.91 acres, more or less, in five parcels of the LHAAP property including: three portions of the "Production Area Parcel," consisting of Tract 100r, containing 31.73 acres in and around the Former Acid Storage Area, Tract 100s, containing 18.80 acres in and around the Former TNT Waste Disposal Plant, and Tract 100t, containing 3.82 acres in and around the Former Sewage Treatment Plant; the "Y-Area Parcel," Tract 100u, containing 17.24 acres; and a portion of the 40.37 acre "Static Test Area Parcel," Tract 100v, containing 38.32 acres (hereinafter referred to as the "Properties") is now suitable

U.S. General Services Administration
Real Property Utilization and Disposal Division (7PZ)
819 Taylor Street, Room 11A30
Fort Worth, TX 76102-6112

for transfer to add to the 6,414.89 acres, more or less, previously transferred on ten separate occasions. True and complete legal descriptions of the Properties are included in **Attachment 1** and **Attachment 2**.

Accordingly, pursuant to 40 U.S.C. 501, et seq. and Public Law 80-537, 16 U.S.C. 667b, and acting under authority delegated to me, I hereby transfer 109.91 acres, more or less, as described in **Attachment 1** and **Attachment 2** to the custody and accountability of the U.S. Department of Interior, Fish and Wildlife Service.

Additional transfers covering the remainder of the real estate comprising the LHAAP will be made when approvals are obtained from the Army on lands currently not suitable for transfer. Future requests for other transfers will specifically identify such requested land by legal description and/or map overlay.

This transfer is expressly made subject to all environmental notices, exceptions, restrictions, agreements, and covenants affecting the Property identified in the Environmental Condition of Property VI, Longhorn Army Ammunition Plant, Karnack, Texas, dated January 2014, (hereinafter referred to as the "ECOP VI") which is incorporated herein by reference and amends the "ECOP" previously described in and made a part of the original transfer of April 26, 2004, and subsequent transfers, and the "ECOP II" dated October 2004, "ECOP III" dated August 2005, "ECOP IV" dated March 2007, and "ECOP V" dated September 2007 and revised December 6, 2013 to the extent and only to the extent the same are valid and affect the Property conveyed herein. FWS covenants and agrees that the Property is hereby transferred subject to the use restrictions and covenants which run with the land as identified in Attachment 3 of the ECOP VI previously described. FWS further covenants and agrees that in the event that the Property, or any part thereof, is sold, conveyed, transferred, leased, or otherwise disposed of, the following notices, covenants, and restrictions shall be inserted in any instrument of conveyance.

Upon finalization of transfer of the total land requested by FWS, a complete boundary legal description will be provided by FWS identifying all former Army land that had been transferred. Any map overlays used in the interim to identify previously transferred land will be voided for use to identify former Army land at LHAAP subsequently controlled by FWS.

The property transferred is subject to compliance by the FWS with the provisions of the National Environmental Policy Act of 1969, as amended, including the preparation of an environmental impact statement if required. The Property is transferred subject to compliance by the FWS with Section 106 of the National Historic Preservation Act of 1966, and Executive Order 11593.

Mr. Thomas E. Lederle, Chief, ACSIM BRAC Division, U.S. Army, 600 Army Pentagon, Washington D.C. 20310 will act for the U.S. Army in arranging for the transfer of custody and accountability of the Property and in other matters related to the transfer.

A copy of our letter of same date to the U.S. Army is enclosed for your information. It is requested that you acknowledge receipt of this communication on the enclosed copy of this letter in the space provided, return it to this office, and that such steps as necessary be taken by your Agency to consummate the transaction.

Sincerely,

Melvin E. Freeman

Melvin E. Freeman, Director
Real Property Utilization and Disposal
Division (7PZ)

Enclosures

Receipt acknowledged:

Name David Allard

Title Realty Specialist

Date 2/2/2015

cc: Mr. Thomas E. Lederle
Chief, ACSIM BRAC Division
600 Army Pentagon
Washington D.C. 20310-0600

bhate
ENVIRONMENT & INFRASTRUCTURE

LETTER OF TRANSMITTAL

DATE: March 22, 2018

PROJECT NAME: Remediation of Multiple Sites, Longhorn Army Ammunition Plant, Karnack, Texas (TX)

TO:

Rose Zeiler — BRAC Site Manager
Richard Smith — USACE Project Manager
Aaron Williams — USACE Project Engineer

FROM: Kim Nemmers — Bhate Project Manager

SUBJECT: **Surface Water Data Transmittal - 2017**
Longhorn Army Ammunition Plant, Karnack, TX
Contract: W9128F-13-D-0012,
Delivery Order: W912BV17F0150

REMARKS

Surface Water sampling data is currently collected at the following frequencies except when locations are dry:

Surface Water	Frequency
HBW-1	Harrison Bayou , quarterly
HBW-7	Harrison Bayou , quarterly
HBW-10	Harrison Bayou , quarterly
GPW-1	Goose Prairie Creek, quarterly
GPW-3	Goose Prairie Creek, quarterly

Surface Water sampling data is updated and reported to the regulatory agencies and to the public as it is available through handouts reviewed and distributed in association with the quarterly Restoration Advisory Board (RAB) meetings, and included in the Administrative Record along with other RAB meeting materials. The attached handouts will be at the April 2018 RAB meeting. Data associated with the 2017 surface sampling events, including the data validation report (Quality Control Summary Report) for the samples, are attached for your file.

List of Attachments:

A. Harrison Bayou and Goose Prairie Creek Perchlorate Data Handouts
B. Quality Control Summary Report
C. Laboratory Data Packages

Attachment A

Harrison Bayou and Goose Prairie Creek Perchlorate Data Handouts

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek, unless the sampling location is dry.

Surface Water Sample Data (in micrograms per liter)

Quarter	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	Jul 1999	Sep 1999	Feb 2000	Apr 2000	Aug 2000	Dec 2000	Feb 2001	Apr 2001	July 2001	Oct 2001	Jan 2002
GPW-1	<1.0U	-	4	<4.0 U	<4.0 U	<4.0 U	-	2.65	<4.0 U	<4.0 U	<4.0 U
GPW-3	<1.0U	<4.0 U	17	8	<4.0 U	<4.0 U	-	2.28	<4.0 U	<4.0 U	<4.0 U
HBW-1	-	<80.0 U	310	23	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-7	-	<8.0 U	370	110	-	-	<4.0 U	-	<4.0 U	<4.0 U	<4.0 U
HBW-10	-	<8.0 U	905	650	<4.0 U	-	<4.0 U	-	<4.0 U	-	-

Quarter	2nd	3rd	4th	1st	2nd	3rd	3rd	4th	2nd	3rd	4th
Creek Sample ID	June 2002	Sept 2002	Dec 2002	Feb 2003	June 2003	Aug 2003	July 2004	Dec 2006	May 2007	Aug 2007	Dec 2007
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 U	<1.0 U	7.48
HBW-1	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	99.3	<0.2U	<1.0 U	<1.0 U	122	<1.0 U
HBW-7	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	<4.0 U	<0.2U	<1.0 U	<1.0 U	1.02	<1.0 U
HBW-10	<4.0 U	<4.0 U	<4.0 U	-	<4.0 U	-	<0.2U	<1.0 U	<1.0 U	<1.0 U	<1.0 U

Quarter	1st	2nd	3rd	4th	2nd	3rd	3rd	3rd	4th	1st	2nd
Creek Sample ID	Mar 2008	Jun 2008	Sep 2008	Dec 2008	May 2009	Jul 2009	Aug 2009	Sep 2009	Dec 2009	Mar 2010	Jun 2010
GPW-1	27	<0.5U	<0.5U	<0.22U	16	<4U	NS	<1.2U	3.7	1.3J	<0.6U
GPW-3	21.9	9.42	1.1	<0.22U	8.9	<4U	NS	<0.6U	2.8	1.8J	<0.6U
HBW-1	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.5U	<0.6U
HBW-7	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	24	<1.2U	<0.275U	1.5U	<0.6U
HBW-10	<0.5U	<0.5U	<0.5U	<0.22U	<0.55U	<4U	NS	<1.5U	<0.275U	1.2U	<0.6U

Quarter	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st
Creek Sample ID	Sep 2010	Dec 2010	Mar 2011	Jun 2011	Sep 2011	Dec 2011	Mar 2012	Jun 2012	Not Applicabl e	Jan & Feb 2013	Mar 2013
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	NS	1.74	0.754
HBW-1	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U
HBW-7	dry	<0.1U	<0.2U	dry	dry	0.171J	0.1U	dry	NS	<0.2U	<0.2U
HBW-10	dry	<0.1U	<0.2U	dry	dry	<0.1U	0.1U	dry	NS	<0.2U	<0.2U

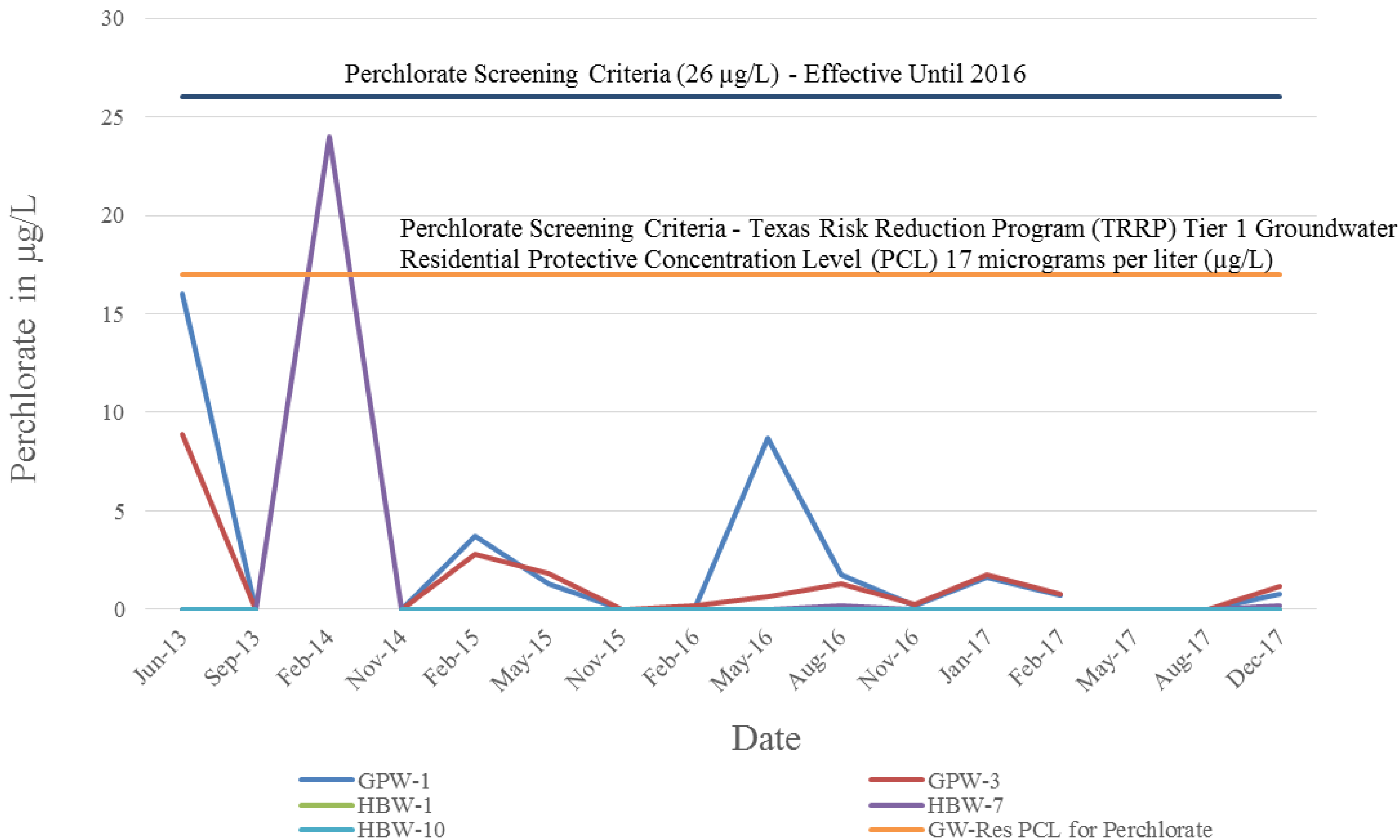
Quarter	2nd	3rd	4th	1st	2nd	3nd	4th	1st	2nd	3rd	4th
Creek Sample ID	Jun 2013	Sept 2013	Dec 2013	Feb 2014	May 2014	Aug 2014	Nov 2014	Feb 2015	May 2015	Aug 2015	Nov 2015
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry	dry	0.311 J
HBW-1	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U
HBW-7	<0.2U	<0.2 U	dry	0.201 J	dry	dry	<0.2 U	0.124 J	dry	dry	<0.2 U
HBW-10	<0.2U	<0.2 U	dry	<0.2 U	dry	dry	<0.2 U	<0.2 U	dry	dry	<0.2 U

Quarter	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Creek Sample ID	Feb 2016	May 2016	Aug 2016	Nov 2016	Feb 2017	May 2017	Aug 2017	Dec 2017
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263	dry	<4.0 U
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	dry	<4.0 U
HBW-1	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	<0.2 U	1.1 J
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J	<1 U	0.155	<0.2 U	<4.0 U
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U	<1 U	<0.2 U	0.111J	<4.0 U

NS – not sampled U – non-detect J – Estimated Dry – no surface water

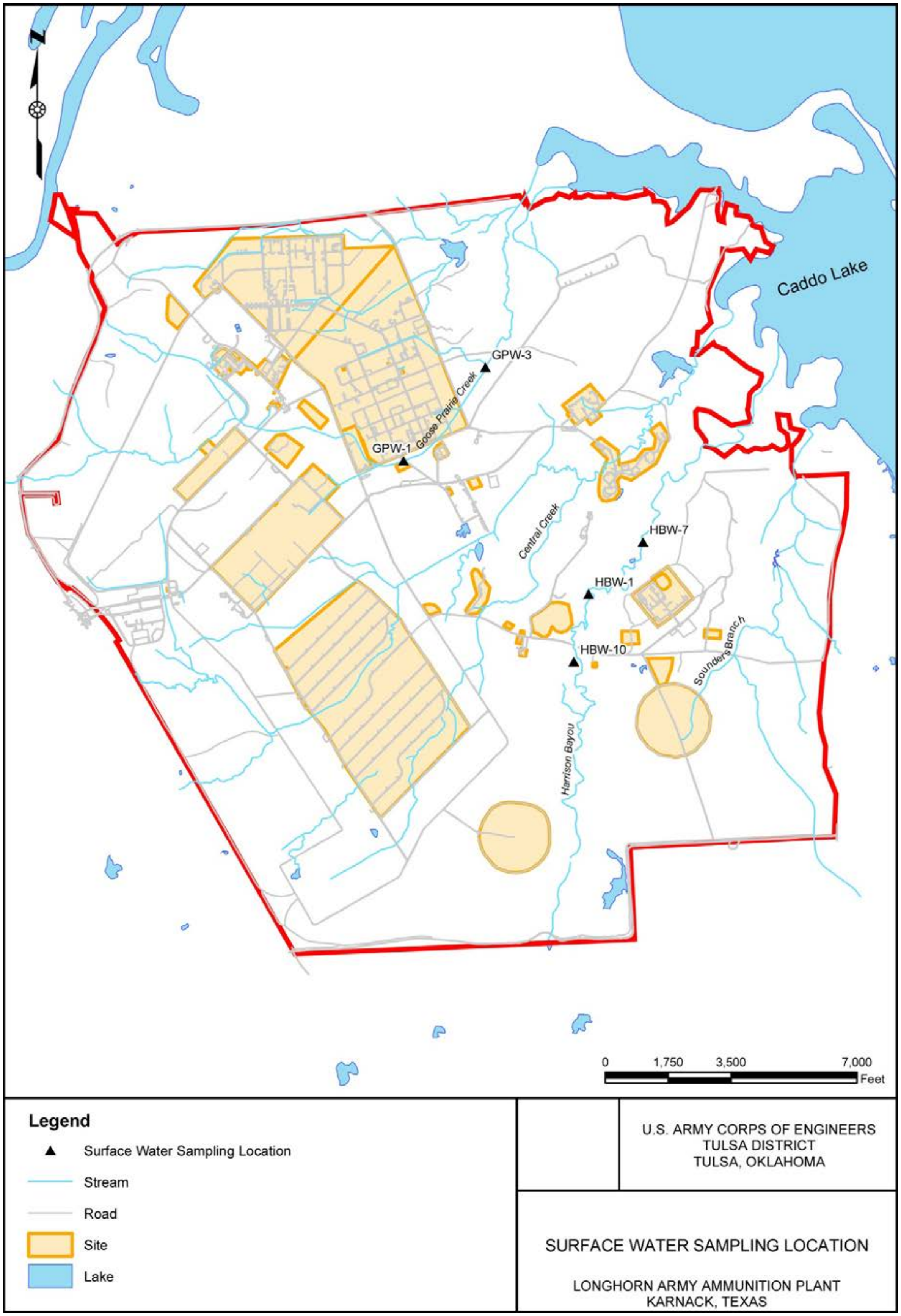
00864169

Surface Water Samples - Perchlorate



00864170

Longhorn Army Ammuntion Plant Creek Sampling Locations



Attachment B

Quality Control Summary Report

00864172

QUALITY CONTROL SUMMARY REPORT
SURFACE WATER
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:

ON THE LINE

U.S. Army Corps of Engineers

Prepared By:

AECOM

AECOM Technical Services

November 2017

Table of Contents

List of Tables

1 INTRODUCTION

AECOM reviewed four data packages from Microbac Laboratory Services, Marietta, OH. Surface water samples were collected January 18, February 15, May 24, and August 31, 2017 at Goose Prairie Creek and Harrison Bayou at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Data were reviewed for conformance to the requirements of the following guidance documents: Automated Data Review by Laboratory Data Consultants (ADR.net), United States Environmental Protection Agency (EPA) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, (EPA, January 2017), and EPA Contract Laboratory Program National Functional Guidelines for Low Concentration Organic Data Review, (EPA, January 2017).

1 1 Intended Use of Data

Groundwater treatment activities consist of monitoring of treated water to ensure compliance with the discharge limitations.

Analyses requested included:

- SW6850 – Perchlorate by LC/MS/MS

Table 1 lists the sample identification numbers (IDs) and their associated laboratory IDs. **Table 2** lists qualified results with the associated quality control parameter that was exceeded.

1 2 Preservation and Holding Times

Sample identification data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and with the required signatures.

1 Calibrations

Initial calibration acceptance criteria are specified in Worksheet 24 of the project-specific QAPP. For perchlorate, the methods criteria are a relative standard deviation (RSD) less than or equal to 20 percent (%) or a correlation coefficient (r^2) $\geq$ 0.99. All calibrations met the method criteria.

1 1 Continuing Calibration erifications (CC)

The continuing calibration verification (CCV) acceptance criteria are specified in Worksheet 24 of the project-specific QAPP. For perchlorate, the methods criteria are if the CCV exceeds 15% difference (%D), the compound is checked in the LCS, if both are outside recovery limits, the compound is rejected, R. If only the CCV exceeds recovery criteria and is less than ±15% difference, then the compound is qualified J or UJ.

All CCVs were within the acceptance criteria.

1 4 Blanks

If the sample result for an associated sample was non-detect or less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, the corresponding sample result for the analyte was qualified U. Where the sample result for the affected analyte was greater than 5X (10X) the amount in the blank, no qualifier was applied.

Perchlorate was not detected in the blanks.

1 Laboratory Control Sample(LCS) Laboratory Control Sample Duplicate(LCSD)

LCS/LCSD recoveries were evaluated using limits defined for each method in Worksheet 15 of the project-specific QAPP.

All LCS/LCSD recoveries were within the control limits.

1 6 Matrix Spike (MS) Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined for each method in Worksheet 15 of the project-specific QAPP. The MS/MSD was run on a sample belonging to another client. Therefore, these non-project MS/MSD results were not used to qualify the data.

1 7 Internal Standards

When the percent recovery for an internal standard in a sample is outside the laboratory limits, the associated sample is qualified for the analytes associated with the internal standard(s) outside of the acceptance criteria.

Internal standard recoveries were within the acceptance criteria.

1 Field Precision

Precision is the measure of variability of individual sample measurements. Evaluation of field duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at 0-25% for groundwater matrices. Field duplicate samples were not submitted with this sample set; therefore, field duplicate variability was not evaluated.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (see Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Identification

Client Sample ID	Laboratory Sample ID	SW6850
GPW 1A-011817	L17010917-01	X
GWP 1-011817	L17010917-02	X
HBW 7-011817	L17010917-03	X
HBW 7-021517	*L17020861-01 (1702143-01)	X
HBW 10-021517	*L17020861-02 (1702143-02)	X
HBW 1-021517	*L17020861-03 (1702143-03)	X
GPW 1-021517	*L17020861-04 (1702143-04)	X
GPW 3-021517	*L17020861-05 (1702143-05)	X
HBW 7-052417	L17051393-01	X
HBW 10-052417	L17051393-02	X
HBW 1-052417	L17051393-03	X
GPW 1-052417	L17051393-04	X
GPW 3-052417	L17051393-05	X
HBW7-083117	L17090079-01	X
HBW10-083117	L17090079-02	X
HBW1-083117	L7090079-03	X

Laboratory – Microbac Laboratories in Marietta, Ohio
*Subcontracted Laboratory – Empirical Laboratories in Nashville, Tennessee
SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
X – Sample analyzed for indicated parameter.

Table 2: Qualified Analytical Data

Client Sample ID	Laboratory Sample ID	Analyte Name	Data Validation Qualifier	Reason for Qualification
N/A	N/A	N/A	N/A	N/A

N/A – Not applicable.

Table 3: Completeness by Method

Method	No. of Rejected Results	% Completeness
SW6850	0	100

SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

00864178

QUALITY CONTROL SUMMARY REPORT SURFACE WATER
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:

U.S. Army Corps of Engineers

Prepared By:

bhate
ENVIRONMENT & INFRASTRUCTURE

1608 13th Avenue South, Suite 300
Birmingham, Alabama 35205
1-800-806-4001 • www.bhate.com

March 2018

Table of Contents

List of Tables

1 INTRODUCTION

Bhate reviewed one data package from ALS Environmental, Houston, Texas (perchlorate data subcontracted thru ALS Environmental in Salt Lake City, Utah). Surface water samples were collected December 26, 2017 at Goose Prairie Creek and Harrison Bayou at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Data were reviewed for conformance to the requirements of the following guidance documents: *USEPA Contract Laboratory Program* [CLP] *National Functional Guidelines for Superfund Organic Methods Data Review* (USEPA, January 2017), *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review* (USEPA, January 2017) and the *Army Draft Basewide Uniform Federal Policy (UFP) – Quality Assurance Project Plan (QAPP) Longhorn Army Ammunition Plant* (Bhate, November 2017).

1 1 Intended Use of Data

Analyses requested included:

- SW6850 – Perchlorate by LC/MS/MS

Table 1 lists the sample identification numbers (IDs) and their associated laboratory IDs. **Table 2** lists qualified results with the associated quality control parameter that was exceeded.

1 2 Preservation and Holding Times

Sample identification data were evaluated for agreement with the chain-of-custody (COC). All samples were received in appropriate containers, within the proper temperature range, in good condition, and with the required signatures.

1 Calibrations

Initial calibration acceptance criteria are specified in Worksheet 24 of the project-specific QAPP. For perchlorate, the methods criteria are a relative standard deviation (RSD) less than or equal to 20 percent (%) or a correlation coefficient (r^2) $\geq$ 0.99.

All calibrations met the method criteria.

1.3.1 Continuing Calibration Verifications (CCV)

The continuing calibration verification (CCV) acceptance criteria are specified in Worksheet 24 of the project-specific QAPP. For perchlorate, the methods criteria are if the CCV is outside $\pm$15% difference (%D) the lab will reanalyze all samples since last acceptable CCV. If reanalysis cannot be performed, all results for perchlorate in all samples since last acceptable CCV are qualified J or UJ.

All CCVs were within the acceptance criteria.

1 4 Blanks

If the sample result for an associated sample was non-detect or less than 5X (10X for common laboratory contaminants) the analyte concentration in the blank, the corresponding sample result for the analyte was qualified UB. Where the sample result for the affected analyte was greater than 5X (10X) the amount in the blank, no qualifier was applied.

Perchlorate was not detected in the blanks.

1 Laboratory Control Sample(LCS)/Laboratory Control Sample Duplicate(LCSD)

LCS/LCSD recoveries were evaluated using limits defined for each method in Worksheet 15 of the project-specific QAPP.

All LCS/LCSD recoveries were within the control limits.

1 6 Matrix Spike (MS)/Matrix Spike Duplicate Sample (MSD)

MS/MSD recoveries were evaluated using limits defined for each method in Worksheet 15 of the project-specific QAPP.

The MS/MSD recoveries were within the control limits.

1 7 Internal Standards.

When the percent recovery for an internal standard in a sample is outside the laboratory limits, the associated sample is qualified for the analytes associated with the internal standard(s) outside of the acceptance criteria.

Internal standard recoveries were within the acceptance criteria.

1 Field Precision

Precision is the measure of variability of individual sample measurements. Evaluation of field duplicates for precision was done using the Relative Percent Difference (RPD). The RPD is defined as the difference between two duplicate samples divided by the mean and expressed as a percent. Field duplicate RPD limits were set at <30% for groundwater matrices. Field duplicate samples were not submitted with this sample set; therefore, field duplicate variability was not evaluated.

2 DATA USABILITY SUMMARY

The data are usable for the intended purposes of the project (see Table 3). The data quality objectives have been met for the project.

Table 1: Field Sample Identification and Laboratory Identification

Client Sample ID	Laboratory Sample ID	SW6850
HBW7_122617	HS17121303-01	X
HBW10_122617	HS17121303-02	X
HBW1_122617	HS17121303-03	X
GPW1_122617	HS17121303-04	X
GPW3_122617	HS17121303-05	X

Laboratory – ALS Environmental Houston, TX (sub'd through ALS Salt Lake City, UT.)
SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
X – Sample analyzed for indicated parameter.

Table 2: Qualified Analytical Data

Client Sample ID	Laboratory Sample ID	Analyte Name	Data Validation Qualifier	Reason for Qualification
N/A	N/A	N/A	N/A	N/A

N/A – Not applicable.

Table 3: Completeness by Method

Method	No. of Rejected Results	% Completeness
SW6850	0	100

SW-846 - Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.

Attachment C

Laboratory Data Packages

Microbac

Laboratory Report Number: L17010917

Kayla Teague
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on January 30 2017

Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1

Microbac

Lab Report #: L17010917
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00114105	H	1.0		J4616882827	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

Microbac

Lab Report #: L17010917
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Samples Received

Client ID	Laboratory ID	Date Collected	Date Received
GPW 1A-011817	L17010917-01	01/18/2017 08:10	01/19/2017 09:35
GWP 1-011817	L17010917-02	01/18/2017 08:25	01/19/2017 09:35
HBW 7-011817	L17010917-03	01/18/2017 08:55	01/19/2017 09:35

Microbac®

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17010917
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG600355	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-01-30 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson	Eric C. Lawson	Chemist III	2017-01-30 15:54:25

RG-366/TRRP-13 May 2010 **ID:** 7964

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17010917
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG600355	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-01-30 00:00:00		

Description	**Yes**	**No**	**NA**	**NR**	**ER#**
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

RG-366/TRRP-13 May 2010 **ID:** 7964

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17010917
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG600355	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-01-30 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
Were MS/MSD RPDs within laboratory QC limits?					
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17010917
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG600355	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-01-30 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17010917
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG600355	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-01-30 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;

2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);

3. NA = Not applicable;

4. NR = Not reviewed;

5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17010917
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG600355	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-01-30 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] ____________ on **(enter date of last inspection)**. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Microbac

Lab Report #:	L17010917
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17010917-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 1A-011817	**Prep Method:**	6850	**Prep Date:**	01/26/2017 19:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	12/16/2016 23:37
Workgroup #:	WG600355	**Analyst:**	JWR	**Run Date:**	01/26/2017 22:40
Collect Date:	01/18/2017 08:10	**Dilution:**	10	**File ID:**	1LM.LM38092
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	14.9		4.00	2.00	1.00

Certificate of Analysis

Sample #:	L17010917-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GWP 1-011817	**Prep Method:**	6850	**Prep Date:**	01/26/2017 19:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	12/16/2016 23:37
Workgroup #:	WG600355	**Analyst:**	JWR	**Run Date:**	01/26/2017 22:58
Collect Date:	01/18/2017 08:25	**Dilution:**	1	**File ID:**	1LM.LM38093
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.150	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17010917
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17010917-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7-011817	**Prep Method:**	6850	**Prep Date:**	01/26/2017 19:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	12/16/2016 23:37
Workgroup #:	WG600355	**Analyst:**	JWR	**Run Date:**	01/26/2017 23:17
Collect Date:	01/18/2017 08:55	**Dilution:**	1	**File ID:**	1LM.LM38094
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.343	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data

Microbac

Lab Report #:	L17010917
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17010917-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 1A-011817	**Prep Method:**	6850	**Prep Date:**	01/26/2017 19:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	12/16/2016 23:37
Workgroup #:	WG600355	**Analyst:**	JWR	**Run Date:**	01/26/2017 22:40
Collect Date:	01/18/2017 08:10	**Dilution:**	10	**File ID:**	1LM.LM38092
Sample Tag:	DL01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	14.9		4.00	2.00	1.00

Certificate of Analysis

Sample #:	L17010917-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GWP 1-011817	**Prep Method:**	6850	**Prep Date:**	01/26/2017 19:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	12/16/2016 23:37
Workgroup #:	WG600355	**Analyst:**	JWR	**Run Date:**	01/26/2017 22:58
Collect Date:	01/18/2017 08:25	**Dilution:**	1	**File ID:**	1LM.LM38093
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.150	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17010917
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17010917-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7-011817	**Prep Method:**	6850	**Prep Date:**	01/26/2017 19:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	12/16/2016 23:37
Workgroup #:	WG600355	**Analyst:**	JWR	**Run Date:**	01/26/2017 23:17
Collect Date:	01/18/2017 08:55	**Dilution:**	1	**File ID:**	1LM.LM38094
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.343	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

2.1.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate

Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of internal standard (IS) = Rx/Ristd

x = amount ratio = concentration analyte/concentration internal standard (IS) = Cx / Cistd

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

y = 1.45x + -0.00242

Step 2: Substitute the value for y

where y = 12600/226000 = 0.055752

Step 3: Solve for x

x = (y - b)/m = 0.0040119

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(x) = (5 ug/L)(0.040119) = 0.200594 ug/L

Example Calculation - Water:

Slope from curve, m:	1.45
Intercept from curve, b:	-0.00242
Response of analyte, Rx:	12600
Response of Internal Standard , Ristd:	226000
Concentration of IS, Cistd (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, Cx (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, Cx (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

INITIAL CALIBRATION SUMMARY

Login Number: L17010917
Analytical Method: 6850
ICAL Workgroup: WG595346

Instrument ID: LCMS1
Initial Calibration Date: 16-DEC-16 23:37
Column ID: F

Analyte		AVG RF	% RSD	LINEAR (R)	QUAD (R^2)
Perchlorate		1.691	3.94	1.00000	

R = Correlation coefficient; 0.995 minimum
R^2 = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008
PDF File ID: 5130660
Report generated 01/30/2017 09:23

Login Number: L17010917
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 16-DEC-16 23:37
Column ID: F

Analyte	WG595346-02			WG595346-03			WG595346-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	10900.0000	1.729	0.200	21400.0000	1.692	0.500	54100.0000	1.728

INT_CAL - Modified 03/06/2008
PDF File ID: 5130660
Report generated 01/30/2017 09:23

INITIAL CALIBRATION DATA

Login Number: L17010917
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 16-DEC-16 23:37
Column ID: F

Analyte	WG595346-05			WG595346-06			WG595346-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	106000.000	1.685	2.00	206000.000	1.675	5.00	505000.000	1.663

INT_CAL - Modified 03/06/2008
PDF File ID: 5130660
Report generated 01/30/2017 09:23

INITIAL CALIBRATION DATA

Login Number: L17010917
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 16-DEC-16 23:37
Column ID: F

Analyte	WG595346-08		
	CONC	RESP	RF
Perchlorate	10.0	978000.000	1.668

INT_CAL - Modified 03/06/2008
PDF File ID: 5130660
Report generated 01/30/2017 09:23

Microbac Laboratories Inc.

ALTERNATE SOURCE CALIBRATION REPORT

Login Number: L17010917 Run Date: 12/16/2016 Sample ID: WG595346-09
Instrument ID: LCMS1 Run Time: 23:56 Method: 6850
File ID: 1LM.LM37773 Analyst: JWR QC Key: DOD4
ICal Workgroup: WG595346 Cal ID: LCMS1 - 16-DEC-16

Analyte		Expected	Found	Units	RF	%D	UCL	Q
Perchlorate		1.00	1.04	ug/L	1.74	4.00	15	

* Exceeds %D Limit

ALT - Modified 09/06/2007
Version 1.5 PDF File ID: 5130661
Report generated 01/30/2017 09:23

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	L17010917-01
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38092
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 22:40	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	204000	69300	2.94	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	L17010917-02
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38093
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 22:58	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	17100	6470	2.64	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	L17010917-03
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38094
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 23:17	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	43700	13800	3.17	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37766
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 21:44	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	10900	3720	2.93	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37767
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 22:02	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	21400	7850	2.73	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37768
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 22:21	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	54100	19300	2.80	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37769
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 22:40	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	106000	36100	2.94	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37770
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 22:59	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	206000	70700	2.91	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37771
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 23:18	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	505000	170000	2.97	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37772
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 23:37	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	978000	326000	3.00	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG595346-09
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM37773
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	12/16/2016 23:56	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	107000	36700	2.92	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38036
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 14:52	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38037
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 15:13	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38038
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 15:33	**Units:**	ug/L

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38039
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 15:53	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38040
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 16:14	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38041
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 16:34	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38042
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 16:55	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG598980-11
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38045
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/18/2017 17:56	**Units:**	ug/L

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-01
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38087
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 21:05	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	25900	8810	2.94	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-02
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38088
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 21:24	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-03
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38089
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 21:43	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	26700	9320	2.86	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-05
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38095
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 23:36	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	64700	21600	3.00	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-06
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38096
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 23:55	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	64100	22600	2.84	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-07
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38086
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 20:46	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	25700	9060	2.84	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**	6850	**Samplenum:**	WG600355-08
Instrument:	LCMS1	**Prep Date:**	01/26/2017 19:00	**File ID:**	1LM.LM38098
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/27/2017 00:33	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	28900	10100	2.86	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG600358-01
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38084
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 20:08	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG600358-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38085
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/26/2017 20:27	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	129000	44100	2.93	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG600358-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38097
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/27/2017 00:14	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	135000	44100	3.06	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17010917	**Prep Method:**		**Samplenum:**	WG600358-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM38099
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG600355	**Analysis Date:**	01/27/2017 00:52	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
January 30, 2017

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001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
AED - ALLEN E. DAVIS	ALS - ADRIANE L. STEED
AMA - ALEXANDRA M. ALFRED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BKT - BRENDAN TORRENCE	BLG - BRENDA L. GREENWALT
BNB - Brandi N. Bentley	BRG - BRENDA R. GREGORY
CAA - CASSIE A. AUGENSTEIN	CAF - CHERYL A. FLOWERS
CAS - Craig A. Smith	CEB - CHAD E. BARNES
CJQ - Cameron J. Quick	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CLW - CHARISSA L. WINTERS
CPD - CHAD P. DAVIS	CRW - CHRISTINA R. WILSON
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EMW - ERIC M. WILKEN
ENY - EMILY N. YOAK	ERP - ERIN R. PORTER
FJB - FRANCES J. BOLDEN	HDD - HANAH D. DAWKINS
JDH - JUSTIN D. HESSON	JDS - JARED D. SMITH
JKP - JACQUELINE K. PARSONS	JLD - JESSICA L. DELONG
JLL - JOHN L. LENT	JMW - JEANA M. WHITE
JST - JOSHUA S. TAYLOR	JTP - JOSHUA T. PEMBERTON
JWR - JOHN W. RICHARDS	JWS - JACK W. SHEAVES
JYH - JI Y. HU	KAK - KATHY A. KIRBY
KAT - KATHY A. TUCKER	KDD - Katelyn D. Daley
KDW - KATHRYN D. WELCH	KEB - KATIE E. BARNES
KHR - KIM H. RHODES	KKB - KERRI K. BUCK
KRA - KATHY R. ALBERTSON	KRB - KAELY R. BECKER
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LKN - LINDA K. NEDEFF	LLS - LARRY L. STEPHENS
LSB - LESLIE S. BUCINA	LSJ - LAURA S. JONES
MAP - MARLA A. PORTER	MBK - MORGAN B. KNOWLTON
MDA - MIKE D. ALBERTSON	MDC - MIKE D. COCHRAN
MES - MARY E. SCHILLING	MMB - MAREN M. BEERY
MRT - MICHELLE R. TAYLOR	MSW - MATT S. WILSON
NPH - Natalie P. Hart	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	QX - QIN XU
RAH - ROY A. HALSTEAD	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCB - SARAH C. BOGOLIN
SDC - SHALYN D. CONLEY	SLM - STEPHANIE L. MOSSBURG
SLP - SHERI L. PFALZGRAF	TB - TODD BOYLE
TGF - TIM G. FELTON	TMB - TIFFANY M. BAILEY
TMM - TAMMY M. MORRIS	VC - VICKI COLLIER
WJB - WILL J. BEASLEY	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	

00864264

AECOM

Chain of Custody Record

COC Number:

Laboratory:	Microbac POC: Stephanie Mossburg	**Project Manager:**	Debra Richmann	**Mail to:**	Linda Raabe
Address:	158 Starlite Drive	**Phone/Fax Number:**	210-296-2000		112 East Pecan STE. 400
	Marietta, OH 45750	**Sampler (print):**	Scott Beesinger		San Antonio, TX 78205
Phone:	1-800-373-4071				210-296-2000
Client:	AECOM	**Signature:**	Scott Beesinger	**Fed Ex Airbill No:**	
Address:	112 East Pecan Ste. 400				
	San Antonio, TX 78205	**pH:**		**Program:**	
Turn Around Time:	STANDARD				
Project Name/Location:	Longhorn				
Project Number:	60256135.0009AA			**ERPIMS REQUIRED FIELDS**	

Site Name	Sample ID/Location ID	SBD	SED	Date	Time	Comp*	Grab	Matrix	Number of Containers	Perchlorate							SA CODE	Cooler ID	LOT CONTROL NUMBERS ABLOT	EBLOT	TBLOT
Harrison Bayou & Goose Prarie Creek	GPW 1A - 011817			1/18/17	8:10		X	W	1	X											
	GPW 1 - 011817			1/18/17	8:25		X	W	1	X											
	HBW 7 - 011817			1/18/17	8:55		X	W	1	X											

Comments: **STANDARD TAT**

Relinquished by: (Signature) Scott Beesinger	Date 1/18/17	Time 1400	Received by: (Signature)	Relinquished by: (Signature)	
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	Remarks:	

Microbac OVD
Received: 01/19/2017 09:35
By: BRENDA GREGORY
221000096038
Brenda Gregory

QC Manager

*Homogenize all composite samples prior to analysis

MICROBAC

Cooler ID 1038

COOLER TEMP >6° C LOG

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

BG 1/19/17

pH Lot # HC693124

pH Exceptions

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

BG 1/19/17

PRESERVATIVE EXCEPTIONS

✓ NONE

__AS NOTED

BG 1/19/17

Document Control # 1957
Last 10-07-2016

Issued to: Document Master File

NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
Total Halide by Bomb Combustion (TX)
Particle Sizing - 200 Mesh (PS200)
Specific Gravity/Density (SPGRAV)
Total Residual Chlorine (CL-TRL)
Total Volatile Solids (all forms) (TVS)
Total Coliform Bacteria (all methods)
Fecal Coliform Bacteria (all methods)
Sulfite (SO3)
Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS
Nitrogen, Ammonia by Method 350.1
Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
Phenolics, Total by Method 420.1
ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

<u>OVD HPLC02/HPLC-UV</u>

Nitroglycerin
Acetic acid
Butyric acid
Lactic acid
Propionic acid
Pyruvic acid

<u>OVD MSS01/GC-MS</u>

1,4-Phenylenediamine
1-Methylnaphthalene
1,4-Dioxane
Atrazine
Benzaldehyde
Biphenyl
Caprolactam
Hexamethylphosphoramide (HMPA)
Pentachlorobenzene
Pentachloroethane

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALS

OVD MSS0I/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP

SOLID AND HAZARDOUS CHEMICALS

<u>OVD MSV0I/GC-MS</u>

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

ANALYTICAL DATA PACKAGE
SDG # 1702143

PROJECT NAME: Perchlorate

SUBMITTAL TO:
Stephanie Mossburg
Microbac Laboratories, Inc.
158 Starlite Drive
Marietta, OH 45750

SUBMITTAL BY:
Empirical Laboratories, LLC (EL)
621 Mainstream Drive, Suite 270
Nashville, TN 37228
Tel (615)345-1115
Fax (866)417-0548

LABORATORY CONTACT PERSON:
Project Manager: Sonya Gordon
Tel (615)345-1115
Fax (866)417-0548
Email: sgordon@empirlabs.com

Original Report Date: February 27, 2017
Report Revision #: 01
Revision Date: March 16, 2017

THIS DOCUMENT MEETS DoD QSM 5.0 STANDARDS

The results relate to only the samples associated with the referenced SDG and the submitted data has been produced in accordance with laboratory procedures. The Laboratory's Data Review Manager, Ms. Amy Barnett, is responsible for the final data produced and reported. Her signature is listed at the end of the Case Narrative within the Analytical Data Package. If applicable to this report package, details on report revisions and the information on subcontracted analysis are listed in the package Case Narrative. This report shall not be reproduced, except in full, without the written approval of Empirical Laboratories, LLC.

L-A-B Accredited - Certificate Number L2226 - Testing

Table of Contents

Sample Delivery Group Case Narrative

Receipt Information:

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision:

Revision 01: The package was revised to change the package level from a level IV to a level III.

Analytical Information:

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. Sample preparation and dilution information is provided within the final results report and at the beginning of each form set. The following information is provided specific to individual methods:

Perchlorate:

No anomalies or deviations are noted.

Data Qualifiers:

As applicable and where required, the following general qualifiers are associated with the sample results. Additional qualifiers will be specified within the reporting sections of the data package or within the body of the Case Narrative.

Analytical Report Terms and Qualifiers

DL: The detection limit (DL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The DL is supported by the method detection limit (MDL) which is determined from analysis of a sample containing the analyte in a given matrix.

LOD: The Limit of Detection is an estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte- and matrix-specific and may be laboratory-dependent. This definition is further clarified in the DoD QSM 4.2 revisions as the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a high level of confidence (99%). At the LOD, the false negative rate (Type II error) is 1%.

LOQ: The Limit of Quantitation is the minimum level, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. This term is further clarified within the DoD QSM 4.2 as the lowest concentration that produces a quantitative result within specified limits of precision and bias.

*: Exceeding quality control criteria are associated with the reported result.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero.

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound. For Metals, the qualifier indicates that the serial dilution was outside of the control limits and the compound should be considered estimated due to the presence of interference.

H: The result was analyzed, extracted, or received outside of the EPA recommended holding time.

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the LOQ. One should feel confident that the result is greater than zero and less than the LOQ.

M: Indicates that the sample matrix interfered with the quantitation of the analyte. In dual column analysis the result is reported from the column with the lower concentration. In inorganics, it indicates that the parameters DL/LOD/LOQ have been raised.

N: The MS/MSD accuracy and/or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter.

P: The associated numerical value is an estimated quantity. There is greater than a 40% difference between the two GC columns for the detected concentrations. The higher of the two values is reported unless matrix interference is obvious or for HPLC analysis where the primary column is reported.

Q: The relative percent difference (RPD) and/or percent recovery exceeded limits in the associated Blank Spike and/or Blank Spike Duplicate.

S: The associated internal standard exceeded criteria.

U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the DL.

X: The parameter shows a potential positive bias on a reported concentration due to an ICV or CCV exceeding the upper control limit on the high side.

Y: The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side.

Z: The parameter shows lack of confirmation/detection, which may be due to a negative bias in the ICV or CCV which exceeds the lower control limit.

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.

B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.

C: The peak was manually integrated to correct the baseline from the original chromatogram.

D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.

E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

LIMS Definitions / Naming Conventions:

The following are general naming conventions that are used throughout the laboratory; however, on a method by method basis, there are additional QAQC items that are named in a consistent format.

BLK: LIMS assigns a unique identifier to the Method Blank by naming it as the letters BLK appended to the Batch ID. A Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The Method Blank is used to assess for possible contamination during preparation and/or analysis steps. Method Blanks within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally.

BS: LIMS assigns a unique identifier to the Blank Spike by naming it as the letters BS appended to the Batch ID. The Blank Spike or Lab Control Sample is a controlled analyte-free matrix, which is spiked with known and verified concentrations of target analytes. Spiking concentrations can be referenced in the method SOP. The BS is used to evaluate the viability of analytes taken through the entire prep (when applicable) and analytical process. Blank Spikes within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally. A duplicate Blank Spike will be designated as a BSD.

MS: The LIMS assigns each Client sample with a unique identifier. The Matrix Spike is designated with a MS at the end of the sample's unique identifier. The Matrix Spike sample is used to assess the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. A duplicate Matrix Spike will be designated as a MSD.

IDs: The LIMS assigns each Client sample with a unique identifier. The letter "RE" may potentially be appended to the end of the LIMS Sample ID. And "RE" implies that the sample was either re-prepped, re-analyzed straight, or re-analyzed at a dilution. Subsequent re-analysis for the sample will be appended with a numerical value beginning with 1 that will increase incrementally. Eg: RE1, RE2, RE3, etc.

Statement of Data Authenticity:

I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, the Data Quality Manager, Technical Directors or Project Managers are authorized to sign this Statement of Data Authenticity.

Amy Barnett

Ms. Amy M. Barnett
Data Review Manager

Empirical Laboratories, LLC
Certifications Approvals
(Revised 01 1   2017)

DoD ELAP QSM   0, Certificate Number L2226
- Aqueous
- Non-aqueous
- Expires: 11/30/2018

State of Florida, Department of Health – NELAP Primary, Lab ID E 7646
- Clean Water Act
- RCRA/CERCLA
- Expires: 06/30/2017

State of Georgia, Environmental Protection Agency – NELAP, Self Certification
- Expires: 06/30/2017

Commonwealth of   entucky, Energy and Environment Cabinet – WWLCP, Laboratory Number   017
- Wastewater
- Expires: 12/31/2017

Commonwealth of   entucky, Department of Environmental Protection – UST, Certificate Number 77
- Aqueous
- Non-aqueous
- Expires: 06/30/2017

State of New Jersey, Department of Environmental Protection – NELAP, Lab ID TN47
- Water Pollution
- Solid and Hazardous Waste
- Expires: 06/30/2017

State of North Carolina, Department of Environment and Natural Resources - Certificate Number 64
- Aqueous
- Non-aqueous
- Expires: 12/31/2017

State of Texas, Commission on Environmental Quality – NELAP, Certificate Number T104704 07-16-14
- Aqueous
- Non-aqueous
- Expires: 12/31/2017

State of Utah, Department of Health – NELAP, Certificate Number TN0042016-
- Aqueous
- Non-aqueous
- Expires: 07/31/2017

Commonwealth of   irginia, Department of General Services – NELAP, Certificate Number   24, Lab ID 46024
- Aqueous
- Non-aqueous
- Expires: 12/14/2017

State of Washington, Department of Ecology – NELAP, Lab ID C   4-16
- Groundwater
- Solid and Hazardous Waste
- Expires: 03/18/2017

ORGANIC CALCULATIONS

GC/MS Volatiles

$$\text{Final Concentration} = \frac{\text{On-column(ug/L or ug/Kg)} * \text{Expected Vol/Weight (mL or g)} * \text{Dilution}}{\text{Initial Vol/Weight (mL or g)} * \text{(Percent Solids/100) (if applicable)}}$$

Note - Expected Vol/Weight value is found in "Final Vol" column of Preparation Batch Summary.

GC/MS Extractables

$$\text{Final Concentration} = \frac{\text{On-column(ng/uL)} * \text{Final Vol (ml)} * \text{Dilution} *\text{(1000uL/mL)}}{\text{Initial Vol/Weight (mL or g)} * \text{(Percent Solids/100) (if applicable)}}$$

= ng/mL or ng/g

= ug/L or ug/kg

GC or LC Extractables

$$\text{Final Concentration} = \frac{\text{On-column(ng/mL)} * \text{Final Vol (mL)} * \text{Dilution}}{\text{Initial Vol/Weight (mL or g)} * \text{(Percent Solids/100) (if applicable)}}$$

= ng/mL or ng/g

= ug/L or ug/kg

Sample Receipt Information

1702143-01 A

AECOM Chain of Custody Record

COC Number:

Microbac	POC: Stephanie Mossburg	Project Manager:	Debra Richmann
Address:	158 Starlite Drive	Phone/Fax Number:	210-296-2000
	Marietta, OH 45750	Sampler (print):	Scott Beesinger
Phone:	1-800-373-4071	Signature:	Scott Beesinger
Client:	AECOM	pH:	
Address:	112 East Pecan Ste. 400		
	San Antonio, TX 78205		
Turn Around Time:	STANDARD		
Project Name/Location:	Longhorn		
Project Number:	60256135.0009AA		

Mail to: Linda Raabe, 112 East Pecan STE. 400, San Antonio, TX 78205, 210-296-2000

Fed Ex Airbill No:

Program:

ERPIMS REQUIRED FIELDS

Site Name	Sample ID/Location ID	SBD	SED	Date	Time	Comp•	Grab	Matrix	Number of Containers	Perchlorate	SA CODE	Cooler ID	LOT CONTROL NUMBERS ABLOT	EBLOT	TBLOT
Harrison Bayou & Goose Prarie Creek	01 HBW 7 - 021517			2/15/17	12:32		X	W	1	X					
	02 HBW 10 - 021517			2/15/17	12:40		X	W	1	X					
	03 HBW 1 - 021517			2/15/17	12:52		X	W	1	X					
	04 GPW 1 - 021517			2/15/17	13:07		X	W	1	X					
	05 GPW 3 - 021517			2/15/17	13:16		X	W	1	X					

Comments: **STANDARD TAT**

Relinquished by: (Signature) Scott Beesinger	Date 2/15/17	Time 1500	Received by: (Signature)	Relinquished by: (Signature)	
Relinquished by: (Signature)	Date	Time	Received for Laboratory by (Signature) Brenda Gregory 2/17/17 @ 950	Time	Remarks:

Microbac OVD
Received: 02/16/2017 09:38
By: BRENDA GREGORY
221000097115

•Homogenize all composite samples prior to analysis

Distribution: White to Laboratory, Canary to Project Manager, Pink QA/QC Manager

SUB-CONTRACTED ANALYSES

Attn: Sonya Gordon

L#: L17020861

Shipped To: Empirical Labs
621 Mainstream Dr.
Suite 270
Nashville, TN 37228

From: Microbac Laboratories Inc.
158 Starlite Park
Marietta, OH 45750
(740) 373-4071

Shipped Via: Fedex

Report To: Adriane Steed

P.O. #:

TAT Required:

See Chain of Custody for ID's, date and time collected.

Microbac Workorder Number	Number of Samples	Analyses
L17020861	5	Sub - CLO4

Ref: SUB: L17020861 - Date: 16Feb17 SHIPPING: 20.91
Dep: Wgt: 13.45 LBS SPECIAL: 0.73
HANDLING: 0.00
DV: 0.00 TOTAL: 21.64
Svcs: PRIORITY OVERNIGHT

Level: 1 2 3 4

Internal COC: YES / NO

Relinquished By	Date/Time	Comments
Cara Strickler	2/16/17 @1600	
Received By	**Date/Time**	**Cooler Temp**

Form 7-1
Revised 07/18/11

II. EMPIRICAL LABORATORIES
COOLER RECEIPT FORM

Cooler Received/Opened On: 2/17/17@0850 Work-order# 1702143

1. Tracking # 1640 (last 4 digits, FedEx)

   Courier: ___FedEx

2. Temperature of rep. sample or temp blank when opened: 1.2 °C + *correction factor (-0.1_) =* 1.1 °C
   (Temp Fluke#1 SN17680086)

3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA

4. Were custody seals on outside of cooler? YES...NO...NA

   If yes, how many and where: one, (R) front

5. Were the seals intact, signed, and dated correctly? YES...NO...NA

6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (initial/date) DJR 2/17/17

7. Were custody seals on containers: YES NO and Intact YES...NO...NA

   Were these signed and dated correctly? YES...NO...NA

8. Packing material used? Bubble-wrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None

9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None

10. Did all containers arrive in good condition (unbroken)? YES...NO...NA

11. Were all container labels complete (#, date, signed, pres., etc.)? YES...NO...NA

12. Did all container labels and tags agree with custody papers? YES...NO...NA

13. a. Were VOA vials received? YES...NO...NA

    b. Was there observable headspace present in any VOA vial (>5mm-6mm)? YES...NO...NA

14. Was there a Trip Blank in this cooler (custody seals present/intact)? YES...NO...NA...Comments__________
    If multiple coolers, sequence #________

I certify that I unloaded the cooler and answered questions 7-14 (initial/date) TH 2/17/17

15. a. On preserved bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA

    b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA

16. Was residual chlorine present for Cyanide "Effluent" samples? If so, treated/documented? YES...NO...NA

17. For 608 Pest/PCB samples, was pH <5 or >9? Was residual chlorine present? If either, adjusted/documented? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-17 (initial/date) TH 2/17/17

18. Were custody papers properly filled out (ink, signed, etc.)? YES...NO...NA

19. Did you sign the custody papers in the appropriate place? YES...NO...NA

20. Were correct containers used for the analysis requested? YES...NO...NA If not, PM notified? YES...NO...NA

21. Was sufficient amount of sample sent in each container? YES...NO...NA If not, PM notified? YES...NO...NA

22. Were there Non-Conformance issues at login? YES...NO...NCR#______________

I certify that I entered this project into LIMS and answered questions 18-22 (initial/date) TH 2/17/17

I certify that I attached a unique LIMS number label with matching sample name to each container (initial/date) TH 2/17/17

I certify that I notified the laboratory of any short holding time or RUSH parameters (initial/date) TH 2/17/17

Empirical Laboratories, LLC

WORK ORDER

1702143

Client:	**Microbac Laboratories, Inc.-Ohio Valley Division**	**Project Manager:**	**Sonya Gordon**
Project:	**Longhorn**	**Project Number:**	**MIC_Perc**

Report To:
Microbac Laboratories, Inc.-Ohio Valley Division
Adriane Steed
158 Starlite Drive
Marietta, OH 45750
Phone: (740) 373-4071
Fax: (740) 373-4835

Invoice To:
Microbac Laboratories, Inc.-Ohio Valley Division
Stephanie Mossburg
158 Starlite Drive
Marietta, OH 45750
Phone :(740) 373-4071
Fax: (740) 373-4835

Date Due:	03/03/2017 16:00 (10 day TAT)	Date Received:	02/17/2017 08:50
Logged In By:	Tiana L. Hutchings	Received By:	Tiana L. Hutchings

Samples Received at: **1.1°C**

Custody seals on the o	Yes	Samples received on i	Yes	Any headspace in vials	No
All containers in good	Yes	Custody seals intact?	Yes	Trip blank received?	No
Did the containers mat	Yes	Proper packing materi	Yes	Cyanide Effluent samp	No
Preserved containers a	No	VOA vials received?	No	608 Pest/PCB sample	No

Analysis	TAT	Expires	Version	Comments
1702143-01 HBW 7 - 021517 [Water] Sampled 02/15/2017 12:32 (GMT-06:00) Central Time (US & Canada)				
LCMS_PERC_6850_Q5	10	03/15/2017 12:32		
1702143-02 HBW 10 - 021517 [Water] Sampled 02/15/2017 12:40 (GMT-06:00) Central Time (US & Canada)				
LCMS_PERC_6850_Q5	10	03/15/2017 12:40		
1702143-03 HBW 1 - 021517 [Water] Sampled 02/15/2017 12:52 (GMT-06:00) Central Time (US & Canada)				
LCMS_PERC_6850_Q5	10	03/15/2017 12:52		
1702143-04 GPW 1 - 021517 [Water] Sampled 02/15/2017 13:07 (GMT-06:00) Central Time (US & Canada)				
LCMS_PERC_6850_Q5	10	03/15/2017 13:07		
1702143-05 GPW 3 - 021517 [Water] Sampled 02/15/2017 13:16 (GMT-06:00) Central Time (US & Canada)				
LCMS_PERC_6850_Q5	10	03/15/2017 13:16		

Sample Delivery Group Assignment Form

CLIENT: Microbac Laboratories, Inc.-Ohio Valley Division
PROJECT NAME: Longhorn
SDG #: 1702143

QC LEVEL: Level IV
Report Due: 3/3/2017
Client Sample Count: 5

Sample Type	Sampled	Received	Lab ID	Client ID	Lab Matrix	SW6850
Client Sample	2/15/2017	2/17/2017	1702143-01	HBW 7 - 021517	Water	X
Client Sample	2/15/2017	2/17/2017	1702143-02	HBW 10 - 021517	Water	X
Client Sample	2/15/2017	2/17/2017	1702143-03	HBW 1 - 021517	Water	X
Client Sample	2/15/2017	2/17/2017	1702143-04	GPW 1 - 021517	Water	X
Client Sample	2/15/2017	2/17/2017	1702143-05	GPW 3 - 021517	Water	X

Forms For

Perchlorates

Sample Extraction Data

Prep Method: PERC_6850_W-SW6850

Lab Number [Field ID]	Batch	Nominal Initial/Final	Initial [mL]	Final [mL]	Dilution	% Solids	Notes	Date
1702143-01 [HBW 7 - 021517]	7B23018	10.00/10.00	10.0	10.0	1.00			02/23/17
1702143-02 [HBW 10 - 021517]	7B23018	10.00/10.00	10.0	10.0	1.00			02/23/17
1702143-03 [HBW 1 - 021517]	7B23018	10.00/10.00	10.0	10.0	1.00			02/23/17
1702143-04 [GPW 1 - 021517]	7B23018	10.00/10.00	10.0	10.0	1.00			02/23/17
1702143-05 [GPW 3 - 021517]	7B23018	10.00/10.00	10.0	10.0	1.00			02/23/17

ANALYSIS DATA SHEET

HBW 7 - 021517

Laboratory:	Empirical Laboratories, LLC			SDG:	1702143		
Client:	Microbac Laboratories, Inc.-Ohio Vall			Project:	Longhorn		
Matrix:	Water	Laboratory ID:	1702143-01	File ID:	PERC000015.D.Report.TXT		
Sampled:	02/15/17 12:32	Prepared:	02/23/17 10:18	Analyzed:	02/23/17 17:49		
Solids:		Preparation:	PERC_6850_W	Dilution:	1		
Batch:	7B23018	Sequence:	7B05408	Calibration:	6144001	Instrument:	LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

Total Target Analytes Reported 1 Project Analytes: 1

ANALYSIS DATA SHEET

HBW 10 - 021517

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: Microbac Laboratories, Inc.-Ohio Vall Project: Longhorn

Matrix: Water Laboratory ID: 1702143-02 File ID: PERC000016.D.Report.TXT

Sampled: 02/15/17 12:40 Prepared: 02/23/17 10:18 Analyzed: 02/23/17 18:08

Solids: Preparation: PERC_6850_W Dilution: 1

Batch: 7B23018 Sequence: 7B05408 Calibration: 6144001 Instrument: LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

Total Target Analytes Reported 1 Project Analytes: 1

ANALYSIS DATA SHEET

HBW 1 - 021517

Laboratory:	Empirical Laboratories, LLC			SDG:	1702143		
Client:	Microbac Laboratories, Inc.-Ohio Vall			Project:	Longhorn		
Matrix:	Water	Laboratory ID:	1702143-03	File ID:	PERC000017.D.Report.TXT		
Sampled:	02/15/17 12:52	Prepared:	02/23/17 10:18	Analyzed:	02/23/17 18:27		
Solids:		Preparation:	PERC_6850_W	Dilution:	1		
Batch:	7B23018	Sequence:	7B05408	Calibration:	6144001	Instrument:	LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

Total Target Analytes Reported 1 Project Analytes: 1

ANALYSIS DATA SHEET

GPW 1 - 021517

Laboratory:	Empirical Laboratories, LLC			SDG:	1702143		
Client:	Microbac Laboratories, Inc.-Ohio Vall			Project:	Longhorn		
Matrix:	Water	Laboratory ID:	1702143-04	File ID:	PERC000018.D.Report.TXT		
Sampled:	02/15/17 13:07	Prepared:	02/23/17 10:18	Analyzed:	02/23/17 18:46		
Solids:		Preparation:	PERC_6850_W	Dilution:	1		
Batch:	7B23018	Sequence:	7B05408	Calibration:	6144001	Instrument:	LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

Total Target Analytes Reported 1 Project Analytes: 1

ANALYSIS DATA SHEET

GPW 3 - 021517

Laboratory:	Empirical Laboratories, LLC			SDG:	1702143		
Client:	Microbac Laboratories, Inc.-Ohio Vall			Project:	Longhorn		
Matrix:	Water	Laboratory ID:	1702143-05	File ID:	PERC000019.D.Report.TXT		
Sampled:	02/15/17 13:16	Prepared:	02/23/17 10:18	Analyzed:	02/23/17 19:05		
Solids:		Preparation:	PERC_6850_W	Dilution:	1		
Batch:	7B23018	Sequence:	7B05408	Calibration:	6144001	Instrument:	LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

Total Target Analytes Reported 1 Project Analytes: 1

LCS / LCS DUPLICATE RECOVERY

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Matrix:	Water		
Batch:	7B23018	Laboratory ID:	7B23018-BS1
Preparation:	PERC_6850_W	Initial/Final:	10 mL / 10 mL

ANALYTE	SPIKE ADDED (ug/L)	LCS CONCENTRATION (ug/L)	LCS % REC.	QC LIMITS REC.
Perchlorate	2.000	1.919	96.0	84 - 119

PREPARATION BATCH SUMMARY

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Batch:	7B23018 Batch Matrix: Water	Preparation:	PERC_6850_W

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
HBW 7 - 021517	1702143-01	02/23/17 10:18	10.00	10.00
HBW 10 - 021517	1702143-02	02/23/17 10:18	10.00	10.00
HBW 1 - 021517	1702143-03	02/23/17 10:18	10.00	10.00
GPW 1 - 021517	1702143-04	02/23/17 10:18	10.00	10.00
GPW 3 - 021517	1702143-05	02/23/17 10:18	10.00	10.00
Blank	7B23018-BLK1	02/23/17 10:18	10.00	10.00
LCS	7B23018-BS1	02/23/17 10:18	10.00	10.00

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: Microbac Laboratories, Inc.-Ohio Valley Division Project: Longhorn

Matrix: Laboratory ID: 7B23018-BLK1 File ID: PERC000008.D.Report.TXT

Sampled: Prepared: Analyzed: 02/23/17 15:37

Solids: Preparation: PERC_6850_W Dilution:

Batch: 7B23018 Sequence: 7B05408 Calibration: 6144001 Instrument: LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

Total Target Analytes Reported: 1

ANALYSIS DATA SHEET

LCS

Laboratory:	Empirical Laboratories, LLC		SDG:	1702143	
Client:	Microbac Laboratories, Inc.-Ohio Valley Division		Project:	Longhorn	
Matrix:		Laboratory ID: 7B23018-BS1		File ID:	PERC000009.D.Report.TXT
Sampled:		Prepared:		Analyzed:	02/23/17 15:56
Solids:		Preparation: PERC_6850_W		Dilution:	
Batch:	7B23018	Sequence: 7B05408	Calibration:	6144001	Instrument: LCMS1

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate	**1.919**	0.500	1.00	2.00	J

Total Target Analytes Reported: 1

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Lab File ID:	PERC000002.D.Report.TXT	Injection Date:	05/21/16
Instrument ID:	LCMS1	Injection Time:	09:46
Sequence:	6E14115	Lab Sample ID:	6E14115-TUN1

m/z	MASS CRITERIA	ACTUAL MASS	
83	99.7 - 100.3% of 83T	100	PASS
85	99.7 - 100.3% of 85T	100	PASS

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Lab File ID:	PERC000002.D.Report.TXT	Injection Date:	02/23/17
Instrument ID:	LCMS1	Injection Time:	13:45
Sequence:	7B05408	Lab Sample ID:	7B05408-TUN1

m/z	MASS CRITERIA	ACTUAL MASS	
83	99.7 - 100.3% of 83T	100	PASS
85	99.7 - 100.3% of 85T	100	PASS

INTERFERENCE CHECK SAMPLE

SW6850

Laboratory: Empirical Laboratories, LLC

SDG: 1702143

Client: Microbac Laboratories, Inc.-Ohio Valley Divisio

Project: Longhorn

Instrument ID: LCMS1

Calibration: 6144001

Sequence: 7B05408

Lab Sample ID	Analyte	True	Found	%R	Units
7B05408-IFA1	Perchlorate-d18	5.000	5.00	61.6	ug/L
	Perchlorate	2.000	1.98	99.2	ug/L

ANALYSIS SEQUENCE SUMMARY

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Sequence:	6E14115	Instrument:	LCMS1
Calibration:	6144001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	6E14115-TUN1	PERC000002.D.Report.TXT	05/21/16 09:46
Cal Standard	6E14115-CAL1	PERC000005.D.Report.TXT	05/21/16 10:39
Cal Standard	6E14115-CAL2	PERC000006.D.Report.TXT	05/21/16 10:57
Cal Standard	6E14115-CAL3	PERC000007.D.Report.TXT	05/21/16 11:15
Cal Standard	6E14115-CAL4	PERC000008.D.Report.TXT	05/21/16 11:33
Cal Standard	6E14115-CAL5	PERC000009.D.Report.TXT	05/21/16 11:50
Cal Standard	6E14115-CAL6	PERC000010.D.Report.TXT	05/21/16 12:08
Cal Standard	6E14115-CAL7	PERC000011.D.Report.TXT	05/21/16 12:26
Cal Standard	6E14115-CAL8	PERC000012.D.Report.TXT	05/21/16 12:44
Initial Cal Check	6E14115-ICV1	PERC000014.D.Report.TXT	05/21/16 13:20

ANALYSIS SEQUENCE SUMMARY

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Sequence:	7B05408	Instrument:	LCMS1
Calibration:	6144001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	7B05408-TUN1	PERC000002.D.Report.TXT	02/23/17 13:45
Calibration Check	7B05408-CCV1	PERC000004.D.Report.TXT	02/23/17 14:22
Low Cal Check	7B05408-LCV1	PERC000005.D.Report.TXT	02/23/17 14:41
Interference Check A	7B05408-IFA1	PERC000006.D.Report.TXT	02/23/17 15:00
Blank	7B23018-BLK1	PERC000008.D.Report.TXT	02/23/17 15:37
LCS	7B23018-BS1	PERC000009.D.Report.TXT	02/23/17 15:56
HBW 7 - 021517	1702143-01	PERC000015.D.Report.TXT	02/23/17 17:49
HBW 10 - 021517	1702143-02	PERC000016.D.Report.TXT	02/23/17 18:08
HBW 1 - 021517	1702143-03	PERC000017.D.Report.TXT	02/23/17 18:27
GPW 1 - 021517	1702143-04	PERC000018.D.Report.TXT	02/23/17 18:46
GPW 3 - 021517	1702143-05	PERC000019.D.Report.TXT	02/23/17 19:05
Calibration Check	7B05408-CCV2	PERC000022.D.Report.TXT	02/23/17 20:02
Low Cal Check	7B05408-LCV2	PERC000023.D.Report.TXT	02/23/17 20:20

INTERNAL STANDARD AREA AND RT SUMMARY
SW6850

Laboratory: Empirical Laboratories, LLC
SDG: 1702143
Client: Microbac Laboratories, Inc.-Ohio Valley Division
Project: Longhorn
Sequence: 7B05408
Instrument: LCMS1
Calibration: 6144001

Internal Standard	Response	RT	Response	Reference Area %	Area % Limits	Q
Calibration Check (7B05408-CCV1)		Lab File ID: PERC000004.D.Report.TXT			Analyzed: 02/23/17 14:22	
Perchlorate-d18	2319060	9.261	2047316	113	50 - 150	
Low Cal Check (7B05408-LCV1)		Lab File ID: PERC000005.D.Report.TXT			Analyzed: 02/23/17 14:41	
Perchlorate-d18	2338540	9.239	2047316	114	50 - 150	
Interference Check A (7B05408-IFA1)		Lab File ID: PERC000006.D.Report.TXT			Analyzed: 02/23/17 15:00	
Perchlorate-d18	1429030	7.515	2047316	70	50 - 150	
Blank (7B23018-BLK1)		Lab File ID: PERC000008.D.Report.TXT			Analyzed: 02/23/17 15:37	
Perchlorate-d18	2369140	9.315	2047316	116	50 - 150	
LCS (7B23018-BS1)		Lab File ID: PERC000009.D.Report.TXT			Analyzed: 02/23/17 15:56	
Perchlorate-d18	2358890	9.331	2047316	115	50 - 150	
HBW 7 - 021517 (1702143-01)		Lab File ID: PERC000015.D.Report.TXT			Analyzed: 02/23/17 17:49	
Perchlorate-d18	1845230	8.45	2047316	90	50 - 150	
HBW 10 - 021517 (1702143-02)		Lab File ID: PERC000016.D.Report.TXT			Analyzed: 02/23/17 18:08	
Perchlorate-d18	1912960	8.559	2047316	93	50 - 150	
HBW 1 - 021517 (1702143-03)		Lab File ID: PERC000017.D.Report.TXT			Analyzed: 02/23/17 18:27	
Perchlorate-d18	1933940	8.571	2047316	94	50 - 150	
GPW 1 - 021517 (1702143-04)		Lab File ID: PERC000018.D.Report.TXT			Analyzed: 02/23/17 18:46	
Perchlorate-d18	2035500	8.984	2047316	99	50 - 150	
GPW 3 - 021517 (1702143-05)		Lab File ID: PERC000019.D.Report.TXT			Analyzed: 02/23/17 19:05	
Perchlorate-d18	2073360	9.013	2047316	101	50 - 150	
Calibration Check (7B05408-CCV2)		Lab File ID: PERC000022.D.Report.TXT			Analyzed: 02/23/17 20:02	
Perchlorate-d18	1850400	8.465	2047316	90	50 - 150	
Low Cal Check (7B05408-LCV2)		Lab File ID: PERC000023.D.Report.TXT			Analyzed: 02/23/17 20:20	
Perchlorate-d18	2174110	8.827	2047316	106	50 - 150	

INITIAL CALIBRATION DATA

SW6850

Laboratory: Empirical Laboratories, LLC

SDG: 1702143

Client: Microbac Laboratories, Inc.-Ohio Valley Division

Project: Longhorn

Calibration: 6144001

Instrument: LCMS1

Matrix: Solid

Calibration Dates: 5/21/16 10:39 5/21/16 12:44

Compound	Level 01		Level 02		Level 03		Level 04		Level 05		Level 06	
	ug/L	RF	ug/L	RF	ug/L	RF	ug/L	RF	ug/L	RF	ug/L	RF
Perchlorate	0.2	0.7845944	0.5	0.7849415	1	0.783103	2	0.8192946	5	0.8473028	10	0.8833049
Perchlorate (101)	0.2		0.5		1		2		5		10	
Perchlorate (85)	0.2	0.334203	0.5	0.290602	1	0.275233	2	0.2750875	5	0.2714884	10	0.2777807

INITIAL CALIBRATION DATA (Continued)

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Calibration:	6144001	Instrument:	LCMS1
Matrix:	Solid	Calibration Dates:	5/21/16 10:39 5/21/16 12:44

Compound	Level 07		Level 08		Level 09		Level 10		Level 11		Level 12	
	ug/L	RF	ug/L	RF	ug/L	RF	ug/L	RF	ug/L	RF	ug/L	RF
Perchlorate	20	0.928708	50	0.9971742								
Perchlorate (101)	20		50									
Perchlorate (85)	20	0.2935408	50	0.3188878								

INITIAL CALIBRATION DATA (Continued)

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Calibration:	6144001	Instrument:	LCMS1
Matrix:	Solid	Calibration Dates:	5/21/16 10:39 5/21/16 12:44

Compound	Mean RF	RF RSD	Slope/QR A	Intercept/QR B	QR C	LR r/QRCOD	LIMIT	Q	Typ
Perchlorate	0.8535529	9.160918					20		A
Perchlorate (101)							20		A
Perchlorate (85)	0.2921029	7.869005					20		A

INITIAL CALIBRATION STANDARDS

SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Sequence:	6E14115	Instrument:	LCMS1
Calibration:	6144001		

Standard ID	Description	Lab Sample ID	Lab File ID	Analysis Date/Time
16D0528	Perchlorate Init Cal 0.2 ug/L	6E14115-CAL1	PERC000005.D.Report.TXT	05/21/16 10:39
16D0529	Perchlorate Init Cal 0.5 ug/L	6E14115-CAL2	PERC000006.D.Report.TXT	05/21/16 10:57
16D0530	Perchlorate Init Cal 1.0 ug/L	6E14115-CAL3	PERC000007.D.Report.TXT	05/21/16 11:15
16D0531	Perchlorate Init Cal 2.0 ug/L	6E14115-CAL4	PERC000008.D.Report.TXT	05/21/16 11:33
16D0532	Perchlorate Init Cal 5.0 ug/L	6E14115-CAL5	PERC000009.D.Report.TXT	05/21/16 11:50
16D0533	Perchlorate Init Cal 10 ug/L	6E14115-CAL6	PERC000010.D.Report.TXT	05/21/16 12:08
16D0534	Perchlorate Init Cal 20 ug/L	6E14115-CAL7	PERC000011.D.Report.TXT	05/21/16 12:26
16D0536	Perchlorate Init Cal 50 ug/L	6E14115-CAL8	PERC000012.D.Report.TXT	05/21/16 12:44

INITIAL CALIBRATION CHECK

SW6850

Laboratory: Empirical Laboratories, LLC
SDG: 1702143
Client: Microbac Laboratories, Inc.-Ohio Valley Division
Project: Longhorn
Instrument ID: LCMS1
Calibration: 6144001
Lab File ID: PERC000014.D.Report.TXT
Calibration Date: 05/21/16 00:00
Sequence: 6E14115
Injection Date: 05/21/16
Lab Sample ID: 6E14115-ICV1
Injection Time: 13:20

COMPOUND	TYPE	CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
		STD	ICV	ICAL	ICV	MIN (#)	ICV	LIMIT (#)
Perchlorate	A	5.000	4.824	0.8535529	0.8235756		-3.5	15

CONTINUING CALIBRATION CHECK
SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Instrument ID:	LCMS1	Calibration:	6144001
Lab File ID:	PERC000004.D.Report.TXT	Calibration Date:	05/21/16 00:00
Sequence:	7B05408	Injection Date:	02/23/17
Lab Sample ID:	7B05408-CCV1	Injection Time:	14:22

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Perchlorate	A	5.000	4.705	0.8535529	0.8032047		-5.9	15

CONTINUING CALIBRATION CHECK
SW6850

Laboratory:	Empirical Laboratories, LLC	SDG:	1702143
Client:	Microbac Laboratories, Inc.-Ohio Valley Division	Project:	Longhorn
Instrument ID:	LCMS1	Calibration:	6144001
Lab File ID:	PERC000022.D.Report.TXT	Calibration Date:	05/21/16 00:00
Sequence:	7B05408	Injection Date:	02/23/17
Lab Sample ID:	7B05408-CCV2	Injection Time:	20:02

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Perchlorate	A	5.000	4.699	0.8535529	0.8021185		-6.0	15

LOW-CONCENTRATION CALIBRATION VERIFICATION

SW6850

Laboratory: Empirical Laboratories, LLC
SDG: 1702143
Client: Microbac Laboratories, Inc.-Ohio Valley Division
Project: Longhorn
Calibration: 6144001
Laboratory ID: 7B05408-LCV1
Sequence: 7B05408
Standard ID: 17A0679

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Perchlorate	1.000	1.011	1.1	30.00

LOW-CONCENTRATION CALIBRATION VERIFICATION

SW6850

Laboratory: Empirical Laboratories, LLC
SDG: 1702143
Client: Microbac Laboratories, Inc.-Ohio Valley Division
Project: Longhorn
Calibration: 6144001
Laboratory ID: 7B05408-LCV2
Sequence: 7B05408
Standard ID: 17A0679

ANALYTE	EXPECTED (ug/L)	FOUND (ug/L)	% DRIFT	QC LIMIT
Perchlorate	1.000	1.011	1.1	30.00

HOLDING TIME SUMMARY
SW6850

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: Microbac Laboratories, Inc.-Ohio Valley Division Project: Longhorn

Sample Name	Date Collected	Date Received	Date Prepared	Days to Prep	Max Days to Prep	Date Analyzed	Days to Analysis	Max Days to Analysis	Q
HBW 7 - 021517	02/15/17 12:32	02/17/17 08:50	02/23/17 10:18	7.91	28.00	02/23/17 17:49	8.22	28.00	
HBW 10 - 021517	02/15/17 12:40	02/17/17 08:50	02/23/17 10:18	7.90	28.00	02/23/17 18:08	8.23	28.00	
HBW 1 - 021517	02/15/17 12:52	02/17/17 08:50	02/23/17 10:18	7.89	28.00	02/23/17 18:27	8.23	28.00	
GPW 1 - 021517	02/15/17 13:07	02/17/17 08:50	02/23/17 10:18	7.88	28.00	02/23/17 18:46	8.24	28.00	
GPW 3 - 021517	02/15/17 13:16	02/17/17 08:50	02/23/17 10:18	7.88	28.00	02/23/17 19:05	8.24	28.00	

PREPARATION BENCH SHEET

7B23018

Empirical Laboratories, LLC

Printed: 2/27/2017 12:20:18PM

Instrument: LCMS1

Matrix: Water

Prepared using: GCLC - PERC_6850_W

(No Surrogate)

Lab Number	Cont ID	Analysis	Prepared	Initial (mL)	Final (mL)	Spike ID	Source ID	ul Spike	ul Surrogate	PH	Comments (Sample; Analysis; Extraction)
1702143-01	A	LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00					NA	
1702143-02	A	LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00					NA	
1702143-03	A	LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00					NA	
1702143-04	A	LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00					NA	
1702143-05	A	LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00					NA	
7B23018-BLK1		LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00					NA	
7B23018-BS1		LCMS_PERC_6850_Q5	02/23/2017	10.00	10.00	17A0609		20		NA	

Reagents Used:

Standard	Description
16J0607	Water HPLC GRADE

SEQUENCE TABLE:

==

Eluent ID 16E0510
16E0510

Line : 1
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 2
Location : Vial 1
Sample Information :
Sample Name : 6E14115-TUN1 16D0464

==

Line : 3
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 4
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 5
Location : Vial 91
Sample Information :
Sample Name : 6E14115-CAL1 16D0529

==

Line : 6
Location : Vial 92
Sample Information :
Sample Name : 6E14115-CAL2 16D0529

==

Line : 7
Location : Vial 93
Sample Information :
Sample Name : 6E14115-CAL3 16D0530

==

Line : 8
Location : Vial 94
Sample Information :
Sample Name : 6E14115-CAL4 16D0531

==

00864313

85-8-16

P1670

Line : 9
Location : Vial 95
Sample Information :
Sample Name : 6E14115-CAL5 16D0532

==

Line : 10
Location : Vial 96
Sample Information :
Sample Name : 6E14115-CAL6 16D0533

==

Line : 11
Location : Vial 97
Sample Information :
Sample Name : 6E14115-CAL7 16D0534

==

Line : 12
Location : Vial 98
Sample Information :
Sample Name : 6E14115-CAL8 16D0536

==

Line : 13
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 14
Location : Vial 99
Sample Information :
Sample Name : 6E14115-ICV1 16D0537

==

Line : 15
Location : Vial 3
Sample Information :
Sample Name : 6E14115-CCV1 NOT USING

==

Line : 16
Location : Vial 4
Sample Information :
Sample Name : 6E14115-LCV1

==

Line : 17
Location : Vial 5
Sample Information :
Sample Name : 6E14115-IFA1

SL 5-23 00864314

p/671

==

Line : 18
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank NOT USING

==

Line : 19
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 20
Location : Vial 41
Sample Information :
Sample Name : 1605063-01@100

==

Line : 21
Location : Vial 42
Sample Information :
Sample Name : 1605063-02@100

==

Line : 22
Location : Vial 3
Sample Information :
Sample Name : 6E14115-CCV2

==

Line : 23
Location : Vial 4
Sample Information :
Sample Name : 6E14115-LCV2

==

Line : 24
Location : Vial 5
Sample Information :
Sample Name : 6E-IFA1

==

Line : 25
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 26
Location : Vial 2

00864315
SE 5-23-16
P1622

Sample Information :
Sample Name : Reagent Blank

===

Line : 27
Location : Vial 51
Sample Information :
Sample Name : 6E-IFA2600

===

Line : 28
Location : Vial 81
Sample Information :
Sample Name : Reagent Blank

===

Line : 29
Location : Vial 81
Sample Information :
Sample Name : Reagent Blank

===

SEQUENCE TABLE: eluent IDs: 17B0519, 17B0520

==

Line : 1
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 2
Location : Vial 1
Sample Information :
Sample Name : 7B05408-TUN1 17A0677

==

Line : 3
Location : Vial 2
Sample Information :
Sample Name : Reagent Blank

==

Line : 4
Location : Vial 3
Sample Information :
Sample Name : 7B05408-CCV1 17A0678

==

Line : 5
Location : Vial 4
Sample Information :
Sample Name : 7B05408-LCV1 17A0679

==

Line : 6
Location : Vial 5
Sample Information :
Sample Name : 7B05408-IFA1 16F0477

==

Line : 7
Location : Vial 81
Sample Information :
Sample Name : Reagent Blank

==

Line : 8
Location : Vial 6
Sample Information :
Sample Name : 7B23018-BLK1

==

Line : 9
Location : Vial 7
Sample Information :
Sample Name : 7B23018-BS1

==

Line : 10
Location : Vial 8
Sample Information :
Sample Name : 1702137-11 x1

==

Line : 11
Location : Vial 9
Sample Information :
Sample Name : 1702137-12

==

Line : 12
Location : Vial 10
Sample Information :
Sample Name : 1702137-13

==

Line : 13
Location : Vial 11
Sample Information :
Sample Name : 7B23018-MS1

==

Line : 14
Location : Vial 12
Sample Information :
Sample Name : 7B23018-MSD1

==

Line : 15
Location : Vial 13
Sample Information :
Sample Name : 1702143-01

==

Line : 16
Location : Vial 14
Sample Information :
Sample Name : 1702143-02

==

Line : 17
Location : Vial 15
Sample Information :
Sample Name : 1702143-03

==

Line : 18
Location : Vial 16
Sample Information :
Sample Name : 1702143-04

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2-24-17

Location : Vial 17
Sample Information :
Sample Name : 1702143-05 x1

==

Line : 20
Location : Vial 18
Sample Information :
Sample Name : 1702145-01

==

Line : 21
Location : Vial 19
Sample Information :
Sample Name : 1702152-01

==

Line : 22
Location : Vial 3
Sample Information :
Sample Name : 7B05408-CCV2 17A0678

==

Line : 23
Location : Vial 4
Sample Information :
Sample Name : 7B05408-LCV2 17A0679

==

Line : 24
Location : Vial 20
Sample Information :
Sample Name : 1702152-02 x1

==

Line : 25
Location : Vial 21
Sample Information :
Sample Name : 1702152-03@2

==

Line : 26
Location : Vial 22
Sample Information :
Sample Name : 1702152-04 x1

==

Line : 27
Location : Vial 23
Sample Information :
Sample Name : 1702154-01

==

Line : 28
Location : Vial 24
Sample Information : 7B23018-MS2

===

Line : 29
Location : Vial 25
Sample Information :
Sample Name : 7B23018-MSD2 x1

===

Line : 30
Location : Vial 26
Sample Information :
Sample Name : 1702154-02

===

Line : 31
Location : Vial 27
Sample Information :
Sample Name : 1702154-03

===

Line : 32
Location : Vial 28
Sample Information :
Sample Name : 1702154-04

===

Line : 33
Location : Vial 29
Sample Information :
Sample Name : 1702154-05

===

Line : 34
Location : Vial 30
Sample Information :
Sample Name : 1702154-06

===

Line : 35
Location : Vial 31
Sample Information :
Sample Name : 1702154-07

===

Line : 36
Location : Vial 3
Sample Information :
Sample Name : 7B05408-CCV3 17A0678

===

Line : 37
Location : Vial 4
Sample Information :
Sample Name : 7B05408-LCV3 17A0679

===

00864320
2·24·17

Location : Vial 5
Sample Information :
Sample Name : 7B05408-IFA2 16E0477

==

Line : 39
Location : Vial 81
Sample Information :
Sample Name : Reagent Blank

==

Line : 40
Location : Vial 32
Sample Information :
Sample Name : 1702196-01@500

==

Line : 41
Location : Vial 33
Sample Information :
Sample Name : 7B23020-BLK1

==

Line : 42
Location : Vial 34
Sample Information :
Sample Name : 7B23020-BS1

==

Line : 43
Location : Vial 35
Sample Information :
Sample Name : 1702154-08 x1

==

Line : 44
Location : Vial 36
Sample Information :
Sample Name : 7B23020-MS1

==

Line : 45
Location : Vial 37
Sample Information :
Sample Name : 7B23020-MSD1

==

Line : 46
Location : Vial 38
Sample Information :
Sample Name : 1702154-09

==

Line : 47
Location : Vial 39
Sample Information : 1702154-10

Sequence: C:\CHEM32\1\SEQUENCE\20170223.S LCMS-1 \6850

2-24-17

==

Line : 48
Location : Vial 40
Sample Information :
Sample Name : 1702154-11 x1

==

Line : 49
Location : Vial 41
Sample Information :
Sample Name : 1702154-12

==

Line : 50
Location : Vial 42
Sample Information :
Sample Name : 1702154-13

==

Line : 51
Location : Vial 43
Sample Information :
Sample Name : 1702154-14

==

Line : 52
Location : Vial 3
Sample Information :
Sample Name : 7B05408-CCV4 17A0678

==

Line : 53
Location : Vial 4
Sample Information :
Sample Name : 7B05408-LCV4 17A0679

==

Line : 54
Location : Vial 44
Sample Information :
Sample Name : 1702128-04@2

==

Line : 55
Location : Vial 45
Sample Information :
Sample Name : 7B21008-MS1@2

==

Line : 56
Location : Vial 46
Sample Information :
Sample Name : 7B21008-MSD1@2

==

Sequence: C:\CHEM32\1\SEQUENCE\20170223.S LCMS-1 \6850

00864326
2-24-17

Location : Vial 47
Sample Information :
Sample Name : 1702128-11@2

===

Line : 58
Location : Vial 48
Sample Information :
Sample Name : 1702128-11@5

===

Line : 59
Location : Vial 49
Sample Information :
Sample Name : 1702128-12@2

===

Line : 60
Location : Vial 50
Sample Information :
Sample Name : 1702137-03@50

===

Line : 61
Location : Vial 51
Sample Information :
Sample Name : 1702137-04@5

===

Line : 62
Location : Vial 52
Sample Information :
Sample Name : 1702137-05@5

===

Line : 63
Location : Vial 53
Sample Information :
Sample Name : 1702137-06@2

===

Line : 64
Location : Vial 54
Sample Information :
Sample Name : 1702137-07@2

===

Line : 65
Location : Vial 55
Sample Information :
Sample Name : 1702137-10@2

===

Line : 66
Location : Vial 3
Sample Information : 7B05408-CCV3 17A0678

Sequence: C:\CHEM32\1\SEQUENCE\20170223.S LCMS-1 \6850 0086432~~8~~7 D-1437 2-24-17

==

1467 2-24

```
Line               : 67
Location           : Vial 4
Sample Information :
Sample Name        : 7B05408-LCV5  17A0679
```

==

```
Line               : 68
Location           : Vial 81
Sample Information :
Sample Name        : Reagent Blank
```

==

Sequence Summary Parameters:

One page header:	No
Print Configuration:	No
Print Sequence:	No
Print Logbook:	No
Print Method(s):	No
Print Analysis reports:	No
Print Statistics for Calib. runs:	No
Print Statistics for Sample runs:	No
Summary style:	Sample Summary

Perchlorate Analysis Evaluation

5/21/2016

Sample	Perc83 Area	Perc85 Area	83/85 Ratio	IS Area	IS Recovery	RT Perc83	RT Perc89	RRT
Perchlorate 0.2 ug/L	65435.8	27872.8	2.3	2085020		9.707	9.729	0.998
Perchlorate 0.5 ug/L	162300	60086.9	2.7	2067670		9.733	9.741	0.999
Perchlorate 1.0 ug/L	327868	115234	2.8	2093390		9.679	9.699	0.998
Perchlorate 2.0 ug/L	670491	225125	3.0	2045940		9.729	9.751	0.998
Perchlorate 5.0 ug/L	1755730	562562	3.1	2072140		9.719	9.74	0.998
Perchlorate 10 ug/L	3646000	1146590	3.2	2063840		9.702	9.722	0.998
Perchlorate 20 ug/L	7550470	2386510	3.2	2032520		9.735	9.746	0.999
Perchlorate 50 ug/L	19125900	6116300	3.1	1918010		9.705	9.717	0.999
Perchlorate 5.0 ug/L ICV	1665970	536774	3.1	2022850	98.80	9.719	9.744	0.997
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			#DIV/0!		0.00			#DIV/0!
Average IS area of curve:	2047316							

83/85 Ratio Critera 2.3-3.8
RRT Criteria 0.98-1.02
IS Recovery Criteria $\pm$ 50% of Avg IS of curve

CAL Date 04/25/16

Perchlorate Analysis Evaluation

2/23/2017 Seq. ID #7B05408

Sample	Perc83 Area	Perc85 Area	83/85 Ratio	IS Area	IS Recovery	RT Perc83	RT Perc89	RRT
6E14115-CAL1	65435.8	27872.8	2.348	2085020		9.707	9.729	0.998
6E14115-CAL2	162300	60086.9	2.701	2067670		9.718	9.741	0.998
6E14115-CAL3	327868	115234	2.845	2093390		9.679	9.699	0.998
6E14115-CAL4	670491	225125	2.978	2045940		9.729	9.751	0.998
6E14115-CAL5	1755730	562562	3.121	2072140		9.719	9.74	0.998
6E14115-CAL6	3646000	1146590	3.18	2063840		9.702	9.722	0.998
6E14115-CAL7	7550470	2386510	3.164	2032520		9.725	9.746	0.998
6E14115-CAL8	19125900	6116300	3.127	1918010		9.705	9.717	0.999
6E14115-ICV1	1665970	536774	3.104	2022850	98.805	9.719	9.744	0.997
1702128-04	108099	0		1686170	82.36	8.639	8.7	0.993
1702128-11	7219450	2243970	3.217	1449580	70.804	7.738	7.778	0.995
1702128-12	0	0		1226500	59.908	6.7	6.744	0.993
1702137-03	4909450	1508230	3.255	2041130	99.698	9.062	9.09	0.997
1702137-04	4097260	1287330	3.183	1971940	96.318	8.673	8.707	0.996
1702137-05	4904510	1516330	3.234	1880780	91.866	8.474	8.494	0.998
1702137-06	96629.2	0		1542570	75.346	7.344	7.415	0.99
1702137-07	47924.5	0		1613950	78.832	8.277	8.237	1.005
1702137-10	7755960	2424700	3.199	1549240	75.672	7.912	7.933	0.997
1702137-13	65298.8	0		1079690	52.737	6.479	6.578	0.985
1702143-01	0	0		1845230	90.129	8.45	8.45	1
1702143-02	0	0		1912960	93.437	8.45	8.559	0.987
1702143-03	0	0		1933940	94.462	8.45	8.571	0.986
1702143-04	85631.4	34159.6	2.507	2035500	99.423	8.96	8.984	0.997
1702143-05	138496	50050.6	2.767	2073360	101.272	8.962	9.013	0.994
1702145-01	0	48227	0	1759050	85.92	7.6	7.638	0.995
1702154-01	875376	305201	2.868	1111090	54.271	6.739	6.764	0.996
1702154-02	1473840	501154	2.941	1225970	59.882	6.737	6.77	0.995
1702154-03	4315410	1368520	3.153	1189040	58.078	6.694	6.75	0.992
1702154-04	8775520	2761280	3.178	1187240	57.99	6.671	6.718	0.993
1702154-05	22709.5	0		1153820	56.358	6.639	6.701	0.991
1702154-11	2114260	720356	2.935	1229600	60.059	7.157	7.192	0.995
1702154-14	2925300	978499	2.99	1139420	55.654	6.604	6.632	0.996
1702196-01	383590	141896	2.703	2163370	105.669	8.912	8.925	0.999
7B05408-CCV1	1862680	599468	3.107	2319060	113.273	9.233	9.261	0.997
7B05408-CCV2	1484240	490026	3.029	1850400	90.382	8.437	8.465	0.997
7B05408-CCV3	1536420	500600	3.069	1900870	92.847	9.078	9.106	0.997
7B05408-CCV4	1505250	492525	3.056	1863200	91.007	9.016	9.044	0.997
7B05408-CCV5	1602340	527733	3.036	2009540	98.155	8.98	9.015	0.996
7B05408-IFA1	483765	165800	2.918	1429030	69.8	7.479	7.515	0.995
7B05408-IFA2	591411	217592	2.718	1719310	83.979	7.752	7.786	0.996
7B05408-LCV1	403637	143604	2.811	2338540	114.225	9.218	9.239	0.998
7B05408-LCV2	375280	122294	3.069	2174110	106.193	8.804	8.827	0.997
7B05408-LCV3	355167	131431	2.702	2030230	99.165	9.213	9.256	0.995
7B05408-LCV4	355693	131907	2.697	2020010	98.666	9.217	9.246	0.997
7B05408-LCV5	367952	133538	2.755	2131920	104.132	9.088	9.117	0.997

7B21008-MS1	370249	142781		1663060	81.231	8.454	8.541	0.99
7B21008-MSD1	369933	140315		1588120	77.571	8.247	8.292	0.995
7B23018-BLK1	0	0		2369140	115.719	9.3	9.315	0.998
7B23018-BS1	772870	260184	2.97	2358890	115.219	9.306	9.331	0.997
7B23018-MS1	485007	184004	2.635	1096680	53.567	6.443	6.49	0.993
7B23018-MS2	1357760	443309	3.063	1206960	58.953	6.732	6.774	0.994
7B23018-MSD1	481737	199484	2.415	1116180	54.519	6.439	6.467	0.996
7B23018-MSD2	1382860	465628	2.7	1252150	61.161	6.742	6.784	0.994
7B23020-BLK1	0	0		2311930	112.925	9.4	9.391	1.001
7B23020-BS1	731159	251853	2.903	2297450	112.218	9.37	9.395	0.997
Average IS area of curve:	2047316.25							

83/85 Ratio Critera 2.3-3.8

RRT Criteria 0.98-1.02

IS Recovery Criteria + 50% of Avg IS of curve

Microbac

Laboratory Report Number: L17051393

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on May 31 2017

Leslie Bucina

Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1

Ethics Service Quality ACIL 2010 Seal of Excellence Program

ACCREDITED IN ACCORDANCE WITH nelac

Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com

Microbac

Lab Report #: L17051393
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
00112534	H	2.0		J4616881659	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

Microbac Laboratories ● Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 ● T: (740)373-4071 F: (740)373-4835
www.microbac.com

Microbac

Lab Report #: L17051393
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Samples Received

Client ID	Laboratory ID	Date Collected	Date Received
HBW 7-052417	L17051393-01	05/24/2017 13:33	05/25/2017 09:38
HBW 10-052417	L17051393-02	05/24/2017 13:47	05/25/2017 09:38
HBW 1-052417	L17051393-03	05/24/2017 14:00	05/25/2017 09:38
GPW 1 -052417	L17051393-04	05/24/2017 14:17	05/25/2017 09:38
GPW 3 -052417	L17051393-05	05/24/2017 14:30	05/25/2017 09:38

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17051393
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG615781	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-05-30 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson	Eric C. Lawson	Chemist III	2017-05-30 19:40:27

RG-366/TRRP-13 May 2010 **ID:** 8100

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17051393
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG615781	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-05-30 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

RG-366/TRRP-13 May 2010 **ID:** 8100

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17051393
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG615781	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-05-30 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?			X		
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?	X				
Were MS/MSD analyzed at the appropriate frequency?	X				
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?		X			1
Were MS/MSD RPDs within laboratory QC limits?	X				
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17051393
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG615781	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-05-30 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17051393
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG615781	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-05-30 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17051393
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG615781	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-05-30 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] ____________ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

1. The MS/MSD yielded recoveries for perchlorate that were marginally above the acceptance limit. This was due to the presence of s small amount of perchlorate in the reference sample.

Microbac

Lab Report #: L17051393
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #:	L17051393-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7-052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 17:26
Collect Date:	05/24/2017 13:33	**Dilution:**	1	**File ID:**	1LM.LM39708
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.155	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 10-052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 19:57
Collect Date:	05/24/2017 13:47	**Dilution:**	1	**File ID:**	1LM.LM39716
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 1-052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 20:54
Collect Date:	05/24/2017 14:00	**Dilution:**	1	**File ID:**	1LM.LM39719
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-04	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 1 -052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 21:13
Collect Date:	05/24/2017 14:17	**Dilution:**	1	**File ID:**	1LM.LM39720
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.263	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-05	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 3 -052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 21:32
Collect Date:	05/24/2017 14:30	**Dilution:**	1	**File ID:**	1LM.LM39721
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.274	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7-052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 17:26
Collect Date:	05/24/2017 13:33	**Dilution:**	1	**File ID:**	1LM.LM39708
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.155	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #: L17051393
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #:	L17051393-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 10-052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 19:57
Collect Date:	05/24/2017 13:47	**Dilution:**	1	**File ID:**	1LM.LM39716
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 1-052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 20:54
Collect Date:	05/24/2017 14:00	**Dilution:**	1	**File ID:**	1LM.LM39719
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #: L17051393
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #:	L17051393-04	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 1 -052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 21:13
Collect Date:	05/24/2017 14:17	**Dilution:**	1	**File ID:**	1LM.LM39720
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.263	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17051393
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17051393-05	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	GPW 3 -052417	**Prep Method:**	6850	**Prep Date:**	05/26/2017 12:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	04/24/2017 15:40
Workgroup #:	WG615781	**Analyst:**	JWR	**Run Date:**	05/26/2017 21:32
Collect Date:	05/24/2017 14:30	**Dilution:**	1	**File ID:**	1LM.LM39721
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.274	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

2.1.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate

Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of internal standard (IS) = Rx/Ristd

x = amount ratio = concentration analyte/concentration internal standard (IS) = Cx / Cistd

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

y = 1.45x + -0.00242

Step 2: Substitute the value for y

where y = 12600/226000 = 0.055752

Step 3: Solve for x

x = (y - b)/m = 0.0040119

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(x) = (5 ug/L)(0.040119) = 0.200594 ug/L

Example Calculation - Water:

Slope from curve, m:	1.45
Intercept from curve, b:	-0.00242
Response of analyte, Rx:	12600
Response of Internal Standard , Ristd:	226000
Concentration of IS, Cistd (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, Cx (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, Cx (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	L17051393-01
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39708
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 17:26	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	25800	8040	3.21	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	L17051393-02
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39716
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 19:57	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	7910	3450	2.29	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	L17051393-03
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39719
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 20:54	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	14000	4310	3.25	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	L17051393-04
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39720
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 21:13	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	50400	16100	3.13	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	L17051393-05
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39721
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 21:32	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	52000	17900	2.91	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39495
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 13:46	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	21000	6820	3.08	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39496
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 14:05	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	38200	13500	2.83	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39497
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 14:24	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	104000	33400	3.11	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39498
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 14:43	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	206000	65300	3.15	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39499
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 15:02	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	412000	130000	3.17	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39500
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 15:21	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	955000	298000	3.20	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39501
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 15:40	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	1860000	603000	3.08	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG611288-09
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39502
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	04/24/2017 15:59	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	197000	65000	3.03	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-01
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39699
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 14:35	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	37000	11500	3.22	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-02
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39700
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 14:54	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	925	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-03
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39701
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 15:13	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	36900	11100	3.32	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-05
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39717
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 20:16	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	47600	14900	3.19	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-06
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39718
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 20:35	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	46000	14100	3.26	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-07
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39698
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 14:16	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	39400	13000	3.03	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-08
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39710
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 18:03	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	44600	15400	2.90	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**	6850	**Samplenum:**	WG615781-09
Instrument:	LCMS1	**Prep Date:**	05/26/2017 12:00	**File ID:**	1LM.LM39723
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 22:10	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	47600	16200	2.94	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG615784-01
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39696
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 13:38	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG615784-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39697
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 13:57	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	198000	61400	3.22	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG615784-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39709
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 17:45	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	216000	68200	3.17	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG615784-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39711
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 18:22	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG615784-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39722
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 21:51	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	226000	72200	3.13	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17051393	**Prep Method:**		**Samplenum:**	WG615784-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM39724
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG615781	**Analysis Date:**	05/26/2017 22:29	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	0.000	0.000	0.000	2.3	3.8	*

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
May 31, 2017

001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY	CAS - Craig A. Smith
CEB - CHAD E. BARNES	CLC - CHRYS L. CRAWFORD
CLS - CARA L. STRICKLER	CPD - CHAD P. DAVIS
CSH - CHRIS S. HILL	CV - Carl Volkman
DAK - DEAN A. KETELSEN	DCM - DAVID C. MERCKLE
DEV - DAVID E. VANDENBERG	DIH - DEANNA I. HESSON
DLB - DAVID L. BUMGARNER	DLP - DOROTHY L. PAYNE
DSM - DAVID S. MOSSOR	DTG - DOMINIC T. GEHRET
ECL - ERIC C. LAWSON	EPT - ETHAN P. TIDD
ERP - ERIN R. PORTER	FJB - FRANCES J. BOLDEN
HRF - HEATHER R. FAIRCHILD	JDH - JUSTIN D. HESSON
JDS - JARED D. SMITH	JKP - JACQUELINE K. PARSONS
JLD - JESSICA L. DELONG	JST - JOSHUA S. TAYLOR
JTP - JOSHUA T. PEMBERTON	JWR - JOHN W. RICHARDS
JWS - JACK W. SHEAVES	JYH - JI Y. HU
KAK - KATHY A. KIRBY	KDD - Katelyn D. Daley
KEB - KATIE E. BARNES	KHR - KIM H. RHODES
KKB - KERRI K. BUCK	KRA - KATHY R. ALBERTSON
KRP - KATHY R. PARSONS	LJH - Lacey J. Hendershot
LLS - LARRY L. STEPHENS	LSB - LESLIE S. BUCINA
LSJ - LAURA S. JONES	MAP - MARLA A. PORTER
MBK - MORGAN B. KNOWLTON	MES - MARY E. SCHILLING
MMB - MAREN M. BEERY	MRT - MICHELLE R. TAYLOR
OJE - OMOYEMWEN J. ENGLISH	PDM - PIERCE D. MORRIS
PIT - MICROBAC WARRENDALE	REK - BOB E. KYER
RLB - BOB BUCHANAN	RNP - RICK N. PETTY
SAV - SARAH A. VANDENBERG	SCA - SUEELLEN C. ADAMS
SCB - SARAH C. BOGOLIN	SCJ - SUE ELLEN C. JOHNSON
SDC - SHALYN D. CONLEY	TB - TODD BOYLE
TMB - TIFFANY M. BAILEY	TMM - TAMMY M. MORRIS
VC - VICKI COLLIER	WTD - WADE T. DELONG
XXX - UNAVAILABLE OR SUBCONTRACT	ZTB - ZACH T. BARNES

00864410

AECOM

Chain of Custody Record

COC Number:

Laboratory:	Microbac POC: Stephanie Mossburg	**Project Manager:**	Elspeth Sharp	**Mail to:**	Linda Raabe
Address:	158 Starlite Drive	**Phone/Fax Number:**	210-296-2000		112 East Pecan STE. 400
	Marietta, OH 45750	**Sampler (print):**	Scott Beesinger		San Antonio, TX 78205
Phone:	1-800-373-4071				210-296-2000
Client:	AECOM	**Signature:**	Scott Beesinger	**Fed Ex Airbill No:**	
Address:	112 East Pecan Ste. 400				
	San Antonio, TX 78205	**pH:**		**Program:**	
Turn Around Time:	STANDARD				
Project Name/Location:	Longhorn				
Project Number:	60256135.0009AA			**ERPIMS REQUIRED FIELDS**	

Site Name	Sample ID/Location ID	SBD	SED	Date	Time	Comp*	Grab	Matrix	Number of Containers	PERCHLORATE	SA CODE	Cooler ID	LOT CONTROL NUMBERS ABLOT	EBLOT	TBLOT
Harrison Bayou & Goose Prarie Creek	HBW 7 - 052417			5/24/17	13:33		X	W	1	X					
	HBW 10 - 052417			5/24/17	13:47		X	W	1	X					
	HBW 1 - 052417			5/24/17	14:00		X	W	1	X					
	GPW 1 - 052417			5/24/17	14:17		X	W	1	X					
	GPW 3 - 052417			5/24/17	14:30		X	W	1	X					

Comments: **STANDARD TAT**

Relinquished by: (Signature) Scott Beesinger	Date 5/24/17	Time 15:00	Received by: (Signature)	...hed by: (Signature)
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature)	

Microbac OVD
Received: 05/25/2017 09:38
By: BRENDA GREGORY 221000101297
Brenda Gregory

*Homogenize all composite samples prior to analysis

Distribution: White to Laboratory, Canary to Project Manager, Pink QA/QC Manager

MICROBAC

Cooler ID 1297

COOLER TEMP >6° C LOG

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

DJO 5/25/17

pH Exceptions

pH Lot # HC601354

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

PRESERVATIVE EXCEPTIONS
✓ NONE
__ AS NOTED
DJO 5/25/17

Document Control # 1957
Last 10-07-2016

Issued to: Document Master File

NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
Total Halide by Bomb Combustion (TX)
Particle Sizing - 200 Mesh (PS200)
Specific Gravity/Density (SPGRAV)
Total Residual Chlorine (CL-TRL)
Total Volatile Solids (all forms) (TVS)
Total Coliform Bacteria (all methods)
Fecal Coliform Bacteria (all methods)
Sulfite (SO3)
Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS
Nitrogen, Ammonia by Method 350.1
Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
Phenolics, Total by Method 420.1
ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

<u>OVD HPLC02/HPLC-UV</u>

Nitroglycerin
Acetic acid
Butyric acid
Lactic acid
Propionic acid
Pyruvic acid

<u>OVD MSS01/GC-MS</u>

1,4-Phenylenediamine
1-Methylnaphthalene
1,4-Dioxane
Atrazine
Benzaldehyde
Biphenyl
Caprolactam
Hexamethylphosphoramide (HMPA)
Pentachlorobenzene
Pentachloroethane

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALS

OVD MSS0I/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP

SOLID AND HAZARDOUS CHEMICALS

OVD MSV0I/GC-MS

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

Microbac

Laboratory Report Number: L17090079

Linda Raabe
AECOM Technical Services, Inc.
1950 N Stemmons FWY
Dallas, TX 75207

Please find enclosed the analytical results for the samples you submitted to Microbac Laboratories. Review and compilation of your report was completed by Microbac's Ohio Valley Division (OVD). If you have any questions, comments, or require further assistance regarding this report, please contact your service representative listed below.

Laboratory Contact:
Adriane Steed – Client Services Specialist
(740) 373-4071
Adriane.Steed@microbac.com

I certify that all test results meet all of the requirements of the DoD QSM and other applicable contract terms and conditions. Any exceptions are attached to this cover page or addressed in the method narratives presented in the report. All results for soil samples are reported on a 'dry-weight' basis unless specified otherwise. Analytical results for water and wastes are reported on a 'as received' basis unless specified otherwise. A statement of uncertainty for each analysis is available upon request. This laboratory report shall not be reproduced, except in full, without the written approval of Microbac Laboratories, DoD ELAP certification number 2936.01. The reported results are related only to the samples analyzed as received.

This report was certified on September 11 2017

Leslie Bucina – Managing Director

State of Origin: TX
Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX
QAPP: DOD Ver 4.1

Ethics Service Quality ACIL 2010 Seal of Excellence Program

ACCREDITED IN ACCORDANCE WITH nelac

Microbac

Lab Report #: L17090079
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Record of Sample Receipt and Inspection

Comments/Discrepancies

This is the record of the shipment conditions and the inspection records for the samples received and reported as a sample delivery group (SDG). All of the samples were inspected and observed to conform to our receipt policies, except as noted below.

There were no discrepancies.

Discrepancy	Resolution

Coolers

Cooler #	Temperature Gun	Temperature	COC #	Airbill #	Temp Required?
0018394	I	3.0		1ZW056F52210009828	X

Inspection Checklist

#	Question	Result
1	Were shipping coolers sealed?	Yes
2	Were custody seals intact?	Yes
3	Were cooler temperatures in range of 0-6?	Yes
4	Was ice present?	Yes
5	Were COC's received/information complete/signed and dated?	Yes
6	Were sample containers intact and match COC?	Yes
7	Were sample labels intact and match COC?	Yes
8	Were the correct containers and volumes received?	Yes
9	Were samples received within EPA hold times?	Yes
10	Were correct preservatives used? (water only)	Yes
11	Were pH ranges acceptable? (voa's excluded)	Yes
12	Were VOA samples free of headspace (less than 6mm)?	NA

Microbac

Lab Report #: L17090079
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Samples Received

Client ID	Laboratory ID	Date Collected	Date Received
HBW 7 - 083117	L17090079-01	08/31/2017 13:08	09/01/2017 14:51
HBW 10 - 083117	L17090079-02	08/31/2017 13:18	09/01/2017 14:51
HBW 1 - 083117	L17090079-03	08/31/2017 13:27	09/01/2017 14:51

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17090079
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG628979	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-09-11 00:00:00		

Laboratory Data Package Cover Page

	R1	Field chain-of-custody documentation;
	R2	Sample identification cross-reference;
	R3	Test reports (analytical data sheets) for each environmental sample that includes: (a) Items consistent with NELAC Chapter 5, (b) dilution factors, (c) preparation methods, (d) cleanup methods, and (e) a.if required for the project, tentatively identified compounds (TICs).
	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
	R5	Test reports/summary forms for blank samples;
	R6	Test reports/summary forms for laboratory control samples (LCSs) including: (a) LCS spiking amounts, (b) calculated %R for each analyte, and (c) the laboratory's LCS QC limits.
	R7	Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including: (a) samples associated with the MS/MSD clearly identified, (b) MS/MSD spiking compounds, (c) concentration of each MS/MSD analyte measured in the parent and spiked samples, (d) calculated %Rs and relative percent differences (RPDs), and (e) the laboratory's MS/MSD QC limits.
	R8	Laboratory analytical duplicate (if applicable) recovery and precision: (a) the amount of analyte measured in the duplicate, (b) the calculated RPD, and (c) the laboratory's QC limits for analytical duplicates.
	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson	Eric C. Lawson	Chemist III	2017-09-11 19:37:22

RG-366/TRRP-13 May 2010 **ID:** 8289

Microbac

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17090079
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG628979	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-09-11 00:00:00		

Description	Yes	No	NA	NR	ER#
Chain-of-custody (C-O-C)					
Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
Were all departures from standard conditions described in an exception report?	X				
Sample and quality control (QC) identification	X				
Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
Test reports					
Were all samples prepared and analyzed within holding times?	X				
Other than those results < MQL, were all other raw values bracketed by calibration standards?	X				
Were calculations checked by a peer or supervisor?	X				
Were all analyte identifications checked by a peer or supervisor?	X				
Were sample detection limits reported for all analytes not detected?	X				
Were all results for soil and sediment samples reported on a dry weight basis?			X		
Were % moisture (or solids) reported for all soil and sediment samples?			X		
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?			X		
If required for the project, are TICs reported?			X		
Surrogate recovery data					
Were surrogates added prior to extraction?			X		
Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
Test reports/summary forms for blank samples	X				
Were appropriate type(s) of blanks analyzed?	X				
Were blanks analyzed at the appropriate frequency?	X				
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
Were blank concentrations < MQL?	X				
Laboratory control samples (LCS):					
Were all COCs included in the LCS?	X				

RG-366/TRRP-13 May 2010 **ID:** 8289

Microbac®

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17090079
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG628979	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-09-11 00:00:00		

Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
Were LCSs analyzed at the required frequency?	X				
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
Was the LCSD RPD within QC limits?	X				
Matrix spike (MS) and matrix spike duplicate (MSD) data					
Were the project/method specified analytes included in the MS and MSD?			X		
Were MS/MSD analyzed at the appropriate frequency?			X		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
Were MS/MSD RPDs within laboratory QC limits?			X		
Analytical duplicate data					
Were appropriate analytical duplicates analyzed for each matrix?			X		
Were analytical duplicates analyzed at the appropriate frequency?			X		
Were RPDs or relative standard deviations within the laboratory QC limits?			X		
Method quantitation limits (MQLs):					
Are the MQLs for each method analyte included in the laboratory data package?	X				
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
Other problems/anomalies					
Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
Initial calibration (ICAL)					
Were response factors and/or relative response factors for each analyte within QC limits?	X				
Were percent RSDs or correlation coefficient criteria met?	X				

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17090079
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG628979	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-09-11 00:00:00		

Was the number of standards recommended in the method used for all analytes?	X				
Were all points generated between the lowest and highest standard used to calculate the curve?	X				
Are ICAL data available for all instruments used?	X				
Has the initial calibration curve been verified using an appropriate second source standard?	X				
Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB):					
Was the CCV analyzed at the method-required frequency?	X				
Were percent differences for each analyte within the method-required QC limits?	X				
Was the ICAL curve verified for each analyte?	X				
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?			X		
Mass spectral tuning					
Was the appropriate compound for the method used for tuning?	X				
Were ion abundance data within the method-required QC limits?	X				
Internal standards (IS)					
Were IS area counts and retention times within the method-required QC limits?	X				
Raw data (NELAC Section 5.5.10)					
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
Were data associated with manual integrations flagged on the raw data?	X				
Dual column confirmation					
Did dual column confirmation results meet the method-required QC?			X		
Tentatively identified compounds (TICs)					
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
Interference Check Sample (ICS) results					
Were percent recoveries within method QC limits?			X		
Serial dilutions, post digestion spikes, and method of standard additions					
Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
Method detection limit (MDL) studies					

RG-366/TRRP-13 May 2010 **ID:** 8289

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17090079
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG628979	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-09-11 00:00:00		

Was a MDL study performed for each reported analyte?	X				
Is the MDL either adjusted or supported by the analysis of DCSs?	X				
Proficiency test reports					
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
Standards documentation					
Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
Compound/analyte identification procedures					
Are the procedures for compound/analyte identification documented?	X				
Demonstration of analyst competency (DOC)					
Was DOC conducted consistent with NELAC Chapter 5?	X				
Is documentation of the analyst's competency up-to-date and on file?	X				
Verification/validation documentation for methods (NELAC Chapter 5)					
Are all the methods used to generate the data documented, verified, and validated, where applicable?	X				
Laboratory standard operating procedures (SOPs)					
Are laboratory SOPs current and on file for each method performed	X				

1. Items identified by the letter “R” must be included in the laboratory data package submitted in the TRRP-required report(s). Items identified by the letter “S” should be retained and made available upon request for the appropriate retention period;
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable);
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report identification number (an Exception Report should be completed for an item if “NR” or “No” is checked).

The Exception Report for each “No” or “Not Reviewed (NR)” item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature

Texas Risk Reduction Program (TRRP) Checklist

Laboratory Name:	Microbac OVD	**Laboratory Log Number:**	L17090079
Project Name:		**Method:**	6850
Prep Batch Number(s):	WG628979	**Reviewer Name:**	Eric Lawson
LRC Date:	2017-09-11 00:00:00		

below, I affirm to the best of my knowledge all problems/anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] ___________ on **(enter date of last inspection**). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Exceptions Report

There are no exceptions.

Microbac

Lab Report #: L17090079
Lab Project #: 2551.096
Project Name: Longhorn Army Ammunition
Lab Contact: Adriane Steed

Certificate of Analysis

Sample #:	L17090079-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7 - 083117	**Prep Method:**	6850	**Prep Date:**	09/08/2017 15:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	09/08/2017 16:52
Workgroup #:	WG628979	**Analyst:**	JWR	**Run Date:**	09/08/2017 20:40
Collect Date:	08/31/2017 13:08	**Dilution:**	1	**File ID:**	1LM.LM40503
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.111	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17090079
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17090079-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 10 - 083117	**Prep Method:**	6850	**Prep Date:**	09/08/2017 15:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	09/08/2017 16:52
Workgroup #:	WG628979	**Analyst:**	JWR	**Run Date:**	09/08/2017 20:59
Collect Date:	08/31/2017 13:18	**Dilution:**	1	**File ID:**	1LM.LM40504
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #:	L17090079
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17090079-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 1 - 083117	**Prep Method:**	6850	**Prep Date:**	09/08/2017 15:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	09/08/2017 16:52
Workgroup #:	WG628979	**Analyst:**	JWR	**Run Date:**	09/08/2017 21:18
Collect Date:	08/31/2017 13:27	**Dilution:**	1	**File ID:**	1LM.LM40505
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data

Microbac

Lab Report #:	L17090079
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17090079-01	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 7 - 083117	**Prep Method:**	6850	**Prep Date:**	09/08/2017 15:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	09/08/2017 16:52
Workgroup #:	WG628979	**Analyst:**	JWR	**Run Date:**	09/08/2017 20:40
Collect Date:	08/31/2017 13:08	**Dilution:**	1	**File ID:**	1LM.LM40503
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.111	J	0.400	0.200	0.100

J	Estimated value ; the analyte concentration was less than the LOQ.

Microbac

Lab Report #:	L17090079
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17090079-02	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 10 - 083117	**Prep Method:**	6850	**Prep Date:**	09/08/2017 15:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	09/08/2017 16:52
Workgroup #:	WG628979	**Analyst:**	JWR	**Run Date:**	09/08/2017 20:59
Collect Date:	08/31/2017 13:18	**Dilution:**	1	**File ID:**	1LM.LM40504
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

Microbac

Lab Report #:	L17090079
Lab Project #:	2551.096
Project Name:	Longhorn Army Ammunition
Lab Contact:	Adriane Steed

Certificate of Analysis

Sample #:	L17090079-03	**PrePrep Method:**	N/A	**Instrument:**	LCMS1
Client ID:	HBW 1 - 083117	**Prep Method:**	6850	**Prep Date:**	09/08/2017 15:00
Matrix:	Water	**Analytical Method:**	6850	**Cal Date:**	09/08/2017 16:52
Workgroup #:	WG628979	**Analyst:**	JWR	**Run Date:**	09/08/2017 21:18
Collect Date:	08/31/2017 13:27	**Dilution:**	1	**File ID:**	1LM.LM40505
Sample Tag:	01	**Units:**	ug/L		

Analyte	CAS #	Result	Qual	LOQ	LOD	DL
Perchlorate	14797-73-0	0.200	U	0.400	0.200	0.100

U	Analyte was not detected. The concentration is below the reported LOD.

2.1.1.2 QC Summary Data

Example Calculation 6850 - Perchlorate

Concentration from Linear Regression

Step 1: Retrieve Curve Data From Plot, y = mx + b

y = response ratio = response of analyte / response of internal standard (IS) = Rx/Ristd

x = amount ratio = concentration analyte/concentration internal standard (IS) = Cx / Cistd

m = slope from curve (1.45)

b = intercept from curve (-0.00242)

y = 1.45x + -0.00242

Step 2: Substitute the value for y

where y = 12600/226000 = 0.055752

Step 3: Solve for x

x = (y - b)/m = 0.0040119

Step 4: Solve for analyte concentration Cx

Cx = (Cis)(x) = (5 ug/L)(0.040119) = 0.200594 ug/L

Example Calculation - Water:

Slope from curve, m:	1.45
Intercept from curve, b:	-0.00242
Response of analyte, Rx:	12600
Response of Internal Standard , Ristd:	226000
Concentration of IS, Cistd (ug/L):	5.00
Response Ratio:	0.05575
Amount Ratio:	0.04012
Analyte Concentration, Cx (ug/L) :	0.200594

Example Calculation - Soil:

Analyte Concentration, Cx (ug/L):	0.20059
Amount of soil extracted (g):	5.00
Final volume of extract (mL):	50.00
Percent solids (Pct wt.)	100
Concentration in soil (ug/kg):	2.005938

Microbac Laboratories Inc.

Instrument Run Log

Instrument: LCMS1 Dataset: 090817_JWR.TXT
Analyst1: JWR Analyst2: NA
Method: 6850 SOP: HPLC06 Rev: 8

Maintenance Log ID: Syringe Filter Lot#: 160109254
Eluent ID#:

Workgroups: Column 1 ID: KP-RPPX250 Column 2 ID: NA
Analytical WG628979 (waters)

Internal STD: COA19471 Surrogate STD: NA Calibration STD STD80232 (09/08/2017)
CCV STD: STD80232 LCS STD: STD80234 MS/MSD STD: NA

Comments: ICAL WG628977 : Alternate Source STD80234
Analytical Column : RPPX 5um (250x4.6mm)
K'Prime S/N RPPX250-02115

Seq.	File ID	Sample Information	Mat	Dil	Reference	Date/Time
1	1LM.LM40484	WG628977-01 CCB	1	1		09/08/17 14:40
2	1LM.LM40485	WG628977-02 STD (0.1 ug/L)	1	1	STD80232	09/08/17 14:59
3	1LM.LM40486	WG628977-03 STD (0.2 ug/L)	1	1	STD80232	09/08/17 15:18
4	1LM.LM40487	WG628977-04 STD (0.5 ug/L)	1	1	STD80232	09/08/17 15:37
5	1LM.LM40488	WG628977-05 STD (1.0 ug/L)	1	1	STD80232	09/08/17 15:56
6	1LM.LM40489	WG628977-06 STD (2.0 ug/L)	1	1	STD80232	09/08/17 16:15
7	1LM.LM40490	WG628977-07 STD (5.0 ug/L)	1	1	STD80232	09/08/17 16:34
8	1LM.LM40491	WG628977-08 STD (10 ug/L)	1	1	STD80232	09/08/17 16:52
9	1LM.LM40492	WG628977-09 SSCV (1.0 ug/L)	1	1	STD80234	09/08/17 17:11
10	1LM.LM40493	WG628984-01 CCB	1	1		09/08/17 17:30
11	1LM.LM40494	WG628984-02 CCV (1.0ug/L)	1	1	STD80232	09/08/17 17:49
12	1LM.LM40495	WG628979-05 MRL (0.2ug/L)	1	1	STD80232	09/08/17 18:08
13	1LM.LM40496	WG628979-01 MCT (0.2ug/L)	1	1	STD80234	09/08/17 18:27
14	1LM.LM40497	WG628979-02 BLANK	1	1		09/08/17 18:46
15	1LM.LM40498	WG628979-03 LCS (0.2ug/L)	1	1	STD80234	09/08/17 19:05
16	1LM.LM40499	WG628979-04 LCS2 (0.2ug/L)	1	1	STD80234	09/08/17 19:24
17	1LM.LM40500	L17081653-01	1	1		09/08/17 19:43
18	1LM.LM40501	L17081653-01 (10x) (NR)	1	10		09/08/17 20:02
19	1LM.LM40502	L17081653-01 (100x) (NR)	1	100		09/08/17 20:21
20	1LM.LM40503	L17090079-01	1	1		09/08/17 20:40
21	1LM.LM40504	L17090079-02	1	1		09/08/17 20:59
22	1LM.LM40505	L17090079-03	1	1		09/08/17 21:18
23	1LM.LM40506	WG628984-03 CCV (1.0ug/L)	1	1	STD80232	09/08/17 21:37
24	1LM.LM40507	WG628979-06 MRL (0.2ug/L)	1	1	STD80232	09/08/17 21:56
25	1LM.LM40508	WG628984-04 CCB	1	1		09/08/17 22:15

Comments

Seq.	Rerun	Dil.	Reason	Analytes

Page: 1 Approved: 11-SEP-17
Eric C. Zimm

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Microbac Laboratories Inc.

Data Checklist

Date: 08-SEP-2017
Analyst: JWR
Analyst: NA
Method: 6850
Instrument: LCMS1
Curve Workgroup: WG628977
Runlog ID: 84489
Analytical Workgroups: L17081653, L17090079

ANALYTICAL	
System Performance Check	NA
DFTPP (GCMS)	NA
Endrin/DDT breakdown (8081/GCMS)	NA
Pentachlorophenol/benzidine tailing (GCMS)	NA
Eluent check (IC)/system pressure (HPLC)	NA
Window standard (FID)	NA
Initial Calibration	X
Average RF	NA
Linear regression or higher order curve	X
Alternate source standard (ICV) % Difference	X
Continuing Calibration (CCV)	X
% D/% Drift	X
Minimum response factors (GCMS)	X
Continuing calibration blank (CCB) (IC/LCMS)	X
Limit of quantitation verification (LOQV) (LCMS)	X
Special standards	NA
Blanks	X
TCL hits	ND
Surrogate recoveries	NA
LCS/LCSD (Laboratory Control Sample)	X
Recoveries	X
Surrogate recoveries	NA
MS/MSD/Sample duplicates	NA
Recoveries	NA
%RPD	NA
Interference check sample (ICS) (LCMS)	MCT
Samples	X
TCL hits	X
Mass spectra (MS/HPLC)/2nd column confirmations (ECD/FID/HPLC)	NA
Surrogate recoveries	NA
Internal standard areas (MS)	X
Library searches (GCMS)	NA
Calculations & correct factors	X
Compounds above calibration range	NA
Reruns	NA
Manual integrations	NA
Project/client specific requirements	X
REPORTING	
Upload batch form	X
KOBRA workgroup data/forms/bench sheets	X
Case narratives	
Check for completeness	X
Primary Reviewer	JWR
SUPERVISORY/SECONDARY REVIEW	
Check for compliance with method and project specific requirements	X
Check the completeness/accuracy of reported information	X
Data qualifiers	X
Secondary Reviewer	ECL

Primary Reviewer:
11-SEP-2017
John Richards

Secondary Reviewer:
11-SEP-2017

CHECKLIST1 - Modified 03/05/2008
Generated: SEP-11-2017 14:46:16

00864440

HOLDING TIMES
EQUIVALENT TO AFCEE FORM 9

Analytical Method: 6850

AAB#: WG628979

Login Number: L17090079

Client ID	ID	Date Collected	TCLP Date	Time Held	Max Hold	Q	Extract Date	Time Held	Max Hold	Q	Run Date	Time Held	Max Hold	Q
HBW 7 - 083117	01	08/31/17					09/08/2017	8.1	28		09/08/17	.2	28	
HBW 10 - 083117	02	08/31/17					09/08/2017	8.1	28		09/08/17	.2	28	
HBW 1 - 083117	03	08/31/17					09/08/2017	8.1	28		09/08/17	.3	28	

* = SEE PROJECT QAPP REQUIREMENTS

HOLD_TIMES - Modified 03/06/2008
PDF File ID: 5470418
Report generated 09/11/2017 14:55

METHOD BLANK SUMMARY

Login Number:	L17090079	Work Group:	WG628979
Blank File ID:	1LM.LM40497	Blank Sample ID:	WG628979-02
Prep Date:	09/08/17 15:00	Instrument ID:	LCMS1
Analyzed Date:	09/08/17 18:46	Method:	6850
Analyst:	JWR		

This Method Blank Applies To The Following Samples:

Client ID	Lab Sample ID	Lab File ID	Time Analyzed	TAG
QCMRL	WG628979-05	1LM.LM40495	09/08/17 18:08	01
MCT	WG628979-01	1LM.LM40496	09/08/17 18:27	01
LCS	WG628979-03	1LM.LM40498	09/08/17 19:05	01
LCS2	WG628979-04	1LM.LM40499	09/08/17 19:24	01
HBW 7 - 083117	L17090079-01	1LM.LM40503	09/08/17 20:40	01
HBW 10 - 083117	L17090079-02	1LM.LM40504	09/08/17 20:59	01
HBW 1 - 083117	L17090079-03	1LM.LM40505	09/08/17 21:18	01
QCMRL	WG628979-06	1LM.LM40507	09/08/17 21:56	01

Report Name: BLANK_SUMMARY
PDF File ID: 5470419
Report generated 09/11/2017 14:55

Microbac Laboratories Inc.
METHOD BLANK REPORT

Login Number:	L17090079	Prep Date:	09/08/17 15:00	Sample ID:	WG628979-02
Instrument ID:	LCMS1	Run Date:	09/08/17 18:46	Prep Method:	6850
File ID:	1LM.LM40497	Analyst:	JWR	Method:	6850
Workgroup (AAB#):	WG628979	Matrix:	Water	Units:	ug/L
Contract #:		Cal ID:	LCMS1 - 08-SEP-17		

Analytes	DL	LOQ	Concentration	Dilution	Qualifier
Perchlorate	0.100	0.400	0.100	1	U

DL Method Detection Limit
LOQ Reporting/Practical Quantitation Limit
ND Analyte Not detected at or above reporting limit
* |Analyte concentration| > 1/2 RL

Report Name:BLANK
PDF ID: 5470420
11-SEP-2017 14:55

Microbac Laboratories Inc.
LABORATORY CONTROL SAMPLE (LCS)

Login Number: L17090079 Analyst: JWR Prep Method: 6850
Instrument ID: LCMS1 Matrix: Water Method: 6850
Workgroup (AAB#): WG628979 Units: ug/L
QC Key: DOD4 Lot #: STD80234

Sample ID: WG628979-03 LCS File ID: 1LM.LM40498 Run Date: 09/08/2017 19:05
Sample ID: WG628979-04 LCS2 File ID: 1LM.LM40499 Run Date: 09/08/2017 19:24

Analytes	LCS			LCS2			%RPD	%Rec Limits	RPD Lmt	Q
	Known	Found	% REC	Known	Found	% REC				
Perchlorate	0.200	0.186	93.0	0.200	0.191	95.5	2.65	80 - 120	15	

LCS_LCS2 - Modified 03/06/2008
PDF File ID: 5470421
Report generated: 09/11/2017 14:55

INITIAL CALIBRATION SUMMARY

Login Number: L17090079
Analytical Method: 6850
ICAL Workgroup: WG628977
Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte		AVG RF	% RSD	LINEAR (R)	QUAD (R^2)
Perchlorate		1.469	6.88	1.00000	

R = Correlation coefficient; 0.995 minimum
R^2 = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008
PDF File ID: 5470894
Report generated 09/11/2017 14:55

INITIAL CALIBRATION DATA

Login Number: L17090079
Analytical Method: 6850

Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-02			WG628977-03			WG628977-04		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	0.100	52500.0000	1.681	0.200	93400.0000	1.487	0.500	233000.000	1.445

INT_CAL - Modified 03/06/2008
PDF File ID: 5470894
Report generated 09/11/2017 14:55

Login Number: L17090079
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-05			WG628977-06			WG628977-07		
	CONC	RESP	RF	CONC	RESP	RF	CONC	RESP	RF
Perchlorate	1.00	460000.000	1.440	2.00	925000.000	1.444	5.00	2230000.00	1.418

INT_CAL - Modified 03/06/2008
PDF File ID: 5470894
Report generated 09/11/2017 14:55

INITIAL CALIBRATION DATA

Login Number: L17090079
Analytical Method: 6850
Instrument ID: LCMS1
Initial Calibration Date: 08-SEP-17 16:52
Column ID: F

Analyte	WG628977-08		
	CONC	RESP	RF
Perchlorate	10.0	4190000.00	1.371

INT_CAL - Modified 03/06/2008
PDF File ID: 5470894
Report generated 09/11/2017 14:55

Microbac Laboratories Inc.

ALTERNATE SOURCE CALIBRATION REPORT

Login Number: L17090079
Run Date: 09/08/2017
Sample ID: WG628977-09
Instrument ID: LCMS1
Run Time: 17:11
Method: 6850
File ID: 1LM.LM40492
Analyst: JWR
QC Key: DOD4
ICal Workgroup: WG628977
Cal ID: LCMS1 - 08-SEP-17

Analyte		Expected	Found	Units	RF	%D	UCL	Q
Perchlorate		1.00	1.04	ug/L	1.48	4.00	15	

* Exceeds %D Limit

ALT - Modified 09/06/2007
Version 1.5 PDF File ID: 5470895
Report generated 09/11/2017 14:55

CONTINUING CALIBRATION BLANK (CCB)

Login Number: L17090079
Run Date: 09/08/2017
Sample ID: WG628984-01
Instrument ID: LCMS1
Run Time: 17:30
Method: 6850
File ID: 1LM.LM40493
Analyst: JWR
Units: ug/L
Workgroup (AAB#): WG628979
Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER
QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 5470426
Report generated 09/11/2017 14:55

Login Number: L17090079
Run Date: 09/08/2017
Sample ID: WG628984-04
Instrument ID: LCMS1
Run Time: 22:15
Method: 6850
File ID: 1LM.LM40508
Analyst: JWR
Units: ug/L
Workgroup (AAB#): WG628979
Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER
QAPP: DOD4

Analytes	MDL	RDL	Concentration	Qualifier
Perchlorate	0.100	0.400	0.100	U

U = Result is less than MDL.
F = Result is between MDL and RL.
* = Result is above RL.

CCB - Modified 03/05/2008
PDF File ID: 5470426
Report generated 09/11/2017 14:55

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L17090079
Run Date: 09/08/2017
Sample ID: WG628984-02
Instrument ID: LCMS1
Run Time: 17:49
Method: 6850
File ID: 1LM.LM40494
Analyst: JWR
QC Key: DOD4
Workgroup (AAB#): WG628979
Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.07	ug/L	1.52	7.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 5470423
Report generated 09/11/2017 14:55

CONTINUING CALIBRATION VERIFICATION (CCV)

Login Number: L17090079
Run Date: 09/08/2017
Sample ID: WG628984-03
Instrument ID: LCMS1
Run Time: 21:37
Method: 6850
File ID: 1LM.LM40506
Analyst: JWR
QC Key: DOD4
Workgroup (AAB#): WG628979
Cal ID: LCMS1 - 08-SEP-17
Matrix: WATER

Analyte		Expected	Found	UNITS	RF	%D	UCL	Q
Perchlorate		1.00	1.05	ug/L	1.49	5.00	15	

* Exceeds %D Criteria

CCV - Modified 03/05/2008
PDF File ID: 5470423
Report generated 09/11/2017 14:55

Login Number:	L17090079	Run Date:	09/08/2017	Sample ID:	WG628979-05
Instrument ID:	LCMS1	Run Time:	18:08	Prep Method:	6850
File ID:	1LM.LM40495	Analyst:	JWR	Method:	6850
Workgroup (AAB#):	WG628979	Matrix:	Water	Units:	ug/L
Contract #:		Cal ID:	LCMS1 - 08-SEP-17		

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.201	101	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 5470422
Report generated 09/11/2017 14:55

Login Number: L17090079
Run Date: 09/08/2017
Sample ID: WG628979-06
Instrument ID: LCMS1
Run Time: 21:56
Prep Method: 6850
File ID: 1LM.LM40507
Analyst: JWR
Method: 6850
Workgroup (AAB#): WG628979
Matrix: Water
Units: ug/L
Contract #:
Cal ID: LCMS1 - 08-SEP-17

Analytes	Expected	Found	% Rec	Limits	Q
Perchlorate	0.200	0.195	97.5	70 - 130	

QCMRL - Modified 03/06/2007
PDF File ID: 5470422
Report generated 09/11/2017 14:55

Microbac Laboratories Inc.

INTERNAL STANDARD AREA SUMMARY
(COMPARED TO AVERAGE OF ICAL)

Login Number: L17090079
Instrument ID: LCMS1
Workgroup (AAB#): WG628979

ICAL CCV Number: WG628977-05
CAL ID: LCMS1-08-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG628977	NA	NA	1580000
Upper Limit	NA	NA	2370000
Lower Limit	NA	NA	790000
L17090079-01	1.00	01	1450000
L17090079-02	1.00	01	1480000

IS-1 - O18LP

Underline = Response outside limits

INTERNAL_STD_AVG_ICAL - Modified 03/10/2010
PDF File ID: 5470427
Report generated 09/11/2017 14:55

INTERNAL STANDARD AREA SUMMARY
(COMPARED TO AVERAGE OF ICAL)

Login Number: L17090079
Instrument ID: LCMS1
Workgroup (AAB#): WG628979

ICAL CCV Number: WG628977-05
CAL ID: LCMS1 - 08-SEP-17
Matrix: WATER

Sample Number	Dilution	Tag	IS-1
WG628977	NA	NA	1580000
Upper Limit	NA	NA	2370000
Lower Limit	NA	NA	790000
L17090079-03	1.00	01	1520000
WG628979-02	1.00	01	1700000
WG628979-03	1.00	01	1700000
WG628979-04	1.00	01	1700000

IS-1 - O18LP

Underline = Response outside limits

INTERNAL_STD_AVG_ICAL - Modified 03/10/2010
PDF File ID: 5470427
Report generated 09/11/2017 14:55

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	L17090079-01
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40503
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 20:40	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	53300	18200	2.93	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	L17090079-02
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40504
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 20:59	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	18300	6400	2.86	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	L17090079-03
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40505
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 21:18	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	12600	4280	2.94	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40485
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 14:59	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	52500	17500	3.00	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40486
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 15:18	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	93400	29500	3.17	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40487
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 15:37	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	233000	79100	2.95	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-05
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40488
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 15:56	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	460000	150000	3.07	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-06
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40489
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 16:15	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	925000	303000	3.05	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-07
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40490
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 16:34	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	2230000	745000	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-08
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40491
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 16:52	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	4190000	1390000	3.01	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628977-09
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40492
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 17:11	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	478000	152000	3.14	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	WG628979-01
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40496
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 18:27	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	97900	33300	2.94	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	WG628979-02
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40497
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 18:46	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	3170	568	5.58	2.3	3.8	*

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	WG628979-03
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40498
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 19:05	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	98000	32800	2.99	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	WG628979-04
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40499
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 19:24	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	100000	32600	3.07	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	WG628979-05
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40495
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 18:08	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	99500	33900	2.94	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**	6850	**Samplenum:**	WG628979-06
Instrument:	LCMS1	**Prep Date:**	09/08/2017 15:00	**File ID:**	1LM.LM40507
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 21:56	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	112000	36100	3.10	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628984-01
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40493
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 17:30	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	3380	1050	3.22	2.3	3.8	

Perchlorate Ion Ratios

Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628984-02
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40494
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 17:49	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	483000	157000	3.08	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628984-03
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40506
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 21:37	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	532000	175000	3.04	2.3	3.8	

Perchlorate Ion Ratios
Microbac Laboratories Inc.

Login #:	L17090079	**Prep Method:**		**Samplenum:**	WG628984-04
Instrument:	LCMS1	**Prep Date:**		**File ID:**	1LM.LM40508
Analyst:	JWR	**Anal Method:**	6850	**Matrix:**	Water
Worknum:	WG628979	**Analysis Date:**	09/08/2017 22:15	**Units:**	ug/L

Analyte	Res #1	Res #2	Ratio	Lower	Upper	Q
PERCHLORATE	3920	1130	3.47	2.3	3.8	

3.0 Attachments

Microbac Laboratories Inc.
Ohio Valley Division Analyst List
September 11, 2017

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001 - BIO-CHEM TESTING WVDEP 220	002 - REIC Consultants, Inc. WVDEP 060
003 - Sturm Environmental	004 - MICROBAC PITTSBURGH
005 - ES LABORATORIES	006 - ALCOSAN LABORATORIES
007 - ALS LABORATORIES	008 - BENCHMARK LABORATORIES
010 - MICROBAC CHICAGOLAND	AC - AMBER R. CARMICHAEL
ADC - ANTHONY D. CANTER	ADG - APRIL D. GREENE
ALS - ADRIANE L. STEED	AWE - ANDREW W. ESSIG
AZH - AFTER HOURS	BJO - BRIAN J. OGDEN
BLG - BRENDA L. GREENWALT	BLR - BRANDON L. RICHARDS
BNB - Brandi N. Bentley	BRG - BRENDA R. GREGORY
CAS - Craig A. Smith	CEB - CHAD E. BARNES
CLC - CHRYS L. CRAWFORD	CLS - CARA L. STRICKLER
CPD - CHAD P. DAVIS	CSH - CHRIS S. HILL
CV - Carl Volkman	DAK - DEAN A. KETELSEN
DCM - DAVID C. MERCKLE	DEV - DAVID E. VANDENBERG
DIH - DEANNA I. HESSON	DLB - DAVID L. BUMGARNER
DLP - DOROTHY L. PAYNE	DSM - DAVID S. MOSSOR
DTG - DOMINIC T. GEHRET	ECL - ERIC C. LAWSON
EPT - ETHAN P. TIDD	ERP - ERIN R. PORTER
FJB - FRANCES J. BOLDEN	HRF - HEATHER R. FAIRCHILD
JDH - JUSTIN D. HESSON	JDS - JARED D. SMITH
JKP - JACQUELINE K. PARSONS	JLD - JESSICA L. DELONG
JST - JOSHUA S. TAYLOR	JTP - JOSHUA T. PEMBERTON
JWR - JOHN W. RICHARDS	JWS - JACK W. SHEAVES
JYH - JI Y. HU	KAK - KATHY A. KIRBY
KDD - Katelyn D. Daley	KEB - KATIE E. BARNES
KHR - KIM H. RHODES	KKB - KERRI K. BUCK
KRA - KATHY R. ALBERTSON	KRP - KATHY R. PARSONS
LJH - Lacey J. Hendershot	LLS - LARRY L. STEPHENS
LSB - LESLIE S. BUCINA	LSJ - LAURA S. JONES
MAP - MARLA A. PORTER	MBK - MORGAN B. KNOWLTON
MES - MARY E. SCHILLING	MMB - MAREN M. BEERY
MRT - MICHELLE R. TAYLOR	OJE - OMOYEMWEN J. ENGLISH
PDM - PIERCE D. MORRIS	PIT - MICROBAC WARRENDALE
REK - BOB E. KYER	RLB - BOB BUCHANAN
RNP - RICK N. PETTY	SAV - SARAH A. VANDENBERG
SCA - SUEELLEN C. ADAMS	SCB - SARAH C. BOGOLIN
SCJ - SUE ELLEN C. JOHNSON	SDC - SHALYN D. CONLEY
TB - TODD BOYLE	TMB - TIFFANY M. BAILEY
TMM - TAMMY M. MORRIS	VC - VICKI COLLIER
WTD - WADE T. DELONG	XXX - UNAVAILABLE OR SUBCONTRACT
ZTB - ZACH T. BARNES	

Qualkey: DOD

Qualifier	Description
*	Surrogate or spike compound out of range
+	Correlation coefficient for the MSA is less than 0.995
<	Result is less than the associated numerical value.
>	Greater than
>,H1	Result is greater than the associated numerical value. Sample analysis performed past holding time.
A	See the report narrative
B	The reported result is associated with a contaminated method blank.
B,H1	Analyte present in method blank. Sample analysis performed past holding time.
B1	Target analyte detected in method blank at or above the method reporting limit
B3	Target analyte detected in calibration blank at or above the method reporting limit
B4	The BOD unseeded dilution water blank exceeded 0.2 mg/L
C	Confirmed by GC/MS
CG	Confluent growth
CT1	Cooler temperature at sample reciept exceeded regulatory limit.
DL	Surrogate or spike compound was diluted out.
E	Estimated concentration due to sample matrix interference
E,CT1	Estimated results. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
EDL	Elevated sample reporting limits, presence of non-target analytes
EMPC	Estimated Maximum Possible Concentration
F, S	Estimated result below quantitation limit; method of standard additions(MSA)
F,CT1	Estimated value; the analyte concentration was less than the RL/LOQ. The cooler temperature at receipt exceeded regula
FL	Free Liquid
FP1	Did not ignite.
H1	Sample analysis performed past holding time.
H1,CT1	Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque
I	Semiquantitative result (out of instrument calibration range)
J	Estimated concentration; sample matrix interference.
J	Estimated value ; the analyte concentration was greater than the highest standard
J	Estimated value ; the analyte concentration was less than the LOQ.
J	The reported result is an estimated value.
J,B	Analyte detected in both the method blank and sample above the MDL.
J,CT1	Estimated value ; the analyte concentration was less than the LOQ. Cooler temperature at sample reciept exceeded regu
J,H1	Estimated value ; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.
J,H1	The reported result is an estimated value. Sample was analyzed past holding time.
J,P	Estimate; columns don't agree to within 40%
J,S	Estimated concentration; analyzed by method of standard addition (MSA)
JB	The reported result is an estimated value. The reported result is also associated with a contaminated method blank.
JQ	The reported result is an estimated value and one or more quality control criteria failed. See narrative.
L	Sample reporting limits elevated due to matrix interference
L1	The associated blank spike (LCS) recovery was above the laboratory acceptance limits.
L2	The associated blank spike (LCS) recovery was below the laboratory acceptance limits.
M	Matrix effect; the concentration is an estimate due to matrix effect.
N	Nontarget analyte; the analyte is a tentativlely identified compound (TIC) by GC/MS
NA	Not applicable
ND	Not detected at or above the reporting limit (RL)
ND, B	Not detected at or above the reporting limit (RL). Analyte present in method blank.
ND, CT1	Analyte was not detected. The concentration is below the reported LOD. The cooler temperature at receipt exceeded reg
ND, L	Not detected; sample reporting limit (RL) elevated due to interference
ND, S	Not detected; analyzed by method of standard addition (MSA)
ND,H1	Not detected; Sample analysis performed past holding time.
ND,H1,CT1	Not detected; Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guide
NF	Not found by library search
NFL	No free liquid
NI	Non-ignitable
NR	Analyte is not required to be analyzed
NS	Not spiked
P	Concentrations >40% difference between the two GC columns
Q	One or more quality control criteria failed. See narrative.
Q,H1	One or more quality control criteria failed. Sample analyzed past holding time. See narrative.
QNS	Quantity of sample not sufficient to perform analysis
RA	Reanalysis confirms reported results
RE	Reanalysis confirms sample matrix interference
S	Analyzed by method of standard addition (MSA)
SMI	Sample matrix interference on surrogate
SP	Reported results are for spike compounds only
T5	Laboratory not licensed for this parameter
TIC	Library Search Compound

Microbac Laboratories Inc.
List of Valid Qualifiers
September 11, 2017

Qualkey: DOD

TNTC	Too numerous to count
TNTC, B	Too numerous to count. Analyte present in method blank.
TNTC,CT1	Too numerous to count. The cooler temperature at receipt exceeded regulatory guidelines for requested testing.
TNTC,H1	Too numerous to count. Sample analysis performed past holding time.
U	Analyte was not detected. The concentration is below the reported LOD.
U,CT1	Analyte was not detected. The concentration is below the reported LOD. Cooler temperature at sample reciept exceeded
U,H1	Not detected; Sample analysis performed past holding time.
UJ	Undetected; the MDL and RL are estimated due to quality control discrepancies.
UQ	Undetected; the analyte was analyzed for, but not detected.
W	Post-digestion spike for furnace AA out of control limits
X	Exceeds regulatory limit
X, S	Exceeds regulatory limit; method of standard additions (MSA)
Z	Cannot be resolved from isomer - see below

00864482

AECOM

Chain of Custody Record

COC Number:

Laboratory:	Microbac POC: Stephanie Mossburg	Project Manager:	Elspeth Sharp
Address:	158 Starlite Drive Marietta, OH 45750	Phone/Fax Number:	210-296-2000
Phone:	1-800-373-4071	Sampler (print):	Scott Beesinger
Client:	AECOM	Signature:	Scott Beesinger
Address:	112 East Pecan Ste. 400 San Antonio, TX 78205	pH:	
Turn Around Time:	STANDARD		
Project Name/Location:	Longhorn		
Project Number:	60256135.0009AA		

Mail to: Linda Raabe
112 East Pecan STE. 400
San Antonio, TX 78205
210-296-2000

Fed Ex Airbill No:

Program:

ERPIMS REQUIRED FIELDS

Site Name	Sample ID/Location ID	SBD	SED	Date	Time	Comp*	Grab	Matrix	Number of Containers	PERCHLORATE	SA CODE	Cooler ID	LOT CONTROL NUMBERS ABLOT	EBLOT	TBLOT
Harrison Bayou & Goose Prarie Creek	HBW 7 - 083117			8/31/17	13:08		X	W	1	X					
	HBW 10 - 083117			8/31/17	13:18		X	W	1	X					
	HBW 1 - 083117			8/31/17	13:27		X	W	1	X					

Comments: **STANDARD TAT**

Relinquished by: (Signature)	Date	Time	Received by: (Signature)
Scott Beesinger	8/31/17	1430	
Relinquished by: (Signature)	Date	Time	Received for Laboratory by: (Signature) Cara Strickler

Microbac OVD
Received: 09/01/2017 14:51
By: CARA STRICKLER
221000105442

ed by: (Signature)

*Homogenize all composite samples prior to analysis

Distribution: White to Laboratory, Canary to Project Manager, Pink QA/QC Manager

MICROBAC®

COOLER TEMP >6° C LOG

Cooler ID 5442

SAMPLE ID	Bottle 1 °C	Bottle 2 °C	Bottle 3 °C	Bottle 4 °C	Bottle 5 °C	Bottle 6 °C

UBO 9/1/17

pH Exceptions

pH Lot # HC601354

SAMPLE ID	Bottle 1	Bottle 2	Bottle 3	Bottle 4	Bottle 5	Bottle 6

UBO 9/1/17

PRESERVATIVE EXCEPTIONS
✓ NONE
__ AS NOTED
UBO 9/1/17

Document Control # 1957
Last 10-07-2016

Issued to: Document Master File

Microbac Laboratories Inc.

Internal Chain of Custody Report

Login: L17090079
Account: 2551
Project: 2551.096
Samples: 3
Due Date: 12-SEP-2017

Samplenum	**Container ID**	**Products**
L17090079-01	958917	PCT-S 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	01-SEP-2017 15:58	BRG		
2	ANALYZ	W1	SEM	07-SEP-2017 15:44	JWR	CLS	
3	STORE	SEM	A1	11-SEP-2017 16:15	CLS	JWR	

Samplenum	**Container ID**	**Products**
L17090079-02	958918	PCT-S 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	01-SEP-2017 15:58	BRG		
2	ANALYZ	W1	SEM	07-SEP-2017 15:44	JWR	CLS	
3	STORE	SEM	A1	11-SEP-2017 16:15	CLS	JWR	

Samplenum	**Container ID**	**Products**
L17090079-03	958919	PCT-S 6850

Bottle: 1

Seq.	Purpose	From	To	Date/Time	Accept	Relinquish	pH
1	LOGIN	COOLER	W1	01-SEP-2017 15:58	BRG		
2	ANALYZ	W1	SEM	07-SEP-2017 15:44	JWR	CLS	
3	STORE	SEM	A1	11-SEP-2017 16:15	CLS	JWR	

A1 - Sample Archive (COLD)
A2 - Sample Archive (AMBIENT)
F1 - Volatiles Freezer in Login
V1 - Volatiles Refrigerator in Login
W1 - Walkin Cooler in Login

NELAP Addendum - January 4, 2016

Non-NELAP LIMS Product and Description

The following is a list of those tests that are not included in the Microbac – OVD NELAP Scope of Accreditation:

Heat of Combustion (BTU)
Total Halide by Bomb Combustion (TX)
Particle Sizing - 200 Mesh (PS200)
Specific Gravity/Density (SPGRAV)
Total Residual Chlorine (CL-TRL)
Total Volatile Solids (all forms) (TVS)
Total Coliform Bacteria (all methods)
Fecal Coliform Bacteria (all methods)
Sulfite (SO3)
Propionaldehyde (HPLC-UV)

SOLID AND HAZARDOUS CHEMICALS
Nitrogen, Ammonia by Method 350.1
Chromium, Hexavalent, Leachable by SM3500 Cr-B 2009
Phenolics, Total by Method 420.1
ASTM D3987-06

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

<u>OVD HPLC02/HPLC-UV</u>

Nitroglycerin
Acetic acid
Butyric acid
Lactic acid
Propionic acid
Pyruvic acid

<u>OVD MSS01/GC-MS</u>

1,4-Phenylenediamine
1-Methylnaphthalene
1,4-Dioxane
Atrazine
Benzaldehyde
Biphenyl
Caprolactam
Hexamethylphosphoramide (HMPA)
Pentachlorobenzene
Pentachloroethane

NELAP Accreditation by Laboratory SOP

NONPOTABLE WATER

OVD MSV01/GC-MS

1, 1, 2-Trichloro-1,2,2-trifluoroethane
1,3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
T-amylmethylether (TAME)
Tetrahydrofuran (THF)

OVD HPLC07/HPLC-MS-MS

Hexamethylphosphoramide (XMPA-LCMS)

OVD HPLC12/HPLC/UV

Acetate
Formate

OVD RSK01/GC-FID

Acetylene
Propane

OVD K9305/ISE

Fluoroborate

SOLID AND HAZARDOUS CHEMICALS

OVD MSS0I/GC-MS

1-Methylnaphthalene
Benzaldehyde
Biphenyl
Caprolactam
Pentachloroethane

NELAP Accreditation by Laboratory SOP

SOLID AND HAZARDOUS CHEMICALS

<u>OVD MSV0I/GC-MS</u>

1.3-Butadiene
Cyclohexane
Cyclohexanone
Dimethyl disulfide
Dimethylsulfide
Ethyl-t-butylether (ETBE)
Isoprene
Methylacetate
Methylcyclohexane
n-Hexane
T-amylmethylether (TAME)

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

WorkOrder: HS17121303

LHAAP/Quarterly Surface Water

Bhate Environmental Associates, Inc.

Marcia Olive
445 Union Blvd Ste 129
Lakewood CO 80228

12-Jan-2018

10450 Stancliff Rd. Suite 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887

January 12, 2018

Marcia Olive
Bhate Environmental Associates, Inc.
445 Union Blvd Ste 129
Lakewood, CO 80228

Work Order: **HS17121303**

Laboratory Results for: **LHAAP/Quarterly Surface Water**

Dear Marcia,

ALS Environmental received 5 sample(s) on Dec 27, 2017 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,

Sonia West

Generated By: Dayna.Fisher
Sonia West
Project Manager

ALS Group USA, Corp Date: 12-Jan-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP/Quarterly Surface Water
Work Order: HS17121303

SAMPLE SUMMARY

Lab Samp ID	Client Sample ID	Matrix	TagNo	Collection Date	Date Received	Hold
HS17121303-01	HBW7_122617	Water		26-Dec-2017 12:45	27-Dec-2017 08:30	☐
HS17121303-02	HBW10_122617	Water		26-Dec-2017 13:00	27-Dec-2017 08:30	☐
HS17121303-03	HBW1_122617	Water		26-Dec-2017 13:12	27-Dec-2017 08:30	☐
HS17121303-04	GPW1_122617	Water		26-Dec-2017 13:25	27-Dec-2017 08:30	☐
HS17121303-05	GPW3_122617	Water		26-Dec-2017 13:36	27-Dec-2017 08:30	☐

ALS Group USA, Corp Date: 12-Jan-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP/Quarterly Surface Water
Work Order: HS17121303

CASE NARRATIVE

Work Order Comments

- The analysis for Perchlorate was subcontracted to ALS Environmental in Salt Lake City, UT.

ALS Group USA, Corp

Date: 12-Jan-18

Client:	Bhate Environmental Associates, Inc.		**ANALYTICAL REPORT**
Project:	LHAAP/Quarterly Surface Water		WorkOrder:HS17121303
Sample ID:	HBW7_122617		Lab ID:HS17121303-01
Collection Date:	26-Dec-2017 12:45		Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	12-Jan-2018 11:16

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

ALS Group USA, Corp Date: 12-Jan-18

Client:	Bhate Environmental Associates, Inc.		**ANALYTICAL REPORT**
Project:	LHAAP/Quarterly Surface Water		WorkOrder:HS17121303
Sample ID:	HBW10_122617		Lab ID:HS17121303-02
Collection Date:	26-Dec-2017 13:00		Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	12-Jan-2018 11:16

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

ALS Group USA, Corp

Date: 12-Jan-18

Client:	Bhate Environmental Associates, Inc.		**ANALYTICAL REPORT**
Project:	LHAAP/Quarterly Surface Water		WorkOrder:HS17121303
Sample ID:	HBW1_122617		Lab ID:HS17121303-03
Collection Date:	26-Dec-2017 13:12		Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	12-Jan-2018 11:16

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

ALS Group USA, Corp Date: 12-Jan-18

Client:	Bhate Environmental Associates, Inc.		**ANALYTICAL REPORT**
Project:	LHAAP/Quarterly Surface Water		WorkOrder:HS17121303
Sample ID:	GPW1_122617		Lab ID:HS17121303-04
Collection Date:	26-Dec-2017 13:25		Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	12-Jan-2018 11:16

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

ALS Group USA, Corp Date: 12-Jan-18

Client:	Bhate Environmental Associates, Inc.		**ANALYTICAL REPORT**
Project:	LHAAP/Quarterly Surface Water		WorkOrder:HS17121303
Sample ID:	GPW3_122617		Lab ID:HS17121303-05
Collection Date:	26-Dec-2017 13:36		Matrix:Water

ANALYSES	RESULT	QUAL	DL	LOD	LOQ	UNITS	DILUTION FACTOR	DATE ANALYZED
SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850)		**Method:NA**						Analyst: SUB
Subcontract Analysis	See Attached		0	0		NA	1	12-Jan-2018 11:16

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

ALS Group USA, Corp Date: 12-Jan-18

Client: Bhate Environmental Associates, Inc.
Project: LHAAP/Quarterly Surface Water
WorkOrder: HS17121303

DATES REPORT

Sample ID	Client Samp ID	Collection Date	TCLP Date	Prep Date	Analysis Date	DF
Batch ID R308871	**Test Name :** SUBCONTRACT ANALYSIS - PERCHLORATE (EPA 6850) **Matrix:** Water					
HS17121303-01	HBW7_122617	26 Dec 2017 12:45			12 Jan 2018 11:16	1
HS17121303-02	HBW10_122617	26 Dec 2017 13:00			12 Jan 2018 11:16	1
HS17121303-03	HBW1_122617	26 Dec 2017 13:12			12 Jan 2018 11:16	1
HS17121303-04	GPW1_122617	26 Dec 2017 13:25			12 Jan 2018 11:16	1
HS17121303-05	GPW3_122617	26 Dec 2017 13:36			12 Jan 2018 11:16	1

ALS Group USA, Corp Date: 12-Jan-18

Client:	Bhate Environmental Associates, Inc.
Project:	LHAAP/Quarterly Surface Water
WorkOrder:	**HS17121303**

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
Arkansas	17-027-0	27-Mar-2018
California	2919 2016-2018	31-Jul-2018
Illinois	004112	09-May-2018
Kentucky	123043	30-Apr-2018
Louisiana	03087 2017-2017	30-Jun-2018
North Dakota	R193 2017-2017	30-Apr-2018
Oklahoma	2017-088	31-Aug-2018
Texas	T104704231-17-19	30-Apr-2018
North Carolina	624-2018	31-Dec-2018

ALS Group USA, Corp Date: 12-Jan-18

Sample Receipt Checklist

Client Name:	Bhate Environmental	Date/Time Received:	**27-Dec-2017 08:30**
Work Order:	HS17121303	Received by:	**PJM**

Checklist completed by: *Cesar A. Lira* (eSignature) 27-Dec-2017 (Date)

Reviewed by: *Sonia West* (eSignature) 28-Dec-2017 (Date)

Matrices: **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):	4.9C/5.2C UC/C		IR25
Cooler(s)/Kit(s):	25709		
Date/Time sample(s) sent to storage:	12/27/2017 14:00		
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:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

Corrective Action:

bhate ENVIRONMENTAL CONSTRUCTION ENERGY

Page: 1 of 1

Project/Phase No: NWO1312.0150

COC Number(1):

LIMS Number:

1608 13th Avenue South, Suite 300
Birmingham Alabama 35205
Tel: 205-918-4000
Fax: 205-918-4050

Chain of Custody and Analytical Request

Facility/Base I.D.: LHAAP

Project/Site Name: LHAAP / Quarterly Surface Water

Client Name:

Collected by: Scott Beesinger

Sample Analysis Requested (5) | Quality Assurance Samples (6)

HS17121303
Bhate Environmental Associates, Inc.
LHAAP/Quarterly Surface Water

Field Sample ID (30 Characters Max)	ERPIMS LOCID (15 Characters Max)	Date Collected (dd-mmm-yyyy)	Time Collected (Military) (hhmm)	Sample Depth (beginning - ending)	SA Code (2)	Sample Number (3)	Sample Matrix (4)	Number of containers	PERCHLORATE	Ambient Blank Lot Control Number	Equipment Blank Lot Control Number	Trip Blank Lot Control Number	Cooler ID
HBW7_122617		26 DEC 2017	1245	-			WG	1	X				
HBW10_122617		26 DEC 2017	1300	-			WG	1	X				
HBW1_122617		26 DEC 2017	1312	-			WG	1	X				
GPW1_122617		26 DEC 2017	1325	-			WG	1	X				
GPW3_122617		26 DEC 2017	1336				WG	1	X				
				-									
				-									
				-									
				-									
				-									
				-									

COMMENTS:

Custody Transfers Prior to Receipt by Laboratory

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1. Scott Beesinger	12/26/17	1430	1. PM	12/27/17	08:30
2.			2.		
3.			3.		

VIC
Temp 4.9
Cooler# 25709 IR#25 CIFO.3

Sample Delivery Details / Laboratory Receipt

Delivered Directly to Lab: ______ Shipped No.:
Method of Shipment:
Fed Ex Airbill Number:
Analytical Lab: ALS 10450 Stancliff Rd, Suite 210 Houston, TX 77099 (281) 530-5656
ATTN: SONIA WEST Lab Recipient: Delivery Date/Time:

1.) Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)
2.) Sample Type (SA) Codes: N = Normal Sample, TB = Trip Blank (-c) Sample, FD = Field Duplicate (-a) Samples, FR = Field Replicate (-b) Samples, EB = Equipment Blank (-d) Samples, MS = Matrix Spike, SD = Matrix Spike Duplicate, AB = Ambient Blank (-e)
3.) Sample Number: Unique sample number collected from a particular location per day. (e.g. Groundwater sample collected from MW-1 on 10/10/99 = 01, if sampled again on 10/10/99 = 02, etc.)
4.) Matrix Codes: GS = Soil Gas, WG = Groundwater, WS = Surface Water, SO = Soil, SE = Sediment, SL = Sludge, SS = Surface Soil Samples, WQ = Aqueous Blank Samples (trip, equipment, ambient, etc), SQ = Soil Blanks
5.) Sample Analysis Requested: Analytical method requested and number of containers provided for each.
6.) Quality assurance samples are assigned by date (ddmmyy) and the sample number associated with the sample (01, 02, etc) (e.g. Equipment blank collected in association with MW-1 on 10/10/99 will be designated 10109901 in the Equipment Blank Lot Control

ALS

ALS
10450 Stancliff Rd., Suite 210
Houston, Texas 77099
Tel. +1 281 530 5656
Fax. +1 281 530 5887
25709

CUSTODY SEAL

Date: 12/26/17 Time: 1430
Name: SCOTT BEESINGER
Company: BHATE

Seal Broken By: SM
Date: 12/27/17

25709 DEC 27 2017

FedEx
TRK# 0221 7376 9750 5229

WED - 27 DEC 10:30A
PRIORITY OVERNIGHT

AB SGRA 25709

77099
TX-US
IAH

FID 162705 26DEC17 GGGA 546C1/574C/0C8A

Sub Contract Raw Data

Bhate Environmental Associates, Inc.
Project: LHAAP/Quarterly Surface Water
ALS WO# HS17121303

Case Narrative

Method: 6850
Analysis: Perchlorate
Analysis SOP: LC-MS-CLO4
ALS WO ID(s): 1736221; 1736222; 1800210

Client: ALS Laboratories (Houston, TX)
Matrix: Water
ELMS Batch (HBN): 2032 (206369)

General Set Information: There were fourteen field samples in these Work Orders. The samples were analyzed for perchlorate.

Method Summary: Each sample was prepared as noted below and analyzed using an Agilent 1100 LC/MSD system in select ion monitoring (SIM) mode at m/z 83 and 85, which corresponds to the loss of one oxygen atom from the perchlorate molecule. ChemStation software was used for instrument control and data analysis. The ion ratio of m/z 83 to 85 was used to positively identify the response peak as perchlorate. Quantitation was performed using the m/z 83 peak area. An internal standard (ISTD) of ^{18}O labeled perchlorate was added to each sample to establish the perchlorate peak retention time and used in quantitation.

Sample Preparation: A 10.0mL aliquot of each sample was transferred into a 15-mL centrifuge tube. 50µL of an ^{18}O labeled perchlorate solution was added to each sample as an internal standard. The samples were then capped, vortexed, and filtered into autosampler vial using Phenex PES membrane 0.45µm Syringe filters.

Holding Times: Holding times were met for all analyses.

Dilutions: Samples 1736222003/07 were analyzed and reported at a 1:10 dilutions. Sample 1736222002 was analyzed and reported at a 1:100 dilution. Samples 1736222005/06/08 were analyzed and reported at a 1:1,000 dilutions. The reporting limits have been adjusted accordingly.

Method QC data: The method blank (LMB 582602) was less than 1/2 the CRDL. The recovery for the LCS (582603) was within acceptable parameters.

MS/MSD Analysis: The matrix spike and matrix spike duplicate (MS/MSD) was performed on sample 1736221001 (Client ID: HBW7_122617). The MS/MSD percent recoveries and relative percent difference (RPD) were within the performance limits.

Instrument QC: Instrument initial and continuing calibrations were performed in accordance with published procedures.

NC/CAR(s): None were required for this set.

Sample Calculation: Samples were reported in µg/L. Results were calculated in µg/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve (µg/L)
B = Dilution performed at time of analysis

Miscellaneous Comments: These samples were analyzed in accordance with the requirements found in the DOD QSM Version 5.1. Manual Integrations were performed for some of the Initial Calibration analyses (datafiles: 28NOVP01/02) along with datafiles 08JAND03/10/26.

Thomas Bosch	January 11, 2018
Analyst	Date

ANALYTICAL REPORT

Report Date: January 12, 2018

Sonia West
ALS Environmental
10450 Stancliff Rd.
Suite 210
Houston, TX 77099

Phone: (281) 530-5656

E-mail: Sonia.West@alsglobal.com

Workorder: **34-1736221**
Project ID: HS17121303 122617
Purchase Order: HS17121303
Project Manager Kevin W. Griffiths

Client Sample ID	Lab ID	Collect Date	Receive Date	Sampling Site
HBW7_122617	1736221001	12/26/17	12/28/17	HS17121303
HBW10_122617	1736221002	12/26/17	12/28/17	HS17121303
HBW1_122617	1736221003	12/26/17	12/28/17	HS17121303
GPW1_122617	1736221004	12/26/17	12/28/17	HS17121303
GPW3_122617	1736221005	12/26/17	12/28/17	HS17121303

ANALYTICAL REPORT

Workorder: 34-1736221
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID: **HBW7_122617** | Sampling Site: HS17121303 | Collected: 12/26/2017
Lab ID: 1736221001 | Media: 125 mL Nalgene | Received: 12/28/2017
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable | **Analysis:** EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2032 (HBN: 206369) | **Percent Solid:** NA
Analyzed: 01/08/2018 09:55 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Sample ID: **HBW10_122617** | Sampling Site: HS17121303 | Collected: 12/26/2017
Lab ID: 1736221002 | Media: 125 mL Nalgene | Received: 12/28/2017
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable | **Analysis:** EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2032 (HBN: 206369) | **Percent Solid:** NA
Analyzed: 01/08/2018 10:52 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Sample ID: **HBW1_122617** | Sampling Site: HS17121303 | Collected: 12/26/2017
Lab ID: 1736221003 | Media: 125 mL Nalgene | Received: 12/28/2017
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable | **Analysis:** EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2032 (HBN: 206369) | **Percent Solid:** NA
Analyzed: 01/08/2018 11:11 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	1.1	1.0	2.0	4.0	1	J

Sample ID: **GPW1_122617** | Sampling Site: HS17121303 | Collected: 12/26/2017
Lab ID: 1736221004 | Media: 125 mL Nalgene | Received: 12/28/2017
Matrix: Water | Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM

Preparation: Not Applicable | **Analysis:** EPA 6850, DoD QSM Water | **Instrument ID:** LCMS04
Batch: ELMS/2032 (HBN: 206369) | **Percent Solid:** NA
Analyzed: 01/08/2018 11:31 | **Report Basis:** Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

ANALYTICAL REPORT

Workorder: 34-1736221
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Analytical Results

Sample ID:	**GPW3_122617**	Sampling Site:	HS17121303	Collected:	12/26/2017
Lab ID:	1736221005	Media:	125 mL Nalgene	Received:	12/28/2017
Matrix:	Water	Sampling Parameter:	NA		

Analysis Method - EPA 6850, DoD QSM

Preparation:	Not Applicable	**Analysis:**	EPA 6850, DoD QSM Water	**Instrument ID:**	LCMS04
		Batch:	ELMS/2032 (HBN: 206369)	**Percent Solid:**	NA
		Analyzed:	01/08/2018 11:50	**Report Basis:**	Wet

Analyte	Result (ug/L)	DL (ug/L)	LOD (ug/L)	LOQ (ug/L)	Dilution	Qual
Perchlorate	ND	1.0	2.0	4.0	1	U

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Method	Analyst	Peer Review
EPA 6850, DoD QSM	/S/ Thomas Bosch 01/11/2018 10:56	/S/ Stephen Brose 01/12/2018 07:59

Laboratory Contact Information

ALS Environmental
960 W Levoy Drive
Salt Lake City, Utah 84123

Phone: (801) 266-7700
Email: alslt.lab@ALSGlobal.com
Web: www.alsslc.com

ANALYTICAL REPORT

Workorder: 34-1736221
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

General Lab Comments

The results provided in this report relate only to the items tested.
Samples were received in acceptable condition unless otherwise noted.
Samples have not been blank corrected unless otherwise noted.
This test report shall not be reproduced, except in full, without written approval of ALS.

ALS provides professional analytical services for all samples submitted. ALS is not in a position to interpret the data and assumes no responsibility for the quality of the samples submitted.

All quality control samples processed with the samples in this report yielded acceptable results unless otherwise noted.

ALS is accredited for specific fields of testing (scopes) in the following testing sectors. The quality system implemented at ALS conforms to accreditation requirements and is applied to all analytical testing performed by ALS. The following table lists testing sector, accreditation body, accreditation number and website. Please contact these accrediting bodies or your ALS project manager for the current scope of accreditation that applies to your analytical testing.

Testing Sector	Accreditation Body (Standard)	Certificate Number	Website
Environmental	ANAB (DoD ELAP)	ADE-1420	http://www.anab.org/accredited-organizations/
	Utah (NELAC)	DATA1	http://health.utah.gov/lab/labimp/
	Nevada	UT00009	http://ndep.nv.gov/bsdw/labservice.htm
	Oklahoma	UT00009	http://www.deq.state.ok.us/CSDnew/
	Iowa	IA# 376	http://www.iowadnr.gov/InsideDNR/RegulatoryWater.aspx
	Texas (TNI)	T104704456-11-1	http://www.tceq.texas.gov/field/qa/lab_accred_certif.html
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
	Kansas	E-10416	http://www.kdheks.gov/lipo/index.html
Industrial Hygiene	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
	Washington	C596-16	http://www.ecy.wa.gov/programs/eap/labs/index.html
Lead Testing:			
CPSC	ANAB (ISO 17025, CPSC)	ADE-1420	http://www.anab.org/accredited-organizations/
Soil, Dust, Paint ,Air	AIHA LAP LLC (ISO 17025 & IHLAP/ELLAP)	101574	http://www.aihaaccreditedlabs.org
Dietary Supplements	ACLASS (ISO 17025)	ADE-1420	http://www.aclasscorp.com

ANALYTICAL REPORT

Workorder: 34-1736221
Client: ALS Environmental (Houston)
Project Manager: Kevin W. Griffiths

Result Symbol Definitions

MDL = Method Detection Limit, a statistical estimate of method/media/instrument sensitivity.
RL = Reporting Limit, a verified value of method/media/instrument sensitivity.
CRDL = Contract Required Detection Limit
Reg. Limit = Regulatory Limit.
ND = Not Detected, testing result not detected above the MDL or RL.
< This testing result is less than the numerical value.
** No result could be reported, see sample comments for details.

Qualifier Symbol Definitions

U = Qualifier indicates that the analyte was not detected above the MDL.
J = Qualifier Indicates that the analyte value is between the MDL and the RL. It is also used to indicate an estimated value for tentatively identified compounds in mass spectrometry where a 1:1 response is assumed.
B = Qualifier indicates that the analyte was detected in the blank.
E = Qualifier indicates that the analyte result exceeds calibration range.
P = Qualifier indicates that the RPD between the two columns is greater than 40%.

Quality Control Sample Batch Report

Analysis Information

Workorder: 1736221

Limits: Client SOW/Contract Specified
Basis: DoD QSM

Preparation: NA
Batch: NA
Prepared By: NA

Analysis: EPA 6850
Batch: ELMS/2032 (HBN: 206369)
Analyzed By: Thomas Bosch

Blank

LMB: 582602
Analyzed: 01/08/2018 09:15

Units: ug/L

Analyte	Result	MDL	RL
Perchlorate	ND	1	2.00

Laboratory Control Sample

LCS: 582603
Analyzed: 01/08/2018 09:34
Dilution: 1
Units: ug/L

Analyte	Result	Target	% Rec	QC Limits	
Perchlorate	5.30	5.00	106	78.8	123.8

Matrix Spike - Matrix Spike Duplicate

Sample: 1736221001
Analyzed: 01/08/2018 09:55
Dilution: 1
Units: ug/L

MS: 582604
Analyzed: 01/08/2018 10:14
Dilution: 1
Units: ug/L

MSD: 582605
Analyzed: 01/08/2018 10:33
Dilution: 1
Units: ug/L

Analyte	Result	Result	Target	% Rec	QC Limits		Result	% Rec	RPD	QC Limits	
Perchlorate	ND	4.81	5	96.1	78.8	123.8	4.79	95.9	0.221	0.0	20.0

Continuing Calibration Verification

CCV: 582599
Analyzed: 01/08/2018 08:17
Units: ug/L
Criteria: ± 15%

CCV: 582606
Analyzed: 01/08/2018 13:08
Units: ug/L
Criteria: ± 15%

CCV: 582608
Analyzed: 01/08/2018 16:40
Units: ug/L
Criteria: ± 15%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	26.3	25.0	105	26.2	25.0	105	26.6	25.0	107

Interference Check Sample

ICSA: 582601
Analyzed: 01/08/2018 08:56
Units: ug/L
Criteria: ± 30%

Analyte	Result	Target	% Rec.
Perchlorate	0.880	1.00	88.0

Limit of Detection Verification

LODV: 582600
Analyzed: 01/08/2018 08:36
Units: ug/L
Criteria: ± 50%

LODV: 582607
Analyzed: 01/08/2018 13:27
Units: ug/L
Criteria: ± 50%

LODV: 582609
Analyzed: 01/08/2018 16:21
Units: ug/L
Criteria: ± 50%

Analyte	Result	Target	% Rec.	Result	Target	% Rec.	Result	Target	% Rec.
Perchlorate	1.02	1.00	102	1.09	1.00	109	1.02	1.00	102

Quality Control Sample
Batch Report

Analysis Information

Workorder: **1736221**

Limits:	Client SOW/Contract Specified	**Preparation:**	NA	**Analysis:**	EPA 6850
Basis:	DoD QSM	**Batch:**	NA	**Batch:**	ELMS/2032 (HBN: 206369)
		Prepared By:	NA	**Analyzed By:**	Thomas Bosch

QC Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

Analyst	Peer Review
/S/ Thomas Bosch 01/11/2018 10:56	/S/ Stephen Brose 01/12/2018 07:57

Symbols and Definitions

- * - Analyte above reporting limit or outside of control limits
- ▲ - Sample result is greater than 4 times the spike added
- ● - Sample and Matrix Duplicate less than 5 times the reporting limit
- ● - Result is above the calibration range
- # - The Matrix Spike, Matrix Spike duplicate or Matrix Duplicate is reported for your information only. The sample matrix may be inappropriate for the method selected.

RPD - Relative % Difference (Spike / Spike Duplicate)

ND - Not Detected (U - Qualifier also flags analyte as not detected)

NA - Not Applicable

QC results are not adjusted for moisture correction, where applicable

1736221

18698/#2 1730029 00864513

10450 Stancliff Rd, Ste 210
Houston, TX 77099
T: +1 281 530 5656
F: +1 281 530 5887
www.alsglobal.com

Subcontract Chain of Custody

COC ID: 8303

SUBCONTRACT TO:

ALS Laboratory Group
960 LeVoy Dr
Salt Lake City, UT 84123

Phone: +1 801 266 7700

CUSTOMER INFORMATION:

Company: ALS Houston
Contact: Sonia West
Address: 10450 Stancliff Rd, Ste 210
Phone: +1 281 530 5656
Email: Sonia.West@alsglobal.com
Alternate Contact: Jumoke M. Lawal
Email: jumoke.lawal@alsglobal.com

INVOICE INFORMATION:

Company: ALS Houston
Contact: Accounts Payable
Address: 10450 Stancliff Rd, Ste 210
Phone: +1 281 530 5656
Reference: HS17121303
TSR: Danielle Winnings

	LAB SAMPLE ID / ANALYSIS REQUESTED	CLIENT SAMPLE ID	MATRIX	COLLECT DATE / DUE DATE
1.	**HS17121303-01**	**HBW7_122617**	**Water**	**26 Dec 2017 12:45**
	SUB_Perch-6850			11 Jan 2018
2.	**HS17121303-02**	**HBW10_122617**	**Water**	**26 Dec 2017 13:00**
	SUB_Perch-6850			11 Jan 2018
3.	**HS17121303-03**	**HBW1_122617**	**Water**	**26 Dec 2017 13:12**
	SUB_Perch-6850			11 Jan 2018
4.	**HS17121303-04**	**GPW1_122617**	**Water**	**26 Dec 2017 13:25**
	SUB_Perch-6850			11 Jan 2018
5.	**HS17121303-05**	**GPW3_122617**	**Water**	**26 Dec 2017 13:36**
	SUB_Perch-6850			11 Jan 2018

Comments: Please analyze for the analysis listed above.
Send report to the emails shown above.

QC Level: DOD IV (DoD Data Package)

Subcontract Chain of Custody

COC ID: 8303

Relinquished By:		Date/Time:	Dec 27, 2017 1800
Received By:		Date/Time:	12/28/2017 9:55
Cooler ID(s):		Temperature(s):	

ALS - SALT LAKE CITY-RELATED INFORMATION REPORT (CRIR)

COOLER OR CONTAINER INFORMATION CHECKLIST (Fill In or Circle)

Client Name: ALS Houston

Project/Task/Site: 1736221

Date/Time of Receipt: 12/28/2017 9:55

Number of Coolers Received: 1

Condition of Coolers: Acceptable/Unacceptable

Cooler Custody Seals: Present/Absent/NA

Intact/Broken/NA

Container Custody Seals: Present/Absent/NA

Intact/Broken/NA

Ice Present: Yes/No/NA

Frozen/Melted/NA

Temperature Control: Present/Not Included

Location Temp Taken: Control/Between Samples

Are all temperatures within project specific guidelines? Yes/No/NA

VOA Headspace Present? Yes/No/NA

pH Check Performed:						
Metals	Yes/No/NA	Total Phenolics	Yes/No/NA	NO3/NO2	Yes/No/NA
Cyanide	Yes/No/NA	TPH – 418.1	Yes/No/NA	Oil & Grease	Yes/No/NA
Sulfide	Yes/No/NA	COD	Yes/No/NA	Total Phosphorous	Yes/No/NA
Ammonia	Yes/No/NA	TKN	Yes/No/NA	TOC Preserved	Yes/No/NA

Cooler Received	ALS Cooler No.	Temp.	Cooler Received	ALS Cooler No.	Temp.	Cooler Received	ALSL Cooler No.	Temp.
1	C17-8138	2 °C	4	C17-	°C	7	C17-	°C
2	C17-	°C	5	C17-	°C	8	C17-	°C
3	C17-	°C	6	C17-	°C	9	C17-	°C

Taken By: [signature] (Signature) Marianne Schmith (Printed Name) 12/28/2017 (Date)

CLIENT-RELATED INFORMATION

- ☐ Missing Cooler
- ☐ Cooler Conditions
- ☐ Missing Paperwork
- ☐ Missing/Incorrect Bottle Labels
- ☐ Missing Samples/Bottles
- ☐ Broken/Leaking Samples
- ☐ Incorrect Bottle Type
- ☐ Cooler Temperatures Out of Range
- ☐ Incorrect Preservation
- ☐ pH Criteria Not Met
- ☐ Residual Chlorine Present
- ☐ Head Space in Bottles
- ☐ Insufficient Sample Volume
- ☐ Chain of Custody Problems
- ☐ Other:

BRIEFLY DESCRIBE THE PROBLEM AND THE ACTION TAKEN:

E-mailed to Client? YES ☐ No ☐

Response Required Within 24 Hours

PROJECT MANAGEMENT

PROJECT MANAGER COMMENTS:

ALS Project Manager: ____________ (Printed Name) Returned to Sample Receipt by: ____________ (Signature) Date: ____________

CRIR.dot

Revised 1/1/15

FZ

R1 907

2 15:00

B 3525 12.28

ORIGIN ID:SGRA (281) 530-5656
SHIPPING DEPT
ALS LABORATORY GROUP
10450 STANCLIFF RD
SUITE 210
HOUSTON, TX 77099
UNITED STATES US

SHIP DATE: 27DEC17
ACTWGT: 22.90 LB
CAD: 300130/CAFE3108
DIMS: 14x11x10 IN

BILL SENDER

TO KEVIN GRIFFITHS
ALS ENVIRONMENTAL
960 W. LEVOY DRIVE

SALT LAKE CITY UT 84123
(801) 266-7700
REF: HS17121303/1224-SW

546C1/5240/53C1

FedEx
Express

E

J171016102001uv

THU - 28 DEC 3:00P
STANDARD OVERNIGHT

TRK# 0201 7376 9751 3525

AX BTFA

84123
UT-US SLC

ALS Environmental

CHAIN-OF-CUSTODY

Project / Job / Task: HS17121303	Split:	Workorder ID: 1736221	Level: ENV_LVL4
Client: ALS Environmental (Houston)		Account: 8101	Type: 125Poly
Comments:			Preservatives: COOL

Item	Collect Date/Time	Sample ID	Lab ID	QC	Matrix	Containers ID(s)	Containers Count	Requested Analysis: EPA 6850, DoD QSM
1	12/26/2017 12:45	HBW7_122617	1736221001		Water	A	1	A
2	12/26/2017 13:00	HBW10_122617	1736221002		Water	A	1	A
3	12/26/2017 13:12	HBW1_122617	1736221003		Water	A	1	A
4	12/26/2017 13:25	GPW1_122617	1736221004		Water	A	1	A
5	12/26/2017 13:36	GPW3_122617	1736221005		Water	A	1	A
6								
7								
8								
9								
10								

ORIGINAL FIELD SAMPLE CHAIN-OF-CUSTODY

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location
Edwards, Meredith D.	12/28/2017 09:05	ALS Sample Receiving	Sample Login
[illegible]	12/28/2017 [illegible]	[illegible]	Storage
R.33.1	1.4.18/12:03	T.Bush	6850

SAMPLE PREPARATION / ANALYSIS CHAIN-OF-CUSTODY

Sample Prep / Analysis for: ______ Lab Notebook No.: ______

Prepared / Analyzed by: ______ Date / Time: ______

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Reason for Transfer / Storage Location

atch Worklist

Batch: ELMS/ 2032
Rule: EPA 6850, DoD QSM Water

Created: 1/5/2018 13:16
Analyst: T. Bosch

Instrument:
Status: WP

HBN: 206369

Workorder: 1736221 [ENV_LVL4]
Workorder: 1736222 [ENV_LVL4]
Workorder: 1800210 [ENV_LVL4]

Pos	Lab ID	Sample ID	Prep Initial	Prep Final	Dust Weight	Type	Mx	Container	Procedure	Mgr	Expire Date	Due Date	Run Date
1	582599	CCV for HBN 206369 [ELMS/2032]				CCV	3		E685041C3Q	5311		1/12/2018	
2	582600	LODV for HBN 206369 [ELMS/2032				LODV	3		E6850..D3Q	5311		1/12/2018	
3	582601	ICS for HBN 206369 [ELMS/2032]				ICS	3		E6850..D3Q	5311		1/12/2018	
4	582602	LMB for HBN 206369 [ELMS/2032]				LMB	3		E6850Q413Q	5311		1/12/2018	
5	582603	LCS for HBN 206369 [ELMS/2032]				LCS	3		E6850Q413Q	5311		1/12/2018	
6	1736221001	HBW7_122617				SAMPLE	3	1736221001-A	E6850Q41.3	5480	1/23/2018	1/12/2018	
7	582604	HBW7_122617(1736221001MS)				MS	3		E6850Q413Q	5311		1/12/2018	
8	582605	HBW7_122617(1736221001MSD)				MSD	3		E6850Q413Q	5311		1/12/2018	
9	1736221002	HBW10_122617				SAMPLE	3	1736221002-A	E6850Q41.3	5480	1/23/2018	1/12/2018	
10	1736221003	HBW1_122617				SAMPLE	3	1736221003-A	E6850Q41.3	5480	1/23/2018	1/12/2018	
11	1736221004	GPW1_122617				SAMPLE	3	1736221004-A	E6850Q41.3	5480	1/23/2018	1/12/2018	
12	1736221005	GPW3_122617				SAMPLE	3	1736221005-A	E6850Q41.3	5480	1/23/2018	1/12/2018	
13	1736222001	18CPTMW04SW_122017				SAMPLE	3	1736222001-A	E6850Q41.3	5480	1/17/2018	1/12/2018	
14	1736222002	18CPTMW04_122017				SAMPLE	3	1736222002-A	E6850Q41.3	5480	1/17/2018	1/12/2018	
15	1736222003	MW2_122017				SAMPLE	3	1736222003-A	E6850Q41.3	5480	1/17/2018	1/12/2018	
16	582606	CCV for HBN 206369 [ELMS/2032]				CCV	3		E685041C3Q	5311		1/12/2018	
17	582607	LODV for HBN 206369 [ELMS/2032				LODV	3		E6850..D3Q	5311		1/12/2018	
18	1736222004	18CPTMWISW_122017				SAMPLE	3	1736222004-A	E6850Q41.3	5480	1/17/2018	1/12/2018	
19	1736222005	MW5_122017				SAMPLE	3	1736222005-A	E6850Q41.3	5480	1/17/2018	1/12/2018	
20	1736222006	MW3_122017				SAMPLE	3	1736222006-A	E6850Q41.3	5480	1/18/2018	1/12/2018	
21	1736222007	18CPTMW08SW_122117				SAMPLE	3	1736222007-A	E6850Q41.3	5480	1/18/2018	1/12/2018	
22	1736222008	18CPTMW08DW_122117				SAMPLE	3	1736222008-A	E6850Q41.3	5480	1/18/2018	1/12/2018	
23	1800210001	LH18/24-SP650_122717				SAMPLE	3	1800210001-A	E6850Q41.3	5480	1/24/2018	1/16/2018	
24	582608	CCV for HBN 206369 [ELMS/2032]				CCV	3		E685041C3Q	5311		1/12/2018	
25	582609	LODV for HBN 206369 [ELMS/2032				LODV	3		E6850..D3Q	5311		1/12/2018	

31 of 134

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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Analytical Documentation

ALS Work Order #'s & Sample #( )'s: 1736221 (001-05); 1736222 (001-08); 1800210 (001)
ELMS Batch/HBN ID: 2032 (206369)
Prep Date: 01/08/2018 Analysis Date: 01/08/2018 Analyst: T. Bosch
Analyte: **Perchlorate** Matrix: **Water** Method: **6850**
Sequence: \\HPCHEM\1\SEQUENCE\CLO4\2018\JAN\08JAN18D. s
Reported DL: **1.0µg/L** Reported LOD: **2.0µg/L** Reported LOQ: **4.0µg/L**

SAMPLE PREPARATION/ANALYSIS:

Water: Samples were prepared by TNB. 10.0mL of each sample was pipetted into a 15-mL centrifuge tube, and 50µL of an oxygen-18 labeled perchlorate solution was added as an internal standard. The samples were capped, vortexed, and filtered with Phenex PES membrane 0.45µm Syringe filters prior to analysis.

REAGENTS: Eluent A1: 95% ASTM Type II water (ALS)/ 5% ACN (B&J Lot DI735)/0.1% glacial acetic acid (JT-Baker Lot 04802).
Eluent B1: 95% ACN (B&J Lot DI735)/ 5% ASTM Type II water (ALS)/0.1% glacial acetic acid (JT-Baker Lot 04802).

STANDARDS: Internal Standard Spiking Solution Horizon# 38780. Dilutions of Working Standard Solution ID 32373 used for CCV's, LODV's, RLVS and IPC.

CALIBRATION CURVE: Used curve from 11/28/2017, sequence 28NOV17P.s Offline Quantitation Method: CLO4-DPR.M

INSTRUMENT CONDITIONS: Samples were analyzed with an Agilent 1100 LC/MSD system, in negative SIM mode, monitoring m/z 83, 85, and 89.
Instrument ID: **LCMS04** Online Acquisition Method: CLO4-AQN.M Fragmentor: 160 Output Gain: 3 Injection Volume: 25µL
Column: KP-RPPX C8 separator, 250mm Mobile Phase: 70% Eluent A1; 30% Eluent B1

FLOW GRADIENT:

Time (min.)	Flow (mL/min)
0	0.65
4.0	0.65
5.0	0.25
14.5	0.25
15.0	0.65
17.5	0.65

QC DATA: 5.0µL of QC Solution Horizon ID 36749 was used for LCS 582603; Target = 5.0µg/L. ASTM type II water was used for LMB 582602.

MS/MSD: MS/MSD was performed on sample 1736221001 (Client ID: HBW7_122617). 5.0µl of Working Standard Solution Horizon ID 36735 was added to 10.0mL of sample preparation. Spike target = 5.0µg/L.

COMMENTS:

1) Results reported in µg/L. Samples 1736222003/07 were analyzed and reported at a 1:10 dilutions. Sample 1736222002 was analyzed and reported at a 1:100 dilution. Samples 1736222005/06/08 were analyzed and reported at a 1:1,000 dilutions. The reporting limits have been adjusted accordingly.
2) All QC, Blank, CCV, and MS/MSD results were within method parameters
3) Sample data can be viewed at two directories within the ALS system: \\ALSLTWS013\LCMS\LCMS04\2018\JAN\HBN# or through NuGenesis\Tree\PrintData\LCMS\DefaultView.
4) Due to limitations of the Chemstation Software, many of the chromatographic peaks require manual integration. Manual Integrations were performed for some of the Initial Calibration analyses (datafiles: 28NOVP01,02) along with datafiles 08JAND02/10/26.
5) Notebook: \\alsltws013\ORGANIC\BOSCH\LCMS\Perchlorates\Waters\2018\ 206369-DOD-ALS-HSTN-LCMS4 or through \\ALSLTWS013\DATAREVIEW\HBN#

STANDARD REPORT

Working Standard - CLO4 WRK

CLO4 WRK — **Description - 6850 WKG Std 100.ug/L**

Standard: 36735
MFG: ALS/SLC
MFG Lot: TNB: 05/10/17
Part ID:

Created By: T. Bosch
Create Date: 05/10/2017
Lab Lot: CLO4 WRK

Amount: 10 mL
Expires: 05/10/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	0.1 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36734	CLO4 INT	6850 Intermdt AccStd 10.ug/mL	CLO4 INT	0.1 mL	05/10/2018

STANDARD REPORT

Constituent

Stock Standard - CLO4 STOCK

CLO4 STOCK — Description - 6850 Stock AccStd 1,000ug/mL

Standard: 36733
MFG: AccuStandard
MFG Lot: 216095148
Part ID: IC-PER-10X-1

Created By: T. Bosch
Create Date: 5/10/2017
Lab Lot: CLO4 STOCK

Amount: 100 mL
Expires: 10/4/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O		Description - ASTM Type II Water
Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Working Standard - CLO4 INT

CLO4 INT Description - 6850 Intermdt AccStd 10.ug/mL

Standard: 36734	Created By: T. Bosch	Amount: 10 mL
MFG: ALS/SLC	Create Date: 05/10/2017	Expires: 05/10/2018
MFG Lot: TNB: 05/10/17	Lab Lot: CLO4 INT	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36733	CLO4 STOCK	6850 Stock AccStd 1,000ug/mL	CLO4 STOCK	0.1 mL	10/04/2018

STANDARD REPORT

Working Standard - CLO4 QC WRK

CLO4 QC WRK Description - 6850 QC WKG STD 100ug/L

Standard: 36750
MFG: ALS/SLC
MFG Lot: TNB: 05/11/17
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC WRK 100.ug/L

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	100 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36749	CLO4 QC INT	6850 QC Intrmdt Std-QC 10ug/mL	CLO4 QC INT 10.ug/mL	0.1 mL	05/11/2018

STANDARD REPORT

Constituent

Working Standard - CLO4 QC INT

CLO4 QC INT	Description - 6850 QC Intrmdt Std-QC 10ug/mL

Standard: 36749
MFG: ALS/SLC
MFG Lot: TNB: 05/11/2017
Part ID:

Created By: T. Bosch
Create Date: 05/11/2017
Lab Lot: CLO4 QC INT 10.ug/mL

Amount: 10 mL
Expires: 05/11/2018
Usable: Yes

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	10 ug/mL

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
109	ASTM H2O	ASTM Type II Water	LAB 109	9.9 mL	11/07/2025
36748	CLO4 QCSTOCK	6850 QC Stock STD 1,000ug/mL	CLO4 QC STOCK	0.1 mL	03/31/2020

STANDARD REPORT

Constituent

Solvent Standard - ASTM H2O

ASTM H2O — Description - ASTM Type II Water

Standard: 109	Created By: ALS Support (Lims)	Amount: 1000 L
MFG: DCL In House	Create Date: 10/6/2005	Expires: 11/7/2025
MFG Lot:	Lab Lot: LAB 109	Usable: Yes
Part ID:		

Pos.	Analyte	Name	Concentration
Solvent - Analyte(s) not applicable			

STANDARD REPORT

Constituent

Stock Standard - CLO4 QCSTOCK

CLO4 QCSTOCK Description - 6850 QC Stock STD 1,000ug/mL

Standard:	36748	Created By:	T. Bosch	Amount:	100 mL
MFG:	Ultra Scientific	Create Date:	5/11/2017	Expires:	3/31/2020
MFG Lot:	CP-0860	Lab Lot:	CLO4 QC STOCK	Usable:	Yes
Part ID:	ICC-013				

Pos.	Analyte	Name	Concentration
1	14797-73-0	Perchlorate	1000 ug/mL

STANDARD REPORT

Working Standard - CLO4ISTDWRK

CLO4ISTDWRK — **Description - Perchlorate ISTD Wrk 1,000ug/L**

Standard:	38780	Created By:	Thomas Bosch	Amount:	10 mL
MFG:	ALS/SLC	Create Date:	10/09/2017 01:10PM	Expires:	10/09/2018
MFG Lot:	TNB: 10/09/17	Verified By:	Thomas Bosch	Usable:	Yes
Pipette ID:	Not Provided	Verify Date:		Lab Lot:	CLO4ISTDWRK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	1000 ug/L
2	14797-73-0-89	Perchlorate 89	1000 ug/L

Composition

Standard	Standard ID	Description	Lab Lot ID	Volume	Expires
23118	CLO4ISTDSTK	Perchlorate ISTD Stock	CLO4ISTDSTK	0.1 mL	02/27/2024

STANDARD REPORT

Constituent

Stock Standard - CLO4ISTDSTK

CLO4ISTDSTK		Description - Perchlorate ISTD Stock
Standard: 23118	Created By: Thomas Bosch	Amount: 1 mL
MFG: Cambridge Isotope	Create Date: 04/04/2014 03:04PM	Expires: 02/27/2024
MFG Lot: SDDG-013	Verified By: Thomas Bosch	Usable: Yes
Part ID: OLM-7310-S	Verify Date: 02/05/2009 12:02AM	Lab Lot: CLO4ISTDSTK

Pos.	Analyte	Name	Concentration
1	14797-73-0-8385	Perchlorate 83:85 Ratio	100 ug/mL
2	14797-73-0-89	Perchlorate 89	100 ug/mL

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Product Name: Perchlorate IC Standard

Description:
This Reference Material (RM) was gravimetrically prepared in accordance with ISO Guide 34 and under ULTRA Scientific's ISO 9001 registered quality system. The neat materials used for this product have been verified by ULTRA's ISO 17025 laboratory and under ULTRA's ISO Guide 34 accreditation. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory. For each analyte, the true value, with its uncertainty value calculated at the 95% confidence level, is reported below.

Analyte	Starting Material	Lot Number	Purity (%)	Calculated Value	True Value	Traceability & Method
perchlorate	potassium perchlorate	RM07987	100	1001 ± 5 µg/mL	976 ± 6 µg/mL	NIST SRM 3141A; ICP-OES

Solvent: water (low TOC, < 50 ppb)

Storage: Store at Room Temperature (15° to 30°C).

Traceability:
Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:
The true value is reported, with its uncertainty value calculated at the 95% confidence level.

Homogeneity:
This RM was formulated and unitized according to an in-house procedure and is guaranteed to be homogeneous. There is no minimum sub-sample size required.

Intended Use:
This RM is intended for the preparation of working reference samples for use in routine laboratory analyses, calibration of instruments, validation of analytical methods, assessments of measurement methods and continuing calibration verification.

Instructions for Use:
Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening and should be processed without delay for the true value to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipetting to the bottle. Tightly cap the bottle after removing any material and store according to the instructions noted above.

Hazards:
Refer to the Safety Data Sheet for information regarding this RM.

Expiration of Certification:
The certification of this RM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the RM is handled and stored in accordance with the instructions given in this certificate. This certification is nullified if the RM is damaged, contaminated, or otherwise modified.

ANAB ACCREDITED REFERENCE MATERIAL PRODUCER
ANAB ACCREDITED TESTING LABORATORY

ULTRA SCIENTIFIC
Analytical Solutions

Certificate of Analysis

TRIPLE ISO CERTIFICATION ULTRA ISO 17025 ISO GUIDE 34 ISO 9001

ISO Guide 34 Reference Material

Product Number: ICC-013
Lot Number: CP-0860

Lot Issue Date: 29-Feb 2016
Expiration Date: 31-Mar 2020

Maintenance of Certification:
The real-time, long term stability of the RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

P. King
Peter A. King, Ph.D.
VP, Technical Operations

D. Lamendola
Daniel J. Lamendola
Director of QA/RA

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

125 Market Street
New Haven, CT 06513
USA

AccuStandard® Inc.

Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

AccuTrace™ Reference Standard

Catalog No: IC-PER-10X-1
Description: Perchlorate Standard
Element: Perchlorate (ClO_4)
SRM: Ind. Std.
Lot: 216095148
Matrix: Water
Hazards: *Refer to SDS for complete safety information*

GHS

Signal Word: Warning

Date Certified: Oct 4, 2016
Expiration: Oct 4, 2018
Sample Size: 100 mL
Components: 1
Storage Condition: Ambient (>5 °C)
Included on ISO/IEC 17025 Scope of Accreditation: Yes
Included on ISO Guide 34 Scope of Accreditation: Yes

Component		SRM #	Prepared Concentration (µg/mL)
ClO_4	Perchlorate	Ind. Std.	1000

The gravimetric uncertainty for this product is ±0.2%. See reverse side for details.

The final solution was checked against an independent standard to verify its concentration.

We use the highest purity raw materials available to minimize impurity levels in the final solution. Typically 99.999%+ pure starting materials are used as well as ASTM Type I 18 megohm deionized water.

All solutions are filtered through a 0.2 µm filter prior to being bottled.

All glassware used in preparation is Class A and calibrated regularly.

All weights are traceable through NIST, Test No. 822-275872-11

All bottles are triple rinsed with deionized water prior to use.

Shake bottle prior to use and do not pipette directly out of the bottle. Use only cleaned Class A volumetric glassware.

We certify the accuracy of this standard to be ±0.5% of the stated value until its expiration date provided it is kept tightly capped and stored under the conditions stated above.

Certified By: Meigan O'Leary
Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.

Cambridge Isotope Laboratories, Inc.

Certificate of Analysis

Quality Standards:
ISO Guide 34 • ISO/IEC 17025 • ISO 13485 • cGMP

23118

Product Name: (Isotopic Label & Enrichment Specification)	PERCHLORIC ACID, SODIUM SALT ($^{18}O_4$, 90%+) 100 UG/ML IN WATER
Lot Number:	SDDG-013
Catalog Number:	OLM-7310-S

Product Information

Chemical Purity Specification:	≥98%
Labeled CAS Number:	NA
Unlabeled CAS Number:	7601-89-0
MW*:	130.4
Chemical Formula:	NaCl*O4
Storage:	Store at room temperature away from light and moisture.
Stability:	See storage and expiration date.

Certification

Cambridge Isotope Laboratories, Inc. guarantees that this material meets or exceeds the specifications stated. Absolute identity as well as chemical and isotopic purities are assured by the use of unambiguous synthetic routes and multiple chemical analyses whenever possible. Results are representative of QC testing at time of release from Quality Control unless otherwise stated.

Volumetric measurements were made with Class A glassware. Gravimetry is traceable to the NIST through calibrated balances and certified, calibrated, standard weights. The calibrations are traceable to the NIST under Test No. 822/270236-04. The calibrations also meet specifications outlined in ISO 9001, ISO/IEC 17025, ANSI/NSCL Z540-1-1994, NCR Document 10CFR50 Appendix B, and applicable subdocuments.

This COA references the bulk catalog number before packaging. The COA also applies to the CIL finished good catalog number. Some possible packaging sizes and their corresponding suffix are -1.2, -1, -0.5, -10, or -0.1.

* *For isotopically labeled compounds, MW listed is for the fully enriched product.*

Approved by: T. J. Eckersley

Timothy J. Eckersley, Ph.D., Quality Assurance

Quality Control Tests and Results

QC Release Date	2/27/2014
Expiration Date	2/27/2024
Concentration Based on Gravimetry	102 µg/mL
Chemical Purity of Neat Material(s)	98%
LC/MS for Concentration	109.4 ± 2.8 µg/mL (k=2)

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	582599 CCV@25	Vial 71	1	Control	1	1.14549e6	12.385	26.33777
*	582600 LODV@1.	Vial 72	1	Control	2	3.76805e4	12.280	1.01562
*	582601 ICS@1.	Vial 73	1	Control	3	2.49371e4	12.041	8.80302e-1
*	582602 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	582603 LCS@5.	Vial 75	1	Control	5	1.94973e5	12.214	5.29911
*	1736221001	Vial 76	1	Sample	6	3.10872e4	12.036	8.87960e-1
*	582604 362211S	Vial 77	1	Sample	7	1.88371e5	12.094	4.80522
*	582605 362211D	Vial 78	1	Sample	8	1.58240e5	12.104	4.79464
*	1736221002	Vial 79	1	Sample	9	0.00000	0.000	0.00000
*	1736221003	Vial 80	1	Sample	10	3.27694e4	12.080	1.09251
*	1736221004	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1736221005	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1736222001	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1736222002 100	Vial 84	1	Sample	14	2.60214e5	12.305	619.85991
*	1736222003 10X	Vial 85	1	Sample	15	6.72525e5	12.179	156.64971
*	582606 CCV@25	Vial 71	1	Control	16	1.18870e6	12.418	26.24661
*	582607 LODV@1.	Vial 72	1	Control	17	4.31770e4	12.270	1.08695
*	1736222004	Vial 86	1	Sample	18	0.00000	0.000	0.00000
*	1736222005 1K	Vial 87	1	Sample	19	1.37562e6	12.336	3.13188e4
*	1736222006 1K	Vial 88	1	Sample	20	6.15407e5	12.349	1.46859e4
*	1736222007 10X	Vial 89	1	Sample	21	9.38833e5	12.207	218.62778
*	1736222008 1K	Vial 90	1	Sample	22	1.37499e6	12.353	3.08094e4
*	1800210001	Vial 92	1	Sample	25	4.57609e4	11.942	1.45940
*	582609 LODV@1.	Vial 72	1	Control	26	4.08069e4	12.259	1.01832
*	582608 CCV@25	Vial 71	1	Control	27	1.19004e6	12.409	26.63706

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	582599 CCV@25	Vial 71	1	Control	1	3.52643e5	12.404	25.76585
*	582600 LODV@1.	Vial 72	1	Control	2	1.39901e4	12.288	9.40188e-1
*	582601 ICS@1.	Vial 73	1	Control	3	1.03139e4	12.050	8.95950e-1
*	582602 LMB	Vial 74	1	Control	4	0.00000	0.000	0.00000
*	582603 LCS@5.	Vial 75	1	Control	5	6.50763e4	12.223	5.30195
*	1736221001	Vial 76	1	Sample	6	1.12375e4	12.091	7.66309e-1
*	582604 362211S	Vial 77	1	Sample	7	6.41747e4	12.116	4.88509
*	582605 362211D	Vial 78	1	Sample	8	5.29940e4	12.110	4.78922
*	1736221002	Vial 79	1	Sample	9	0.00000	0.000	0.00000
*	1736221003	Vial 80	1	Sample	10	1.04691e4	12.074	8.57578e-1
*	1736221004	Vial 81	1	Sample	11	0.00000	0.000	0.00000
*	1736221005	Vial 82	1	Sample	12	0.00000	0.000	0.00000
*	1736222001	Vial 83	1	Sample	13	0.00000	0.000	0.00000
*	1736222002 100	Vial 84	1	Sample	14	8.44845e4	12.321	607.51704
*	1736222003 10X	Vial 85	1	Sample	15	2.19018e5	12.203	158.99673
*	582606 CCV@25	Vial 71	1	Control	16	3.67172e5	12.433	25.75282
*	582607 LODV@1.	Vial 72	1	Control	17	1.52559e4	12.260	9.63602e-1
*	1736222004	Vial 86	1	Sample	18	0.00000	0.000	0.00000
*	1736222005 1K	Vial 87	1	Sample	19	4.14786e5	12.354	3.02457e4
*	1736222006 1K	Vial 88	1	Sample	20	1.97524e5	12.362	1.46723e4
*	1736222007 10X	Vial 89	1	Sample	21	2.99209e5	12.220	219.55160
*	1736222008 1K	Vial 90	1	Sample	22	4.16880e5	12.373	2.98845e4
*	1800210001	Vial 92	1	Sample	25	1.87732e4	11.977	1.62643
*	582609 LODV@1.	Vial 72	1	Control	26	1.60463e4	12.270	1.01089
*	582608 CCV@25	Vial 71	1	Control	27	3.65901e5	12.425	26.03858

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	582599 CCV@25	Vial 71	1	Control	1	1.77131e5	12.405	5.00000
*	582600 LODV@1.	Vial 72	1	Control	2	1.75472e5	12.294	5.00000

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	582601 ICS@1.	Vial 73	1	Control	3	1.34582e5	12.058	5.00000
*	582602 LMB	Vial 74	1	Control	4	1.82149e5	12.427	5.00000
*	582603 LCS@5.	Vial 75	1	Control	5	1.66838e5	12.232	5.00000
*	1736221001	Vial 76	1	Sample	6	1.66279e5	12.070	5.00000
*	582604 362211S	Vial 77	1	Sample	7	1.78298e5	12.114	5.00000
*	582605 362211D	Vial 78	1	Sample	8	1.50118e5	12.119	5.00000
*	1736221002	Vial 79	1	Sample	9	1.39148e5	12.106	5.00000
*	1736221003	Vial 80	1	Sample	10	1.41559e5	12.094	5.00000
*	1736221004	Vial 81	1	Sample	11	1.63910e5	12.197	5.00000
*	1736221005	Vial 82	1	Sample	12	1.69085e5	12.238	5.00000
*	1736222001	Vial 83	1	Sample	13	1.63059e5	11.956	5.00000
*	1736222002 100	Vial 84	1	Sample	14	1.89341e5	12.321	500.00000
*	1736222003 10X	Vial 85	1	Sample	15	1.84162e5	12.202	50.00000
*	582606 CCV@25	Vial 71	1	Control	16	1.84530e5	12.435	5.00000
*	582607 LODV@1.	Vial 72	1	Control	17	1.87499e5	12.281	5.00000
*	1736222004	Vial 86	1	Sample	18	1.57843e5	12.007	5.00000
*	1736222005 1K	Vial 87	1	Sample	19	1.74782e5	12.358	5000.00000
*	1736222006 1K	Vial 88	1	Sample	20	1.80647e5	12.371	5000.00000
*	1736222007 10X	Vial 89	1	Sample	21	1.78667e5	12.222	50.00000
*	1736222008 1K	Vial 90	1	Sample	22	1.78008e5	12.374	5000.00000
*	1800210001	Vial 92	1	Sample	25	1.46856e5	11.966	5.00000
*	582609 LODV@1.	Vial 72	1	Control	26	1.89512e5	12.280	5.00000
*	582608 CCV@25	Vial 71	1	Control	27	1.81696e5	12.430	5.00000

*** End of Report ***

Sequence Table:

Method and Injection Info Part:

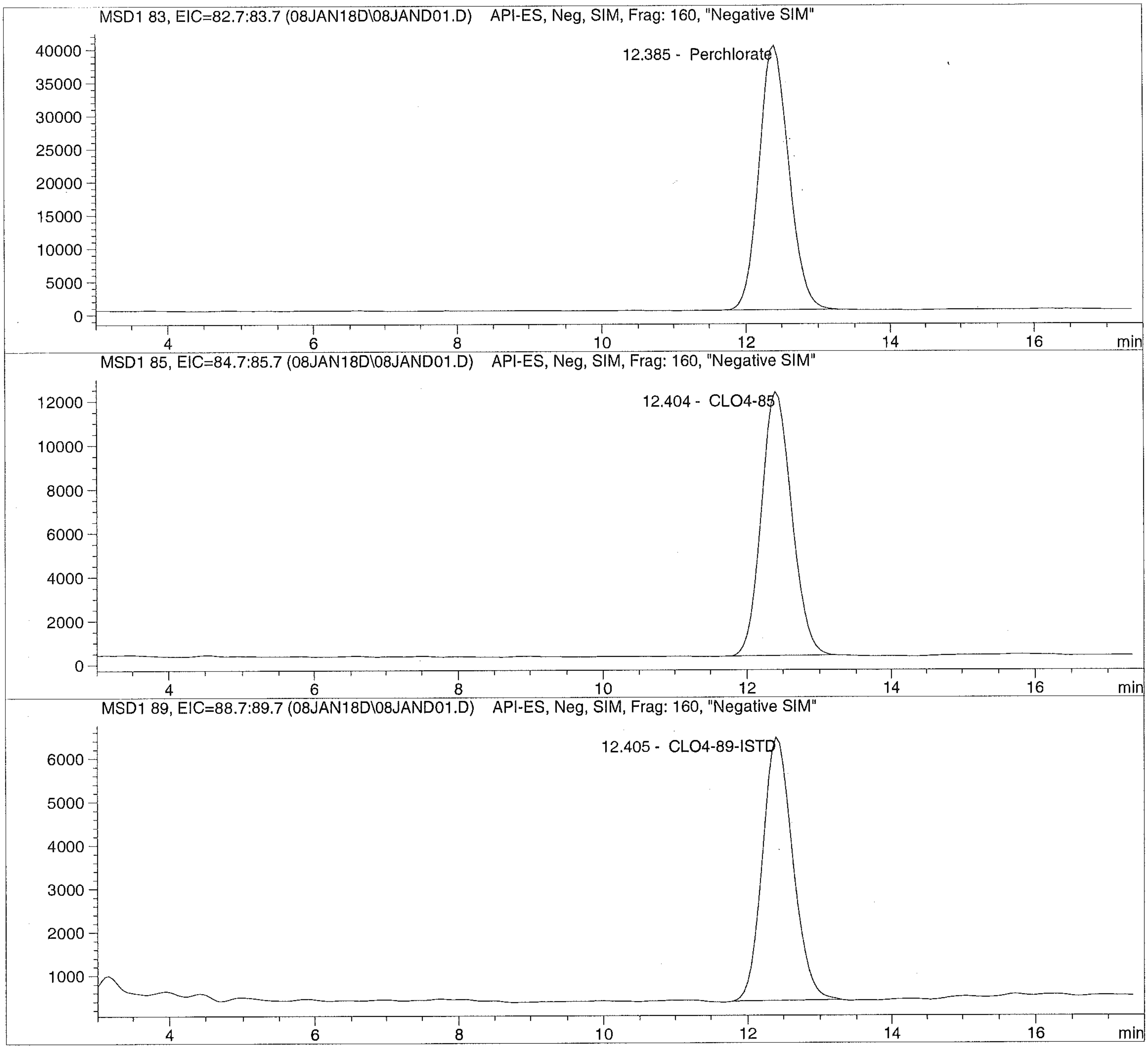
Line	Location	SampleName		Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	582599	CCV@25	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	582600	LODV@1.	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	582601	ICS@1.	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	582602	LMB	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	582603	LCS@5.	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	1736221001		CLO4-DOD	1	Sample		
7	Vial 77	582604	362211S	CLO4-DOD	1	Sample		
8	Vial 78	582605	362211D	CLO4-DOD	1	Sample		
9	Vial 79	1736221002		CLO4-DOD	1	Sample		
10	Vial 80	1736221003		CLO4-DOD	1	Sample		
11	Vial 81	1736221004		CLO4-DOD	1	Sample		
12	Vial 82	1736221005		CLO4-DOD	1	Sample		
13	Vial 83	1736222001		CLO4-DOD	1	Sample		
14	Vial 84	1736222002	100	CLO4-DOD	1	Sample		
15	Vial 85	1736222003	10X	CLO4-DOD	1	Sample		
16	Vial 71	582606	CCV@25	CLO4-DOD	1	Ctrl Samp		
17	Vial 72	582607	LODV@1.	CLO4-DOD	1	Ctrl Samp		
18	Vial 86	1736222004		CLO4-DOD	1	Sample		
19	Vial 87	1736222005	1K	CLO4-DOD	1	Sample		
20	Vial 88	1736222006	1K	CLO4-DOD	1	Sample		
21	Vial 89	1736222007	10X	CLO4-DOD	1	Sample		
22	Vial 90	1736222008	1K	CLO4-DOD	1	Sample		
23	Vial 91	1800210001	10X	CLO4-DOD	1	Sample		
24	Vial 71	582608	CCV@25	CLO4-DOD	1	Ctrl Samp		
25	Vial 92	1800210001		CLO4-DOD	1	Sample		
26	Vial 72	582609	LODV@1.	CLO4-DOD	1	Ctrl Samp		
27	Vial 71	582608	CCV@25	CLO4-DOD	1	Ctrl Samp		

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND01.D Sample Name: 582599 CCV@25

Injection Date:	1/08/2018 08:17:41	Seq Line:	1
Sample Name:	582599 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND01.D   Sample Name: 582599   CCV@25

Injection Date:	1/08/2018 08:17:41	Seq Line:	1
Sample Name:	582599 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Wed, 20. Dec. 2017,08:01:52 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.385	BBA	1145492.5	26.3378	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.404	PBA	352643.5	25.7658	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.405	PBA	177130.7	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D   Sample Name: 582600   LODV@1.

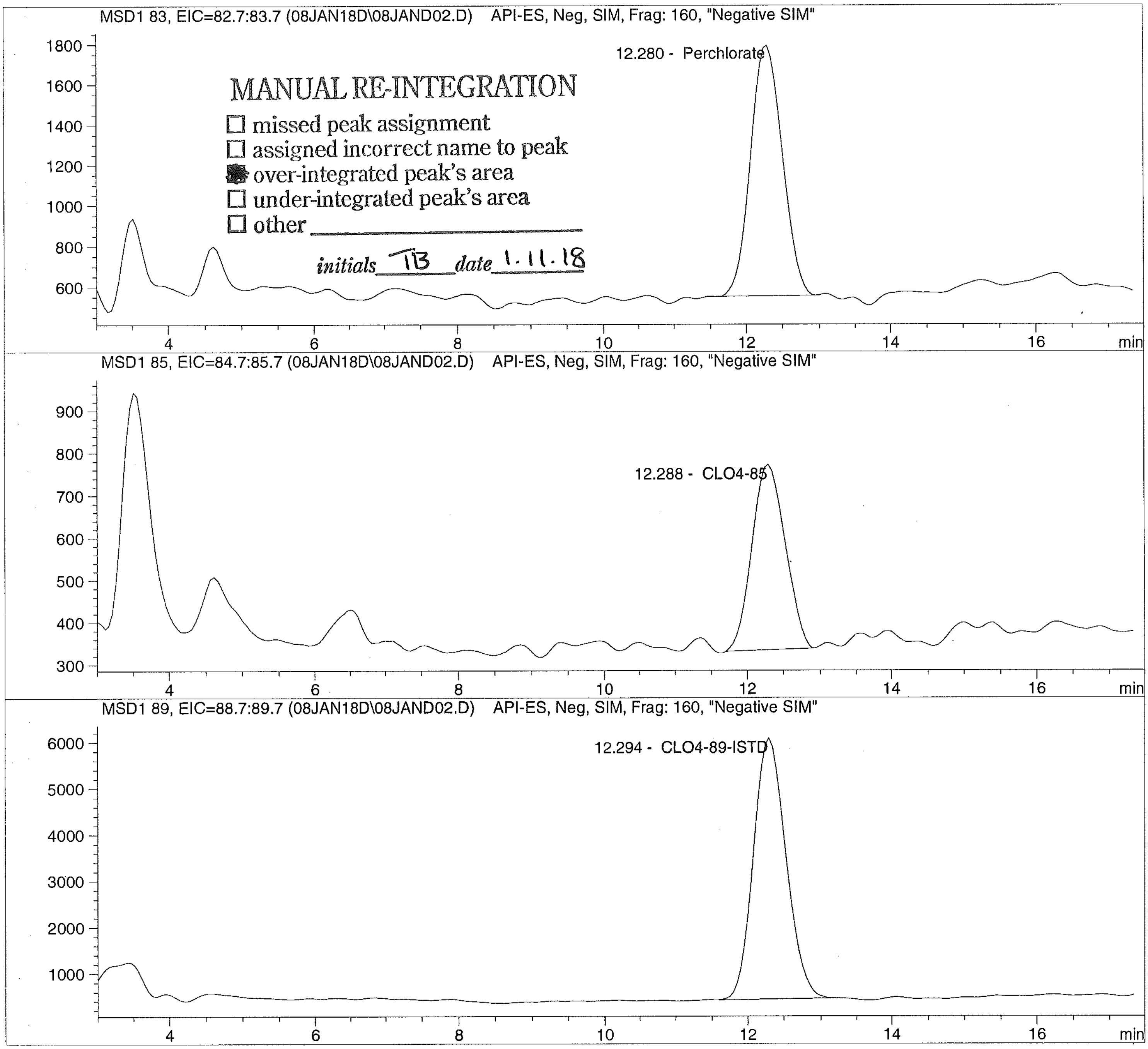
Injection Date:	1/08/2018 08:36:51	Seq Line:	2
Sample Name:	582600 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method:	CLO4-DOD.M
Analysis Method:	C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:	12/20/2017 08:11:26

Perchlorate analysis

MANUAL RE-INTEGRATION
- [ ] missed peak assignment
- [ ] assigned incorrect name to peak
- [x] over-integrated peak's area
- [ ] under-integrated peak's area
- [ ] other ______

initials TB *date* 1.11.18



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D Sample Name: 582600 LODV@1.

Injection Date: 1/08/2018 08:36:51 Seq Line: 2
Sample Name: 582600 LODV@1. Location: Vial 72
Acq Operator: TNB Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.280	MM	37680.5	1.0156	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.288	PBA	13990.1	0.9402	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.294	BBA	175472.0	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND03.D Sample Name: 582601 ICS@1.

==

Injection Date:	1/08/2018 08:56:03	Seq Line:	3
Sample Name:	582601 ICS@1.	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

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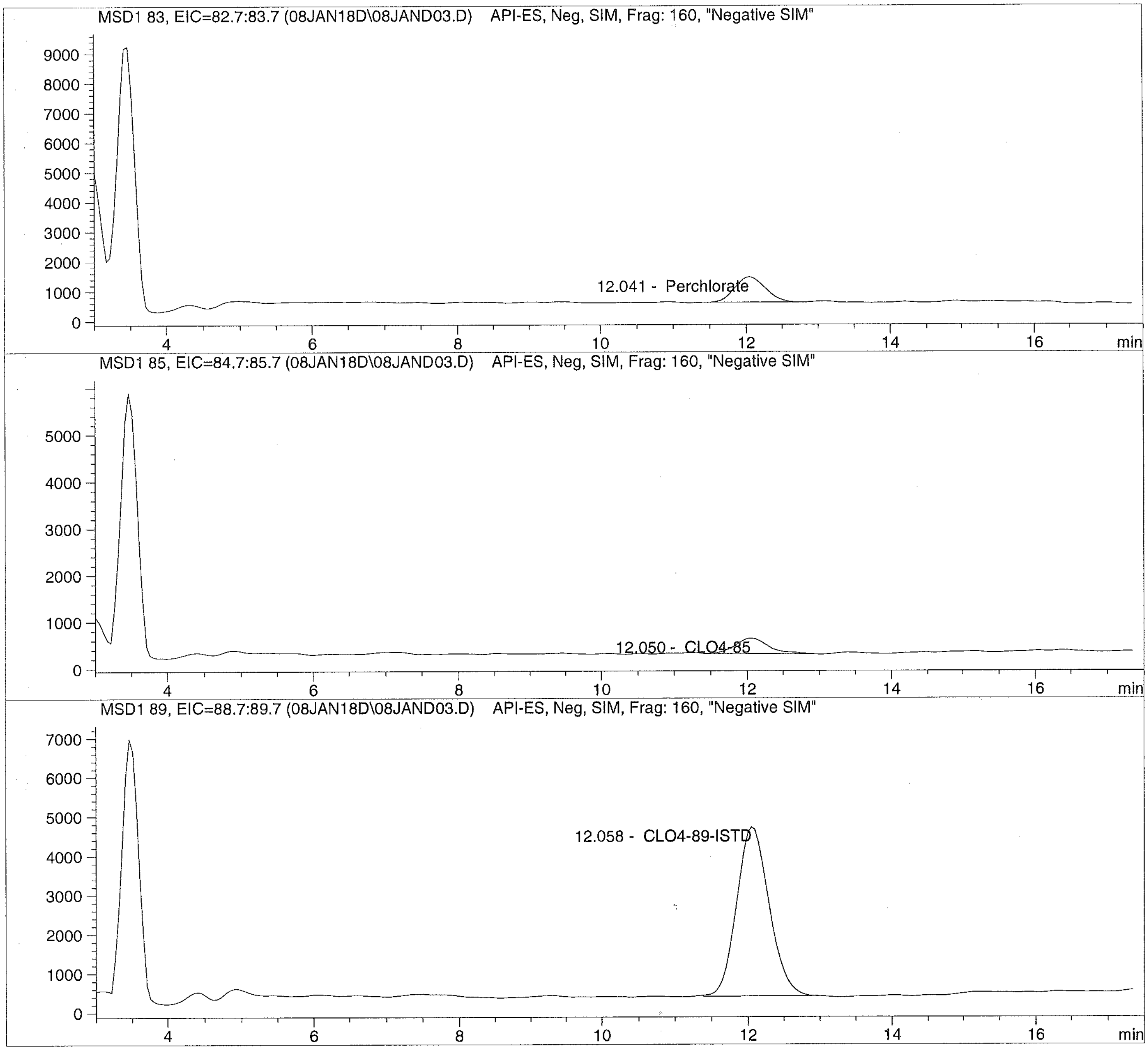


Injection Date:	1/08/2018 08:56:03	Seq Line:	3
Sample Name:	582601 ICS@1.	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 μl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.041	PBA	24937.1	0.8803	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.050	PBA	10313.9	0.8959	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.058	BBA	134582.5	5.0000	CLO4-89-ISTD

*** End of Report ***

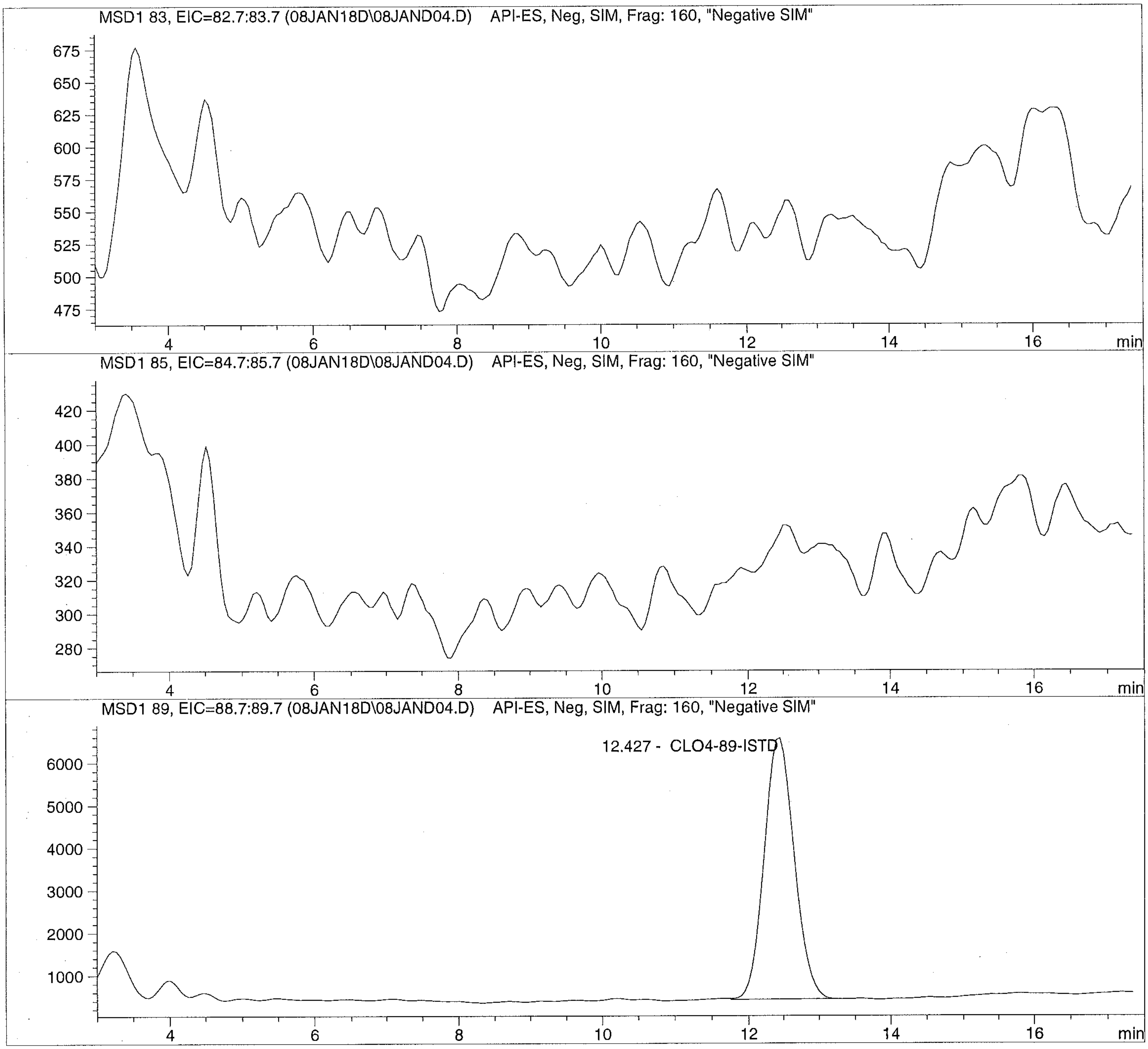
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND04.D Sample Name: 582602 LMB 00864545

Injection Date: 1/08/2018 09:15:17
Sample Name: 582602 LMB
Acq Operator: TNB

Seq Line: 4
Location: Vial 74
Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND04.D Sample Name: 582602 LMB

Injection Date:	1/08/2018 09:15:17	Seq Line:	4
Sample Name:	582602 LMB	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Wed, 20. Dec. 2017,08:01:52 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.427	BBA	182149.0	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND05.D   Sample Name: 582603   LCS@5.   00864547

===

Injection Date:	1/08/2018 09:34:27	Seq Line:	5
Sample Name:	582603 LCS@5.	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

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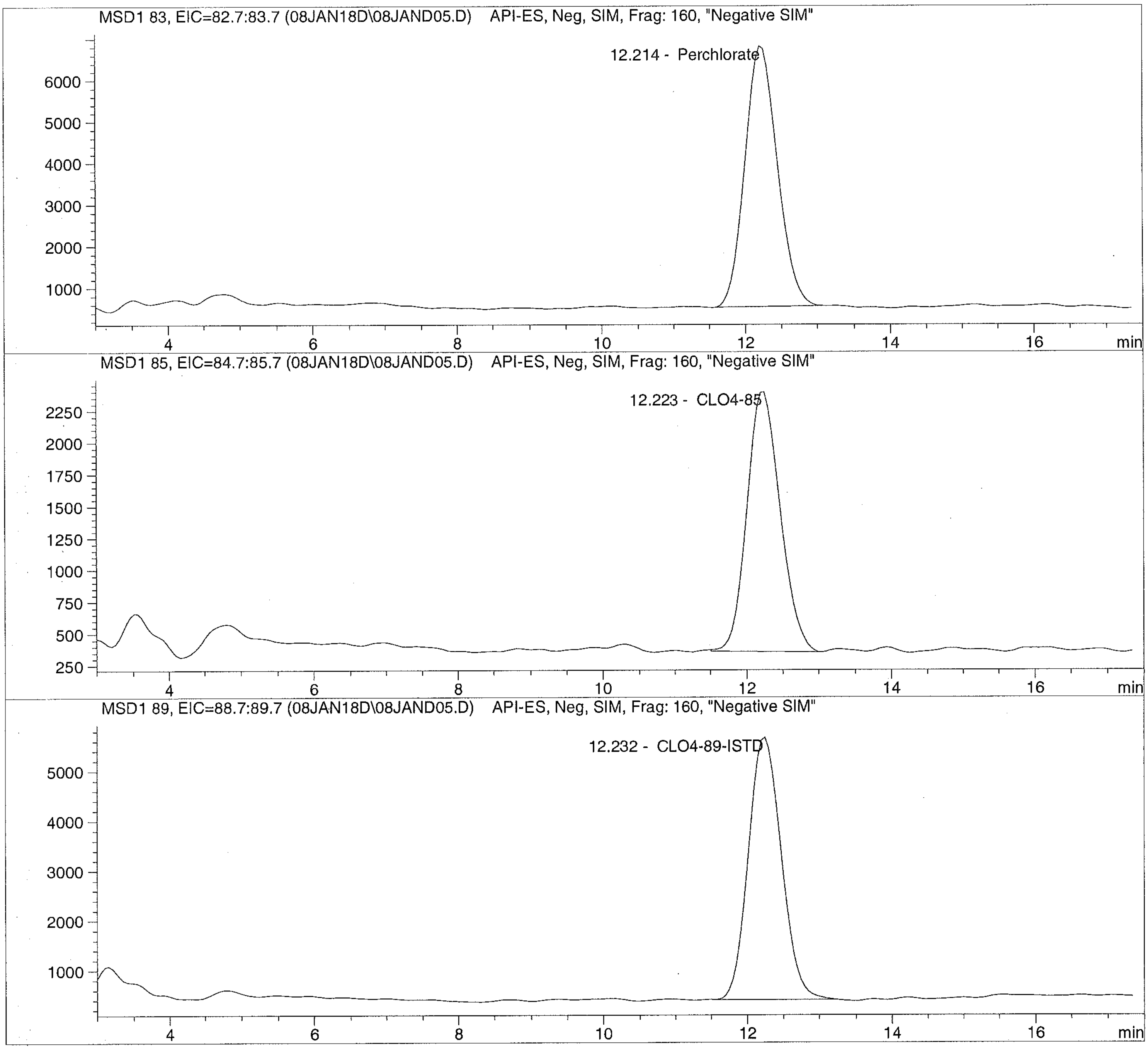


Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND05.D Sample Name: 582603 LCS@5.

Injection Date: 1/08/2018 09:34:27
Sample Name: 582603 LCS@5.
Acq Operator: TNB

Seq Line: 5
Location: Vial 75
Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.214	PBA	194972.6	5.2991	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.223	BBA	65076.3	5.3019	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.232	BBA	166837.8	5.0000	CLO4-89-ISTD

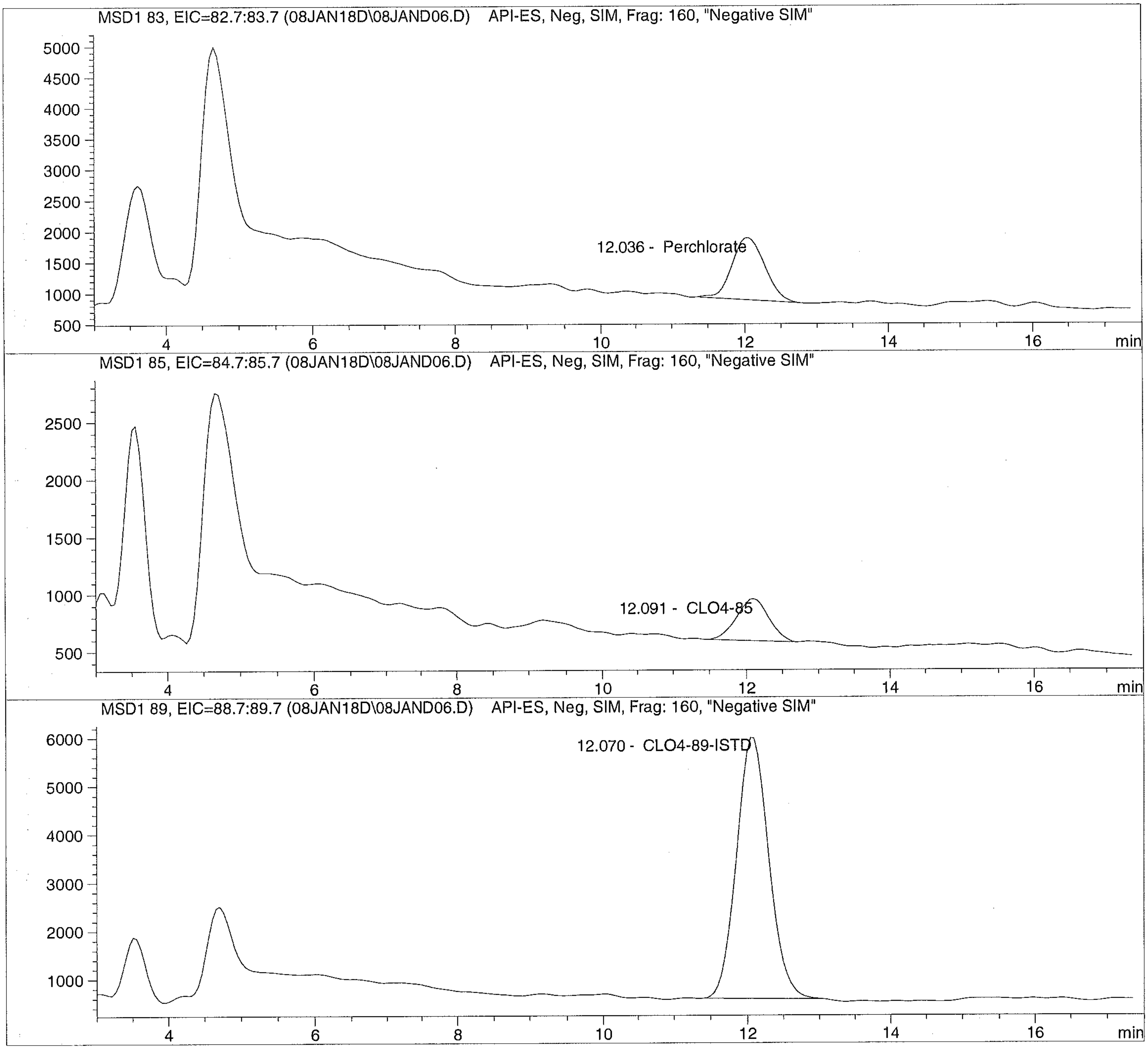
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND06.D   Sample Name: 1736221001

Injection Date:	1/08/2018 09:55:06	Seq Line:	6
Sample Name:	1736221001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND06.D Sample Name: 1736221001

Injection Date:	1/08/2018 09:55:06	Seq Line:	6
Sample Name:	1736221001	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.036	PBA	31087.2	0.8880	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.091	PBA	11237.5	0.7663	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.070	BBA	166279.1	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND07.D Sample Name: 582604 362211S 00864551

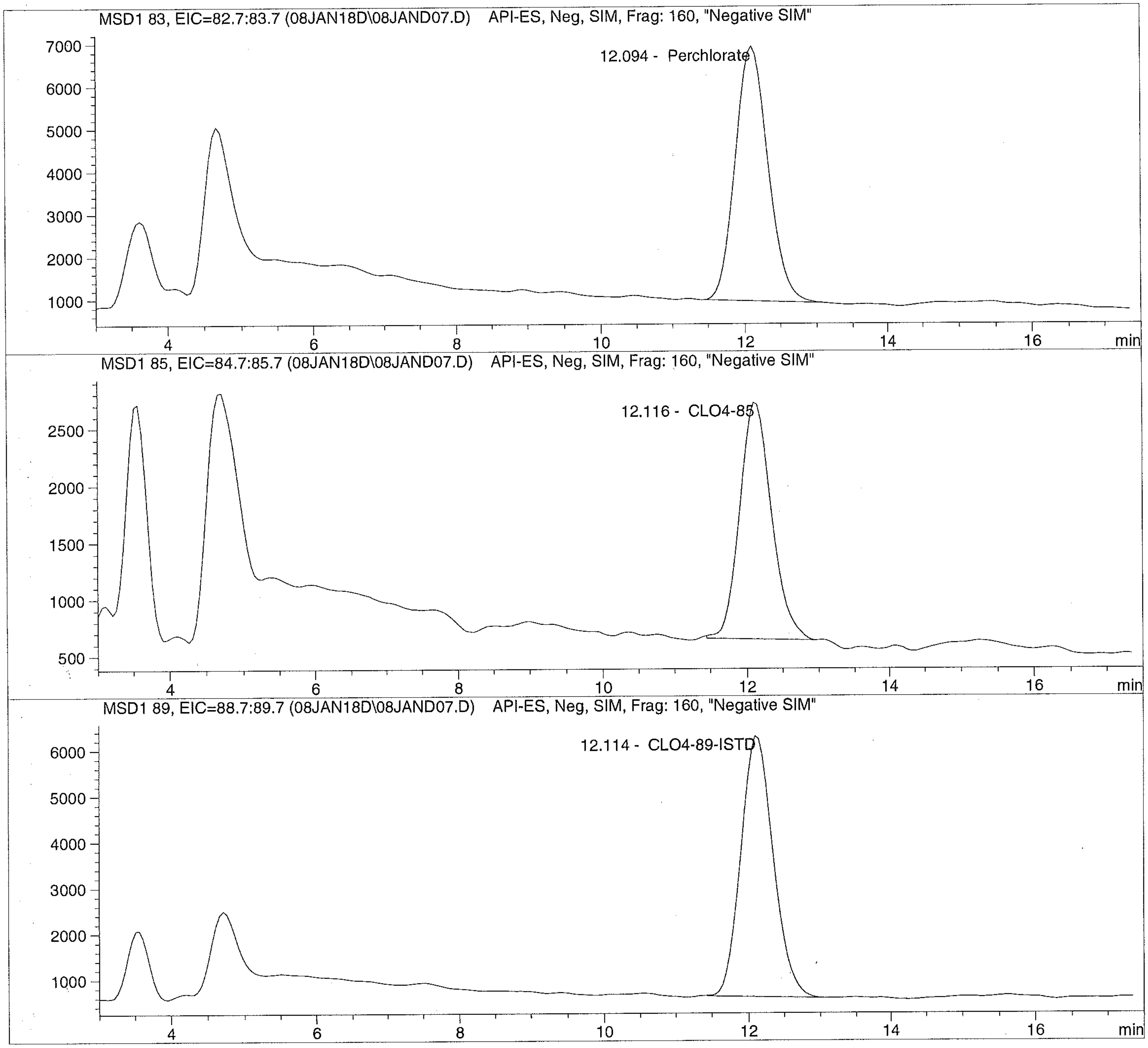
===

Injection Date:	1/08/2018 10:14:18	Seq Line:	7
Sample Name:	582604 362211S	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

===



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND07.D Sample Name: 582604 362211S

Injection Date: 1/08/2018 10:14:18 Seq Line: 7
Sample Name: 582604 362211S Location: Vial 77
Acq Operator: TNB Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.094	PBA	188371.2	4.8052	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.116	BBA	64174.7	4.8851	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.114	BBA	178297.8	5.0000	CLO4-89-ISTD

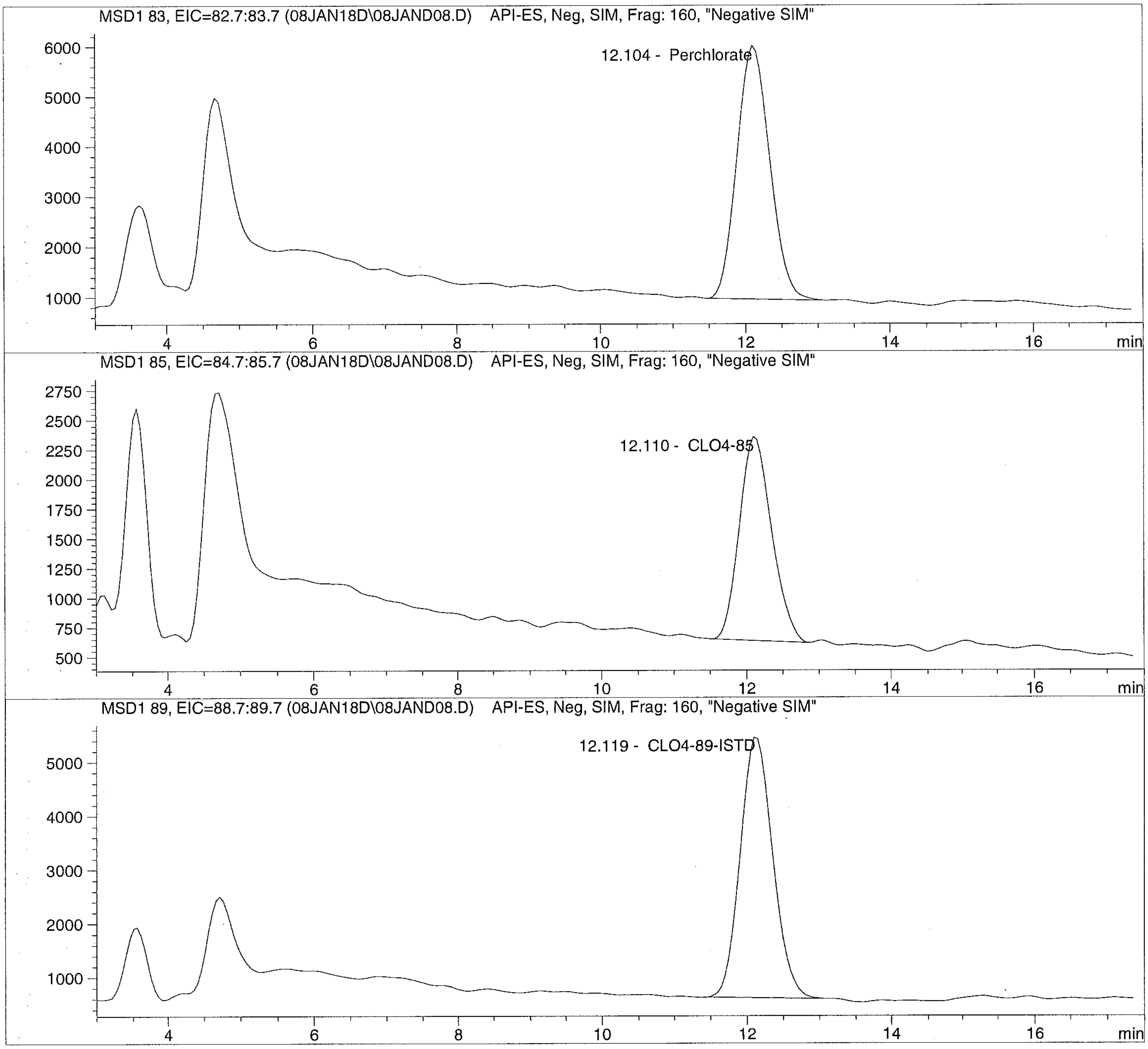
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND08.D Sample Name: 582605 362211D

Injection Date:	1/08/2018 10:33:30	Seq Line:	8
Sample Name:	582605 362211D	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND08.D Sample Name: 582605 362211D

Injection Date:	1/08/2018 10:33:30	Seq Line:	8
Sample Name:	582605 362211D	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.104	PBA	158239.9	4.7946	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.110	PBA	52994.0	4.7892	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.119	PBA	150118.3	5.0000	CLO4-89-ISTD

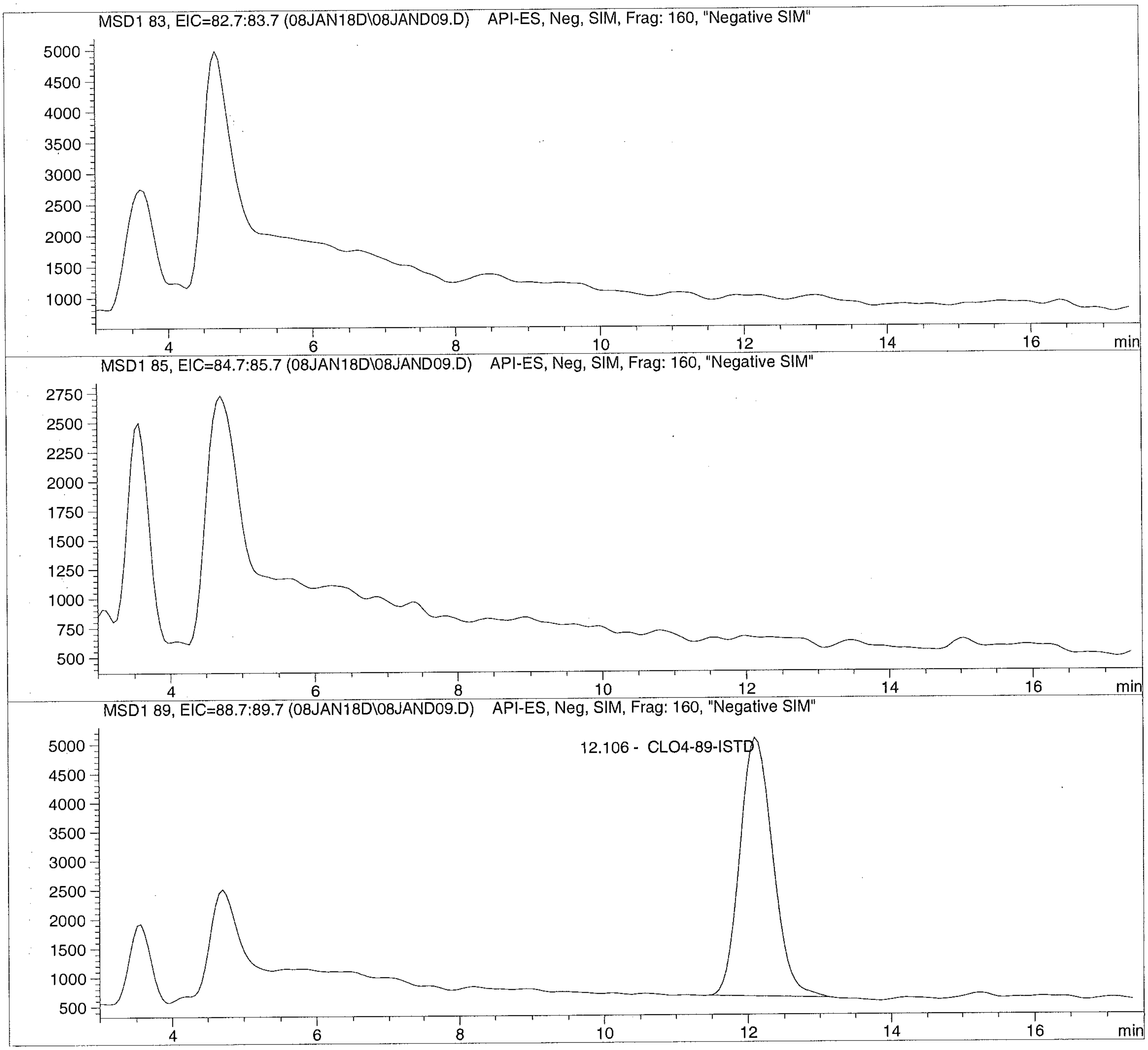
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND09.D Sample Name: 1736221002

Injection Date:	1/08/2018 10:52:41	Seq Line:	9
Sample Name:	1736221002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND09.D Sample Name: 1736221002

Injection Date:	1/08/2018 10:52:41	Seq Line:	9
Sample Name:	1736221002	Location:	Vial 79
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.106	BBA	139148.3	5.0000	CLO4-89-ISTD

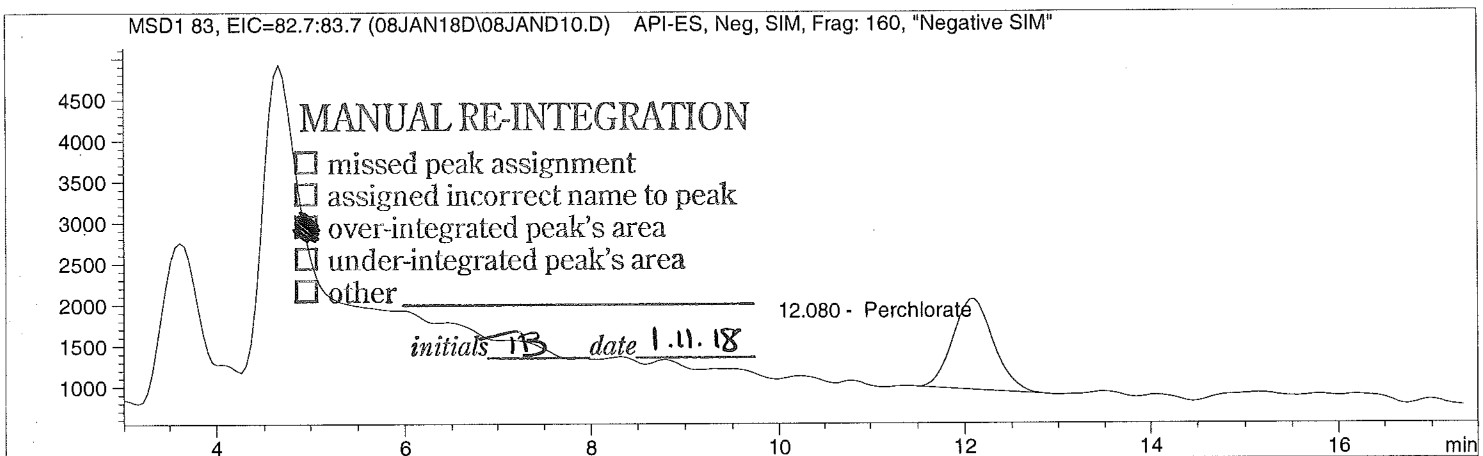
*** End of Report ***

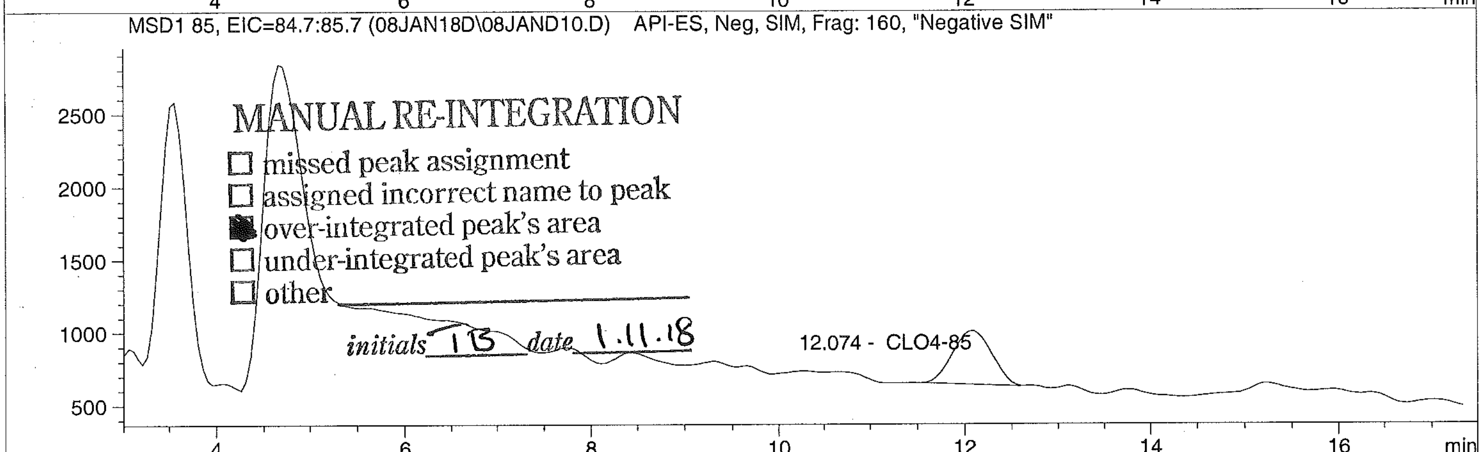
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D Sample Name: 1736221003

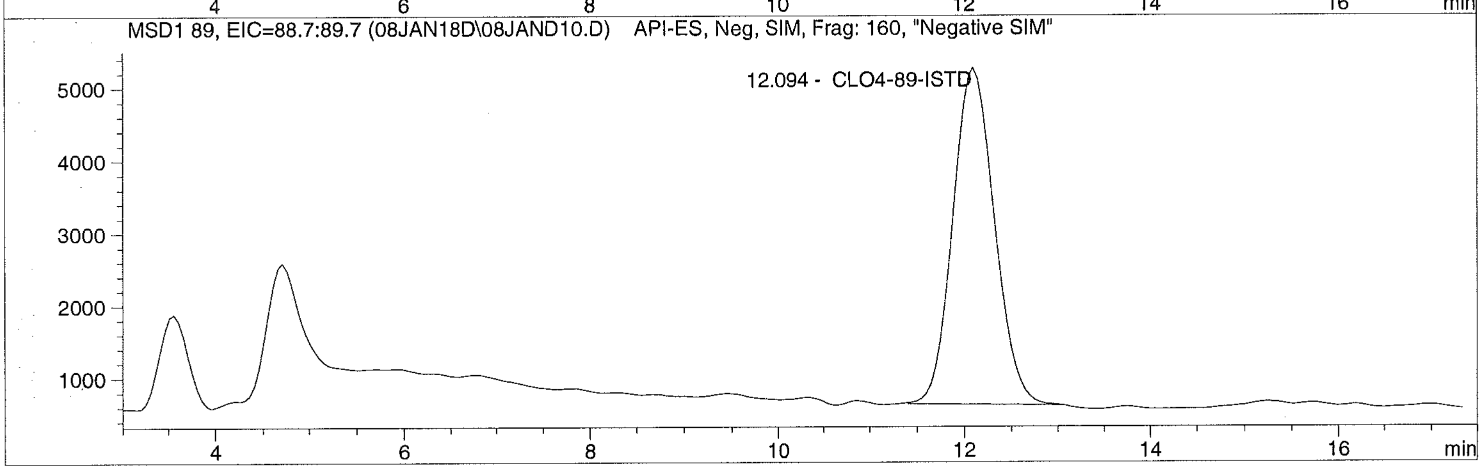
Injection Date:	1/08/2018 11:11:49	Seq Line:	10
Sample Name:	1736221003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D   Sample Name: 1736221003

Injection Date:	1/08/2018 11:11:49	Seq Line:	10
Sample Name:	1736221003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.080	MM	32769.4	1.0925	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.074	MM	10469.1	0.8576	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

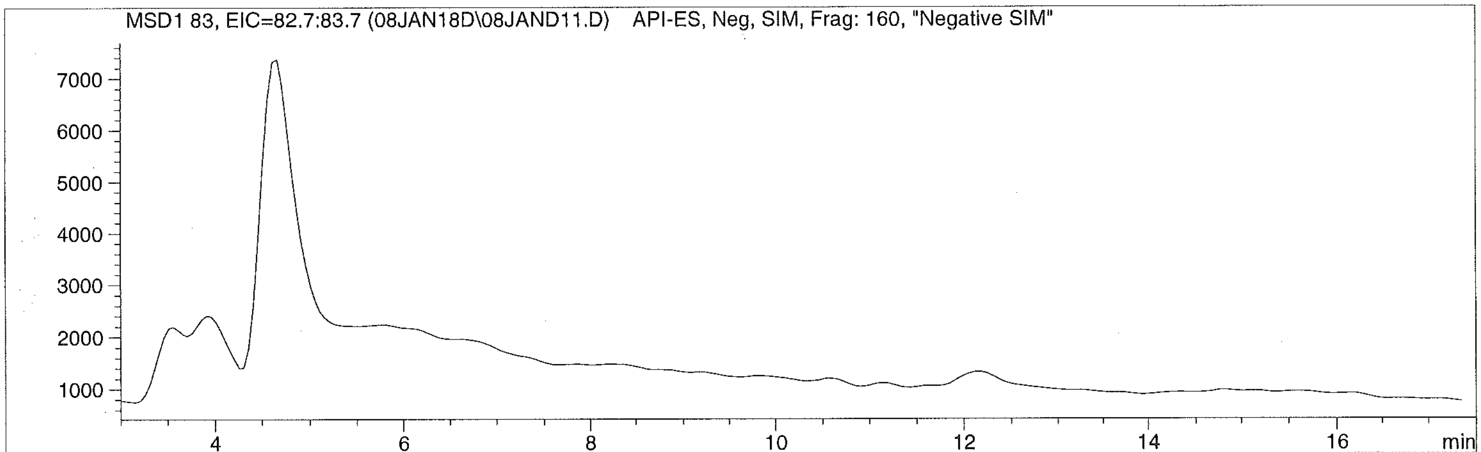
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.094	BBA	141559.2	5.0000	CLO4-89-ISTD

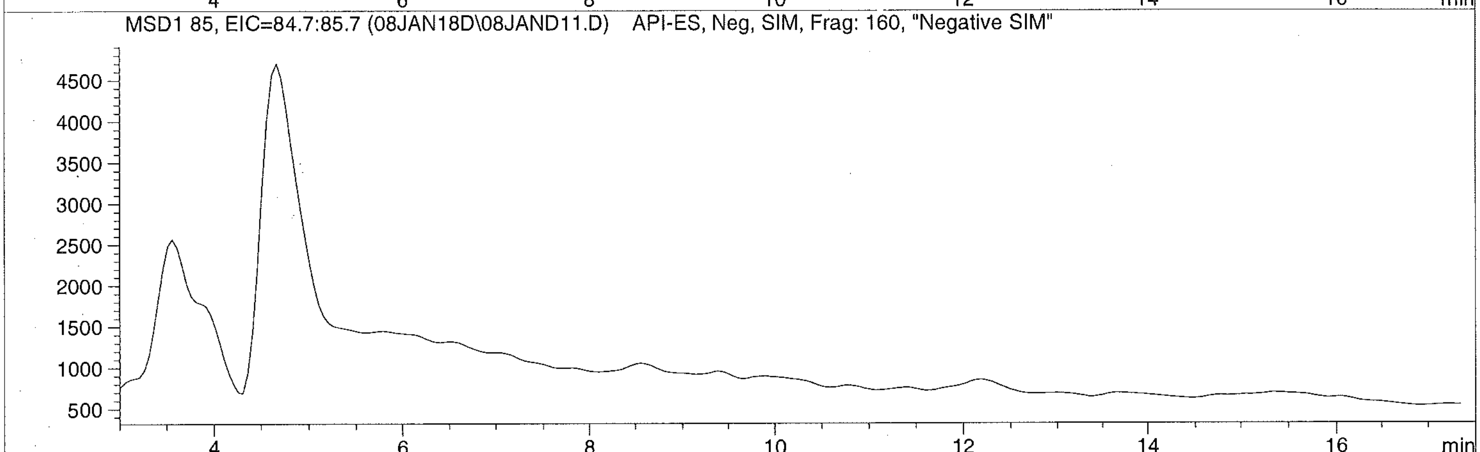
*** End of Report ***

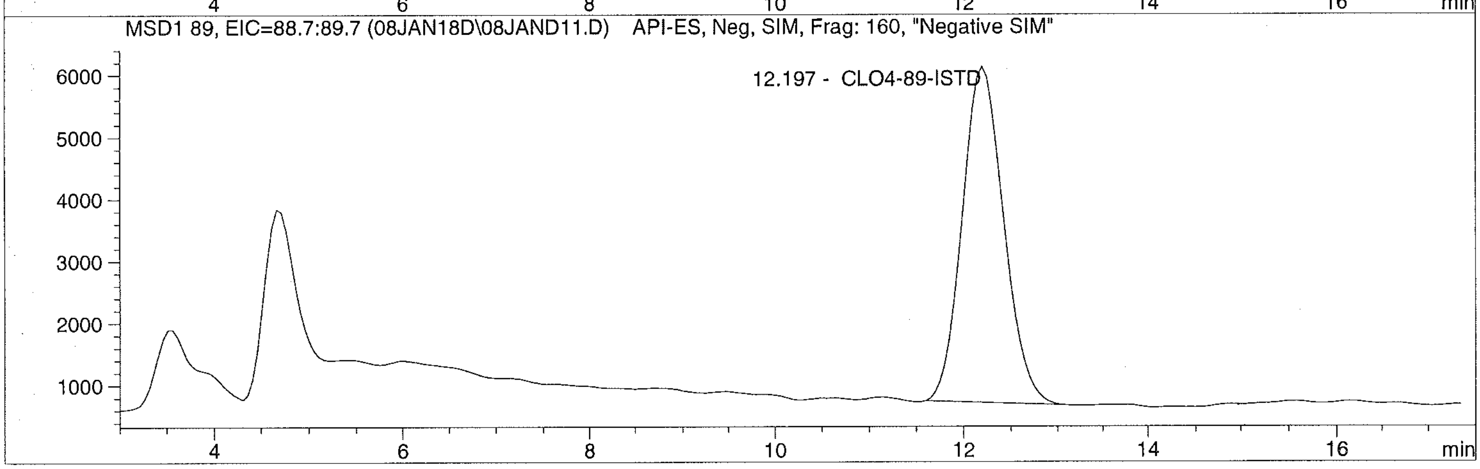
```
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND11.D        Sample Name: 1736221004
=====================================================================================
Injection Date:    1/08/2018  11:31:01           Seq Line:          11
Sample Name:       1736221004                    Location:     Vial 81
Acq Operator:      TNB                           Inj. No.:           1
                                                 Inj. Vol.:      25 µl

Acq. Method:       CLO4-DOD.M
Analysis Method:   C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:      12/20/2017 08:11:26

Perchlorate analysis
=====================================================================================
```







Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND11.D Sample Name: 1736221004

Injection Date:	1/08/2018 11:31:01	Seq Line:	11
Sample Name:	1736221004	Location:	Vial 81
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Wed, 20. Dec. 2017,08:01:52 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.197	PBA	163910.3	5.0000	CLO4-89-ISTD

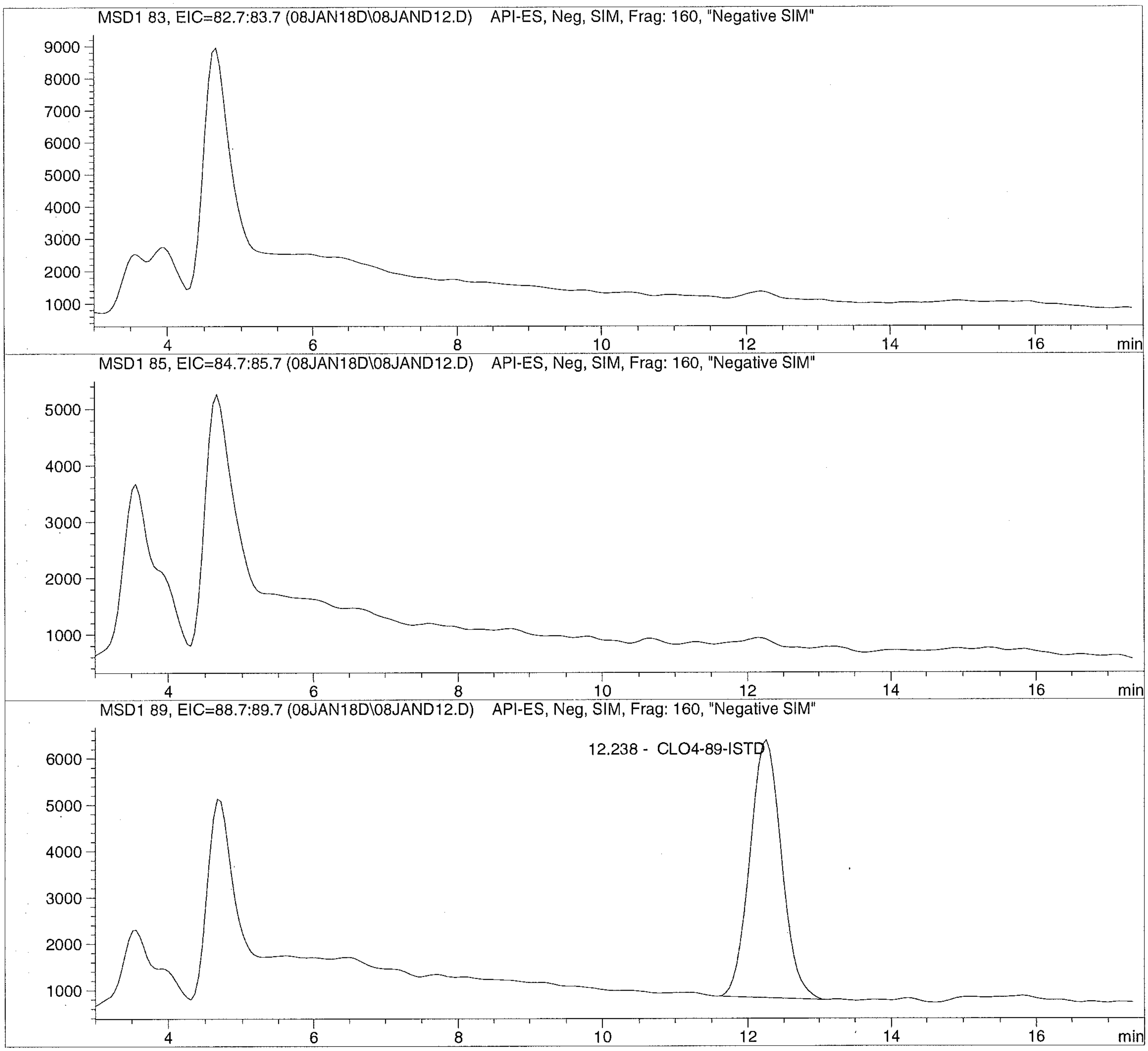
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND12.D Sample Name: 1736221005

Injection Date:	1/08/2018 11:50:08	Seq Line:	12
Sample Name:	1736221005	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND12.D Sample Name: 1736221005

Injection Date:	1/08/2018 11:50:08	Seq Line:	12
Sample Name:	1736221005	Location:	Vial 82
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Wed, 20. Dec. 2017,08:01:52 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.238	PBA	169084.7	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND13.D   Sample Name: 1736222001

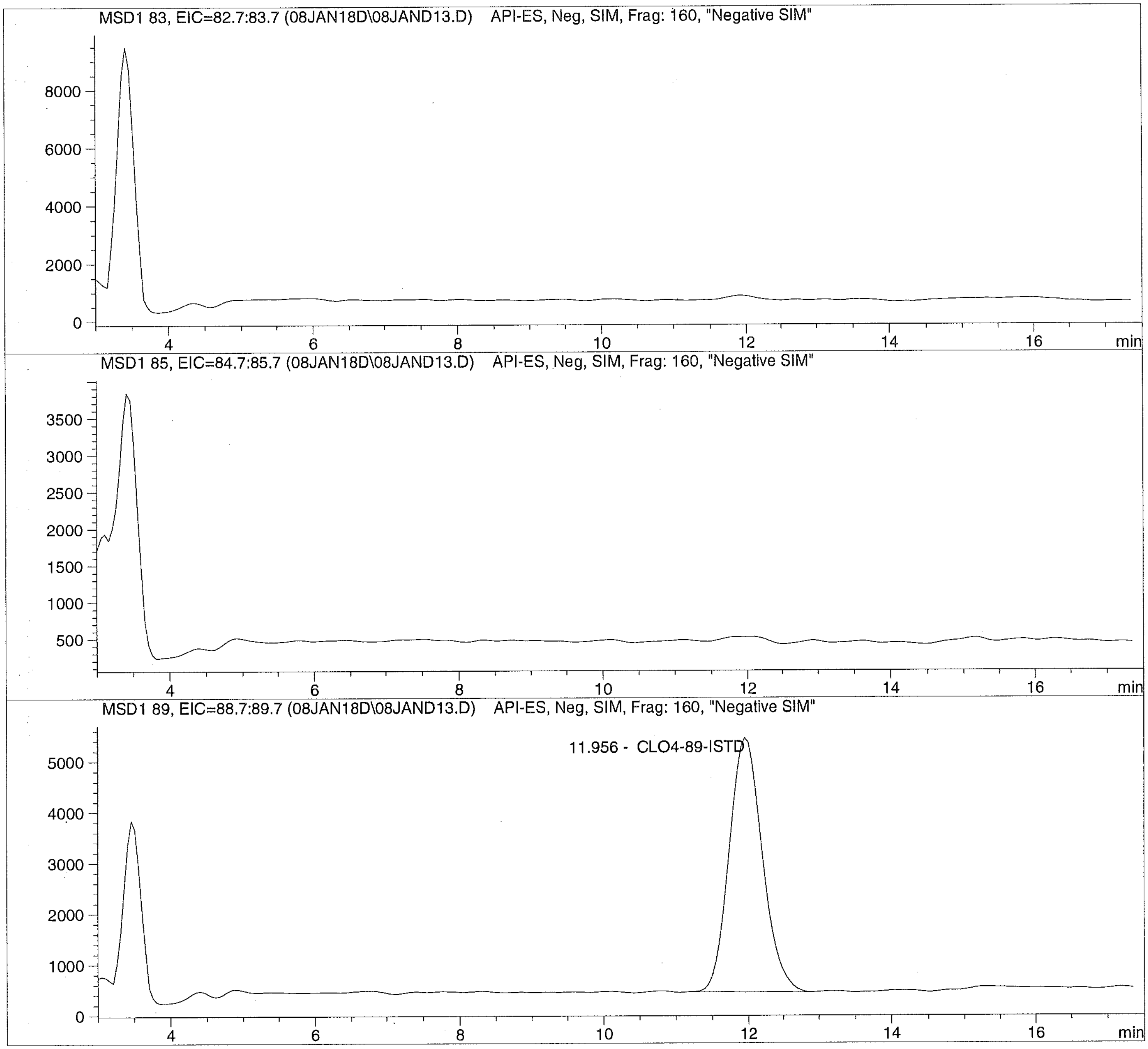
===

Injection Date:	1/08/2018 12:09:16	Seq Line:	13
Sample Name:	1736222001	Location:	Vial 83
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

===



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND13.D Sample Name: 1736222001

Injection Date: 1/08/2018 12:09:16
Sample Name: 1736222001
Acq Operator: TNB

Seq Line: 13
Location: Vial 83
Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
11.956	BBA	163058.7	5.0000	CLO4-89-ISTD

*** End of Report ***

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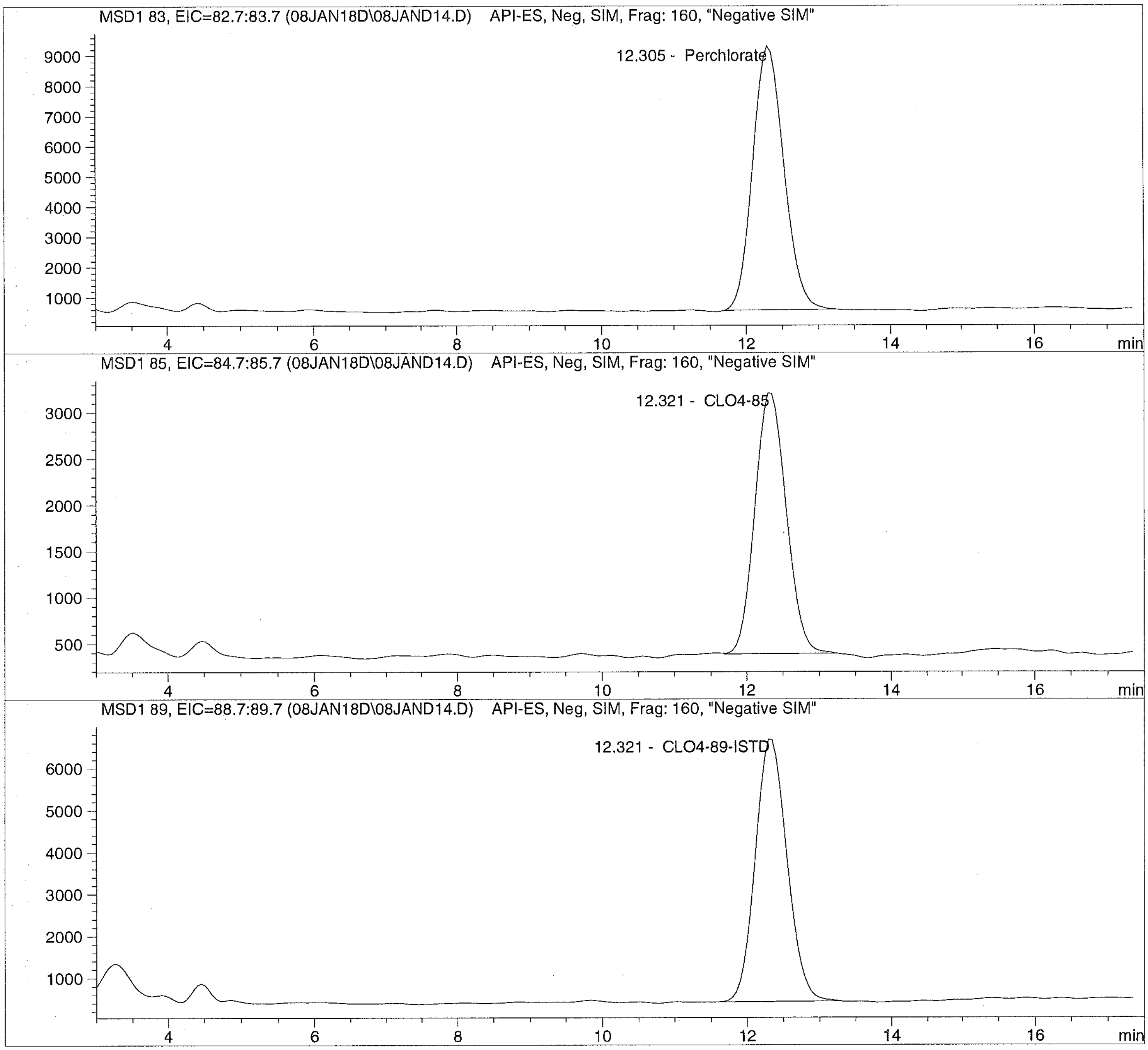
Injection Date:	1/08/2018 12:28:24	Seq Line:	14
Sample Name:	1736222002 100	Location:	Vial 84
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

==



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND14.D   Sample Name: 1736222002 100

Injection Date: 1/08/2018 12:28:24   Seq Line: 14
Sample Name: 1736222002 100   Location: Vial 84
Acq Operator: TNB   Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 100.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.305	BBA	260213.5	619.8599	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

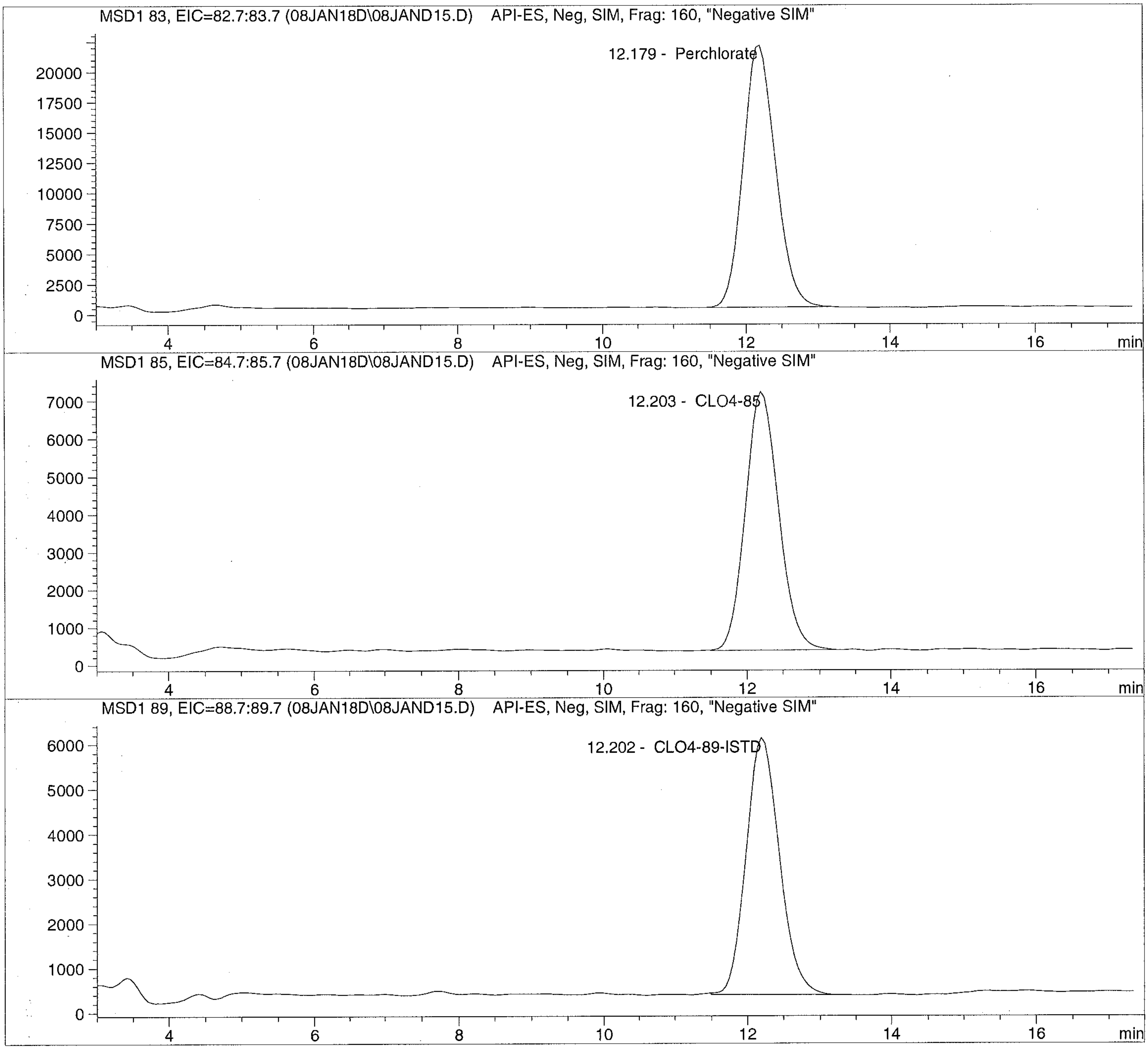
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.321	BBA	84484.5	607.5170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.321	BBA	189341.2	500.0000	CLO4-89-ISTD

*** End of Report ***

```
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND15.D        Sample Name: 1736222003    10X
=====================================================================================
Injection Date:     1/08/2018  12:47:33              Seq Line:           15
Sample Name:        1736222003    10X                Location:         Vial 85
Acq Operator:       TNB                              Inj. No.:            1
                                                     Inj. Vol.:         25 µl

Acq. Method:        CLO4-DOD.M
Analysis Method:    C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:       12/20/2017 08:11:26

Perchlorate analysis
=====================================================================================
```



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND15.D Sample Name: 1736222003 10X

Injection Date:	1/08/2018 12:47:33	Seq Line:	15
Sample Name:	1736222003 10X	Location:	Vial 85
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 10.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.179	PBA	672525.0	156.6497	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.203	BBA	219017.6	158.9967	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.202	BBA	184162.5	50.0000	CLO4-89-ISTD

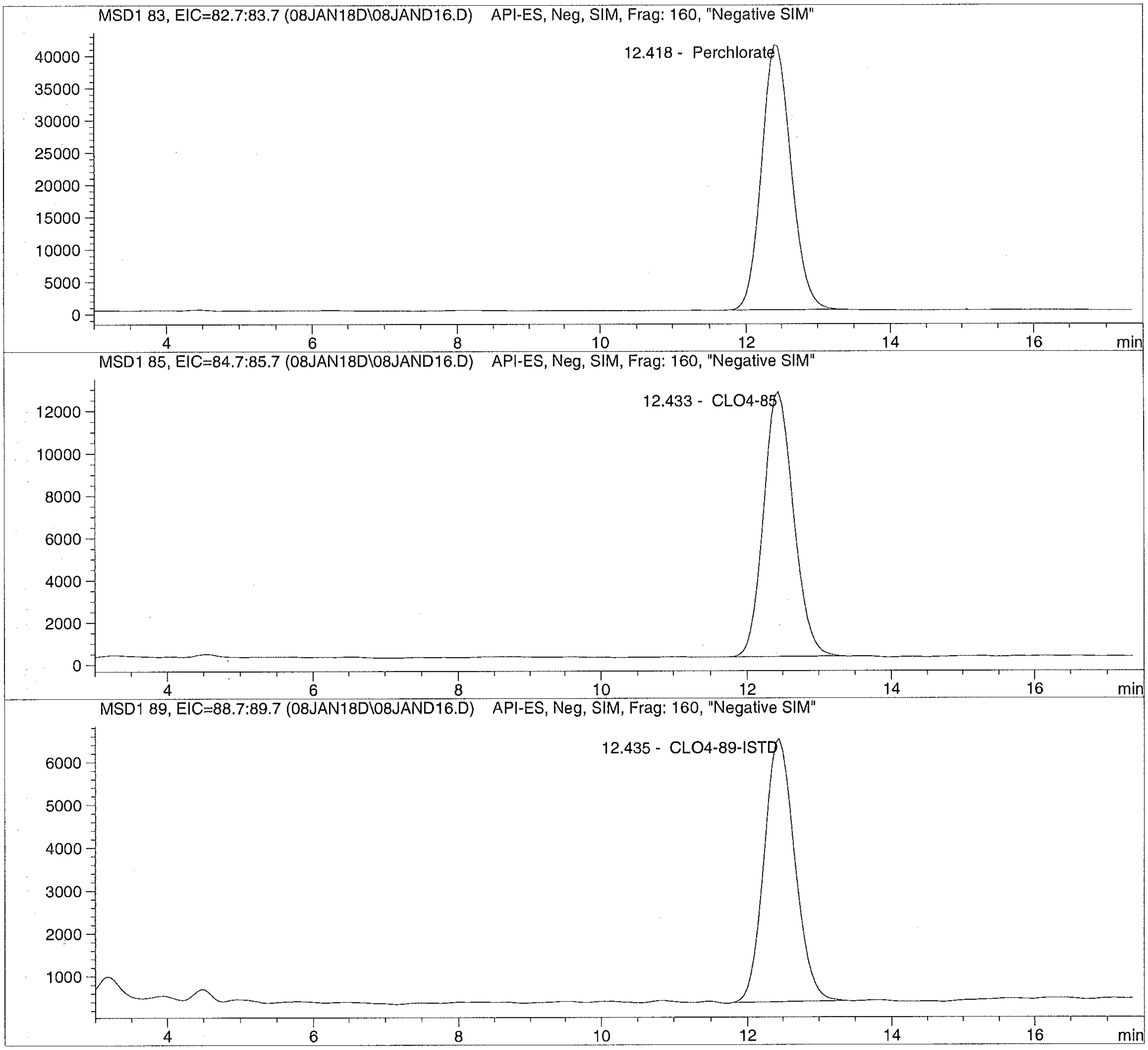
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND16.D   Sample Name: 582606 CCV@25

Injection Date:	1/08/2018 13:08:12	Seq Line:	16
Sample Name:	582606 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Injection Date:	1/08/2018 13:08:12	Seq Line:	16
Sample Name:	582606 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.418	PBA	1188700.2	26.2466	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.433	PBA	367172.0	25.7528	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.435	PBA	184529.9	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND17.D   Sample Name: 582607   LODV@1.

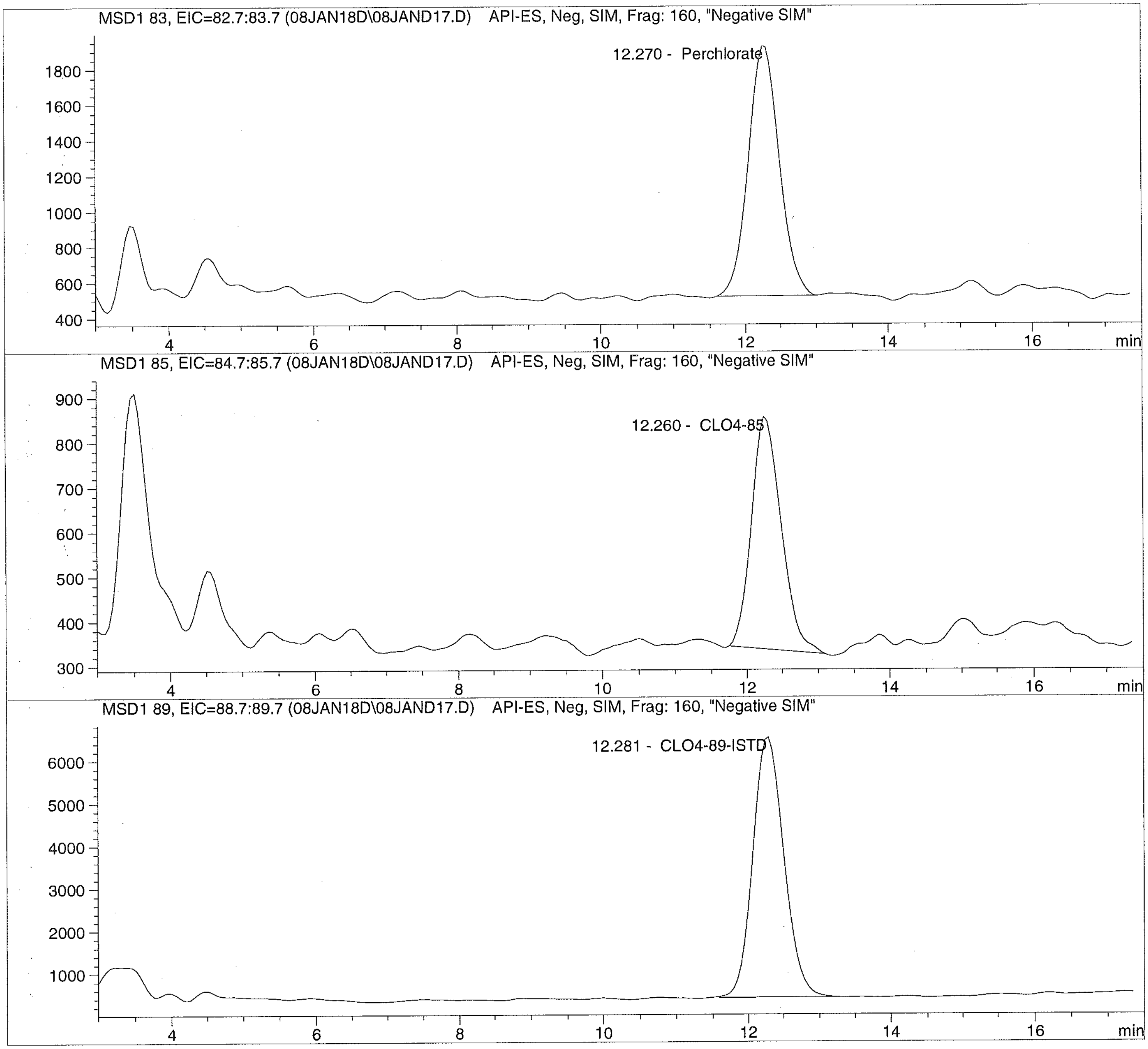
==

Injection Date:	1/08/2018 13:27:20	Seq Line:	17
Sample Name:	582607 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

==



Injection Date: 1/08/2018 13:27:20
Sample Name: 582607 LODV@1.
Acq Operator: TNB

Seq Line: 17
Location: Vial 72
Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.270	PBA	43177.0	1.0870	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

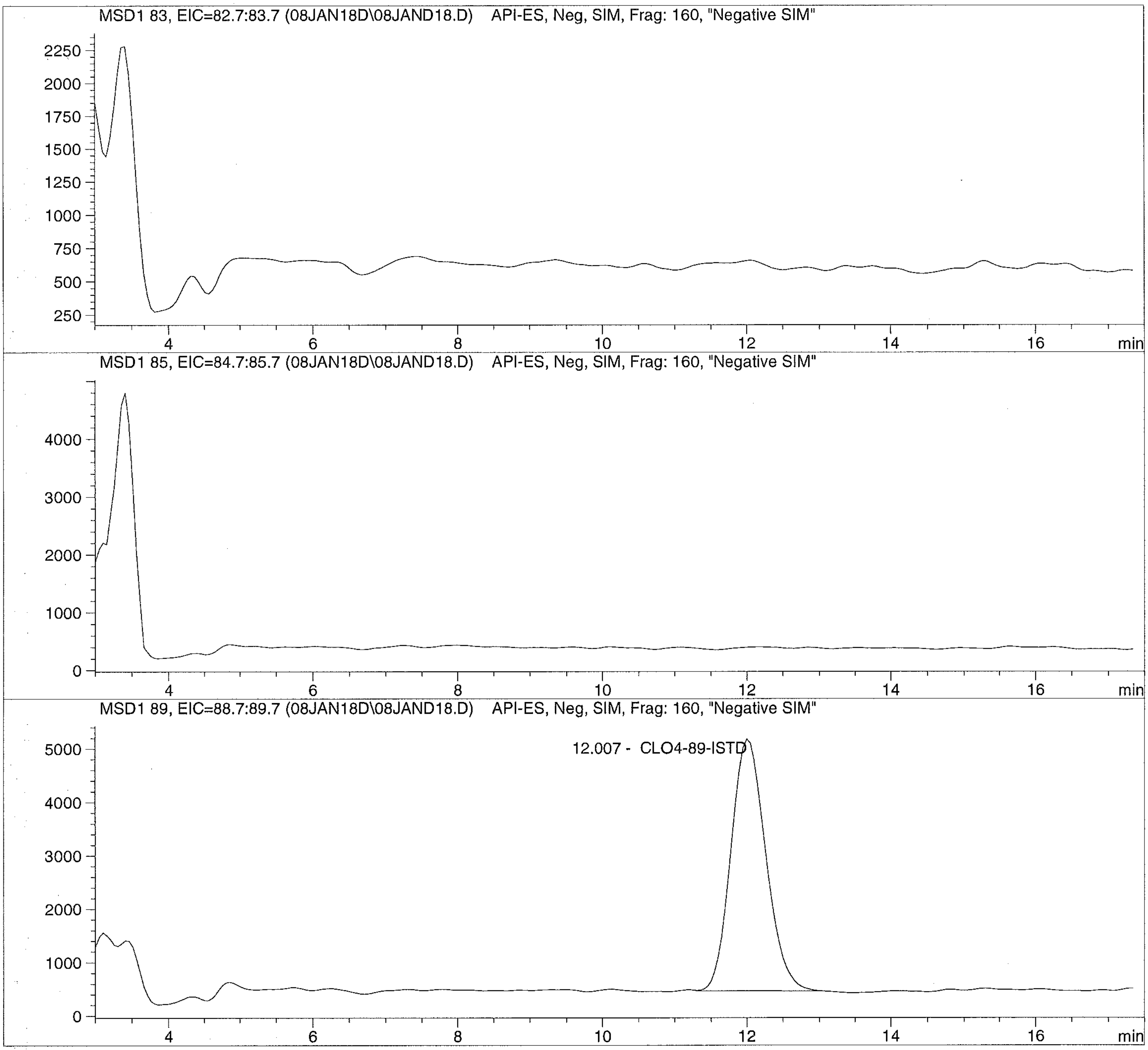
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.260	PBA	15255.9	0.9636	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.281	BBA	187499.3	5.0000	CLO4-89-ISTD

*** End of Report ***

```
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND18.D        Sample Name: 1736222004
=====================================================================================
Injection Date:    1/08/2018  13:46:29                Seq Line:          18
Sample Name:       1736222004                         Location:      Vial 86
Acq Operator:      TNB                                Inj. No.:           1
                                                      Inj. Vol.:       25 µl

Acq. Method:       CLO4-DOD.M
Analysis Method:   C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:      12/20/2017 08:11:26

Perchlorate analysis
=====================================================================================
```



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND18.D Sample Name: 1736222004

Injection Date:	1/08/2018 13:46:29	Seq Line:	18
Sample Name:	1736222004	Location:	Vial 86
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
0.000		0.0	0.0000	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.007	BBA	157843.1	5.0000	CLO4-89-ISTD

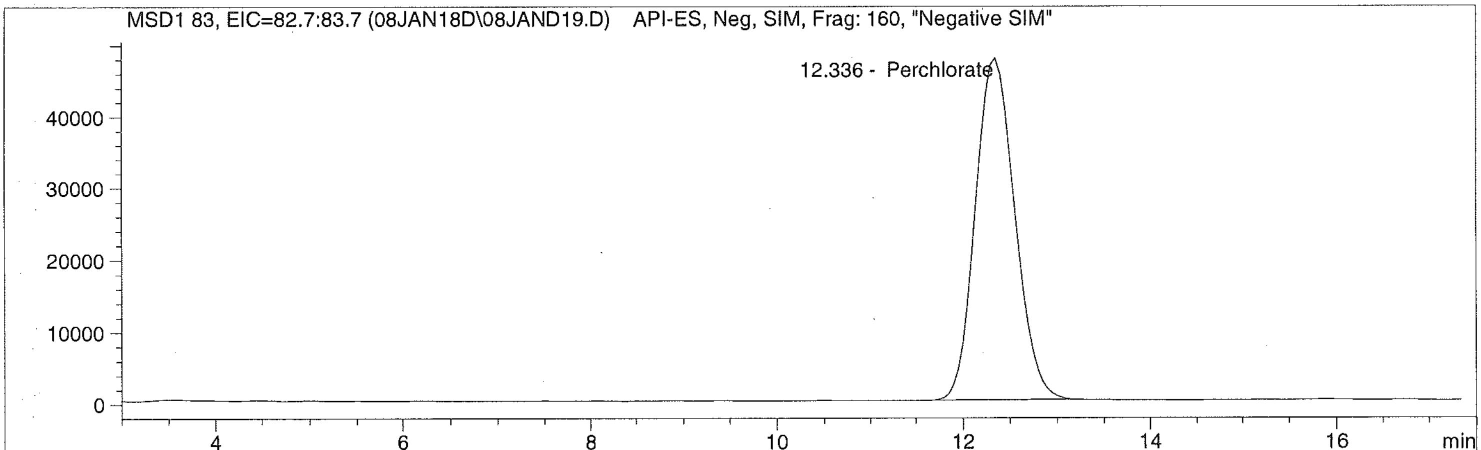
*** End of Report ***

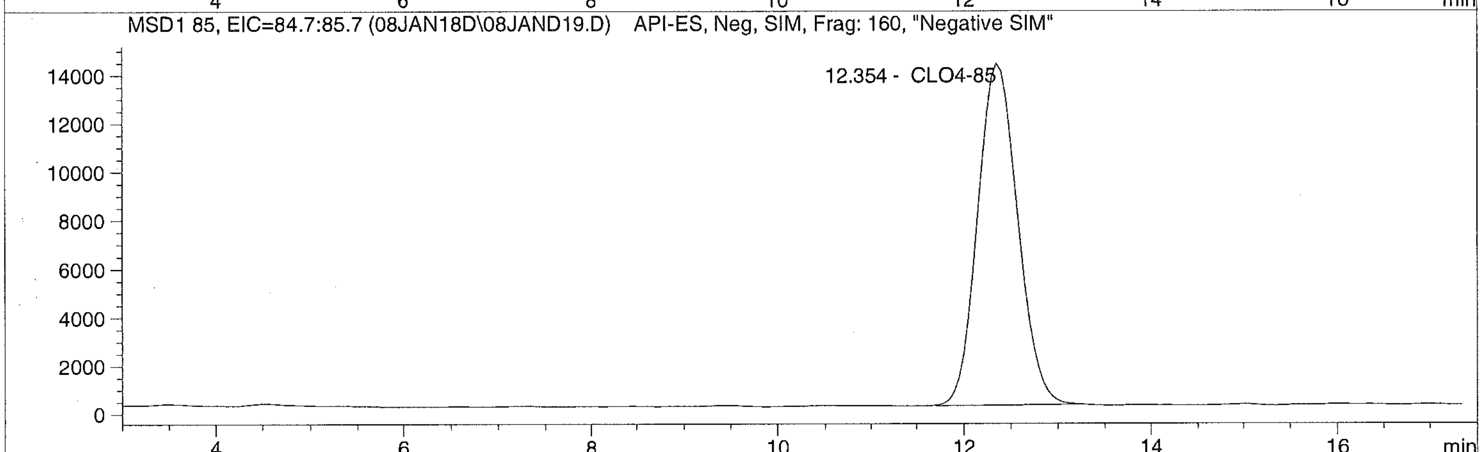
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND19.D   Sample Name: 1736222005   1K

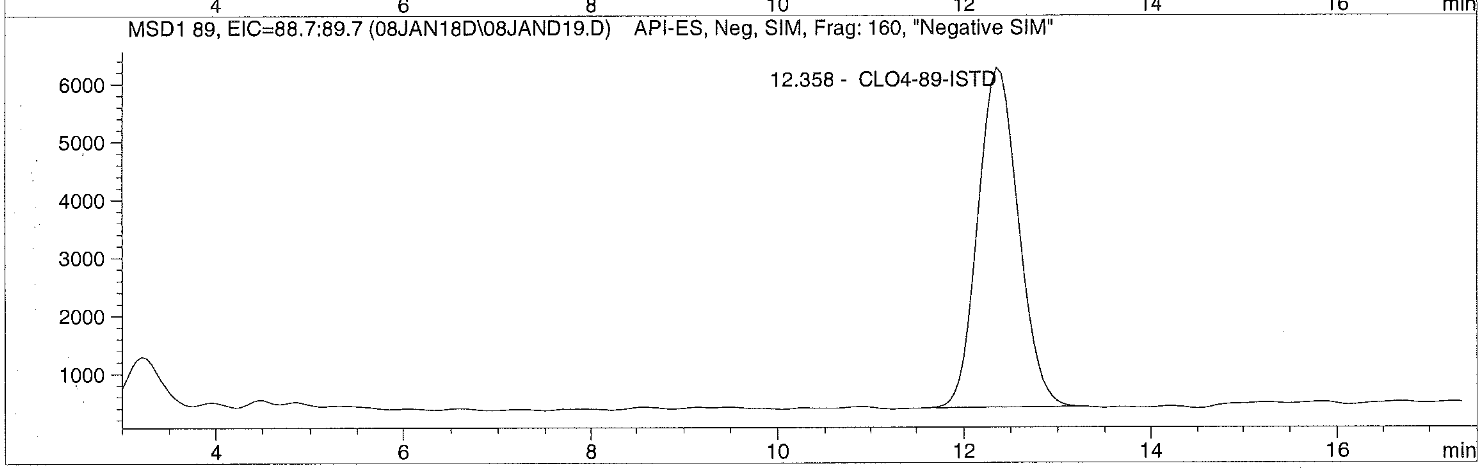
Injection Date:	1/08/2018 14:05:39	Seq Line:	19
Sample Name:	1736222005 1K	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis







Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND19.D Sample Name: 1736222005 1K

Injection Date:	1/08/2018 14:05:39	Seq Line:	19
Sample Name:	1736222005 1K	Location:	Vial 87
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1000.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.336	PBA	1375622.1	31318.8180	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.354	PBA	414786.1	30245.6824	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.358	PBA	174781.8	5000.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND20.D   Sample Name: 1736222006   1K

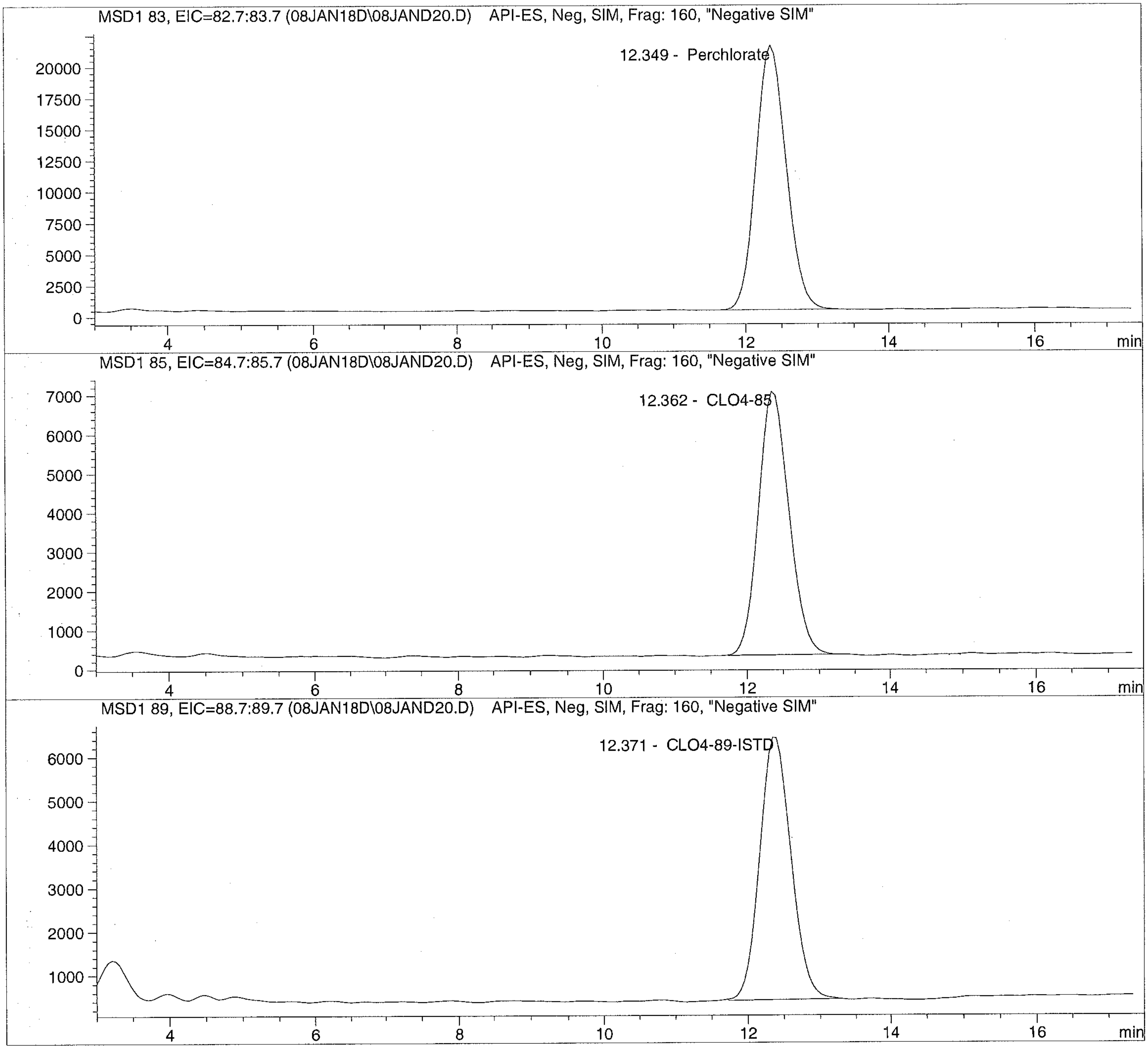
==

Injection Date:	1/08/2018 14:24:48	Seq Line:	20
Sample Name:	1736222006 1K	Location:	Vial 88
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

==



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND20.D Sample Name: 1736222006 1K

Injection Date: 1/08/2018 14:24:48
Sample Name: 1736222006 1K
Acq Operator: TNB

Seq Line: 20
Location: Vial 88
Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1000.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.349	PBA	615406.7	14685.8937	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.362	BBA	197523.7	14672.3128	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.371	BBA	180646.8	5000.0000	CLO4-89-ISTD

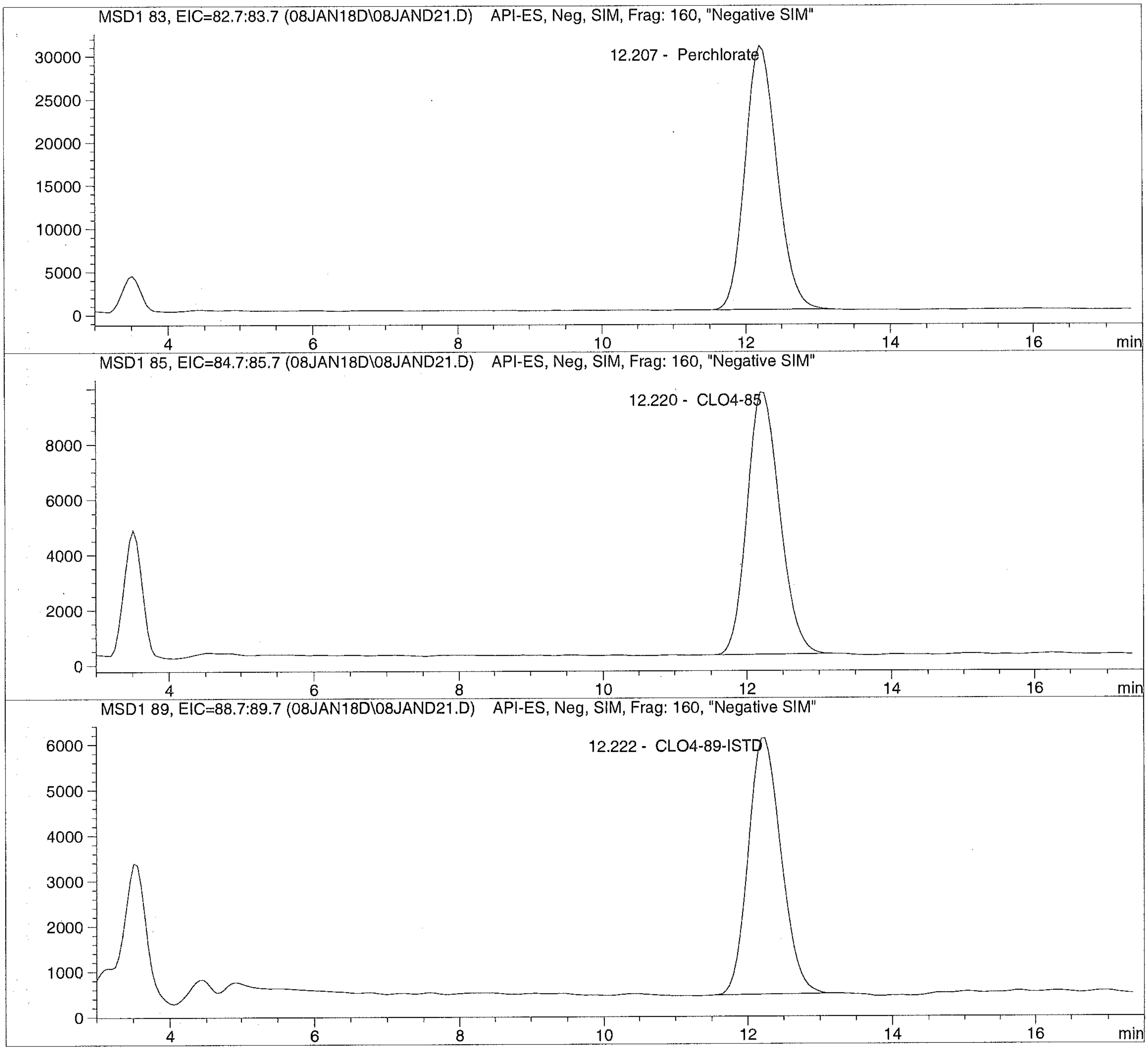
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND21.D   Sample Name: 1736222007 10X

Injection Date:	1/08/2018 14:44:00	Seq Line:	21
Sample Name:	1736222007 10X	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND21.D Sample Name: 1736222007 10X

Injection Date:	1/08/2018 14:44:00	Seq Line:	21
Sample Name:	1736222007 10X	Location:	Vial 89
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 10.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.207	PBA	938832.6	218.6278	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.220	PBA	299209.2	219.5516	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.222	PBA	178666.8	50.0000	CLO4-89-ISTD

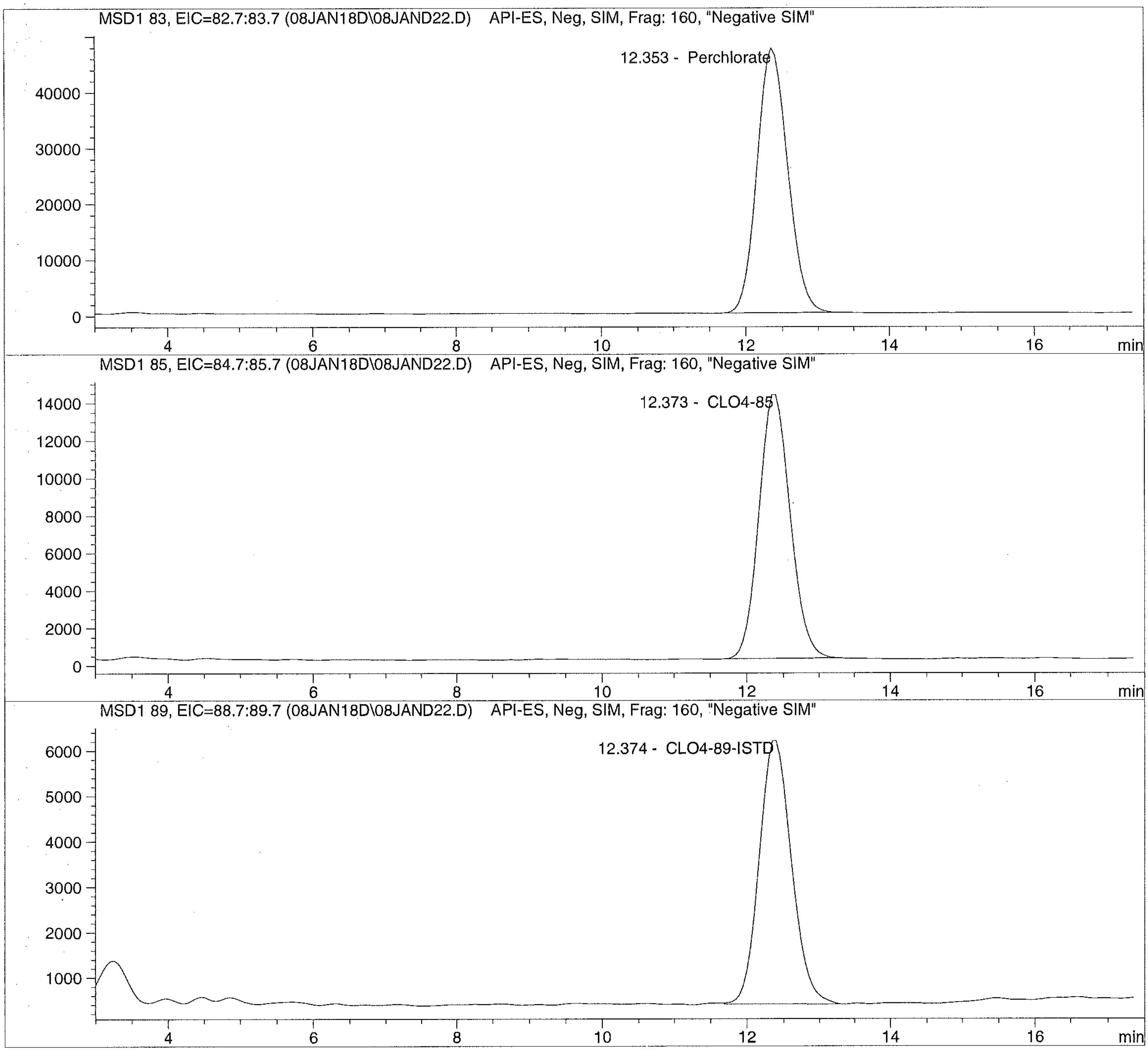
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND22.D   Sample Name: 1736222008   1K

Injection Date: 1/08/2018 15:03:11   Seq Line: 22
Sample Name: 1736222008 1K   Location: Vial 90
Acq Operator: TNB   Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND22.D   Sample Name: 1736222008 1K

Injection Date: 1/08/2018 15:03:11   Seq Line: 22
Sample Name: 1736222008 1K   Location: Vial 90
Acq Operator: TNB   Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1000.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.353	PBA	1374991.0	30809.3521	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.373	PBA	416880.0	29884.5170	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.374	BBA	178007.8	5000.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND25.D   Sample Name: 1800210001

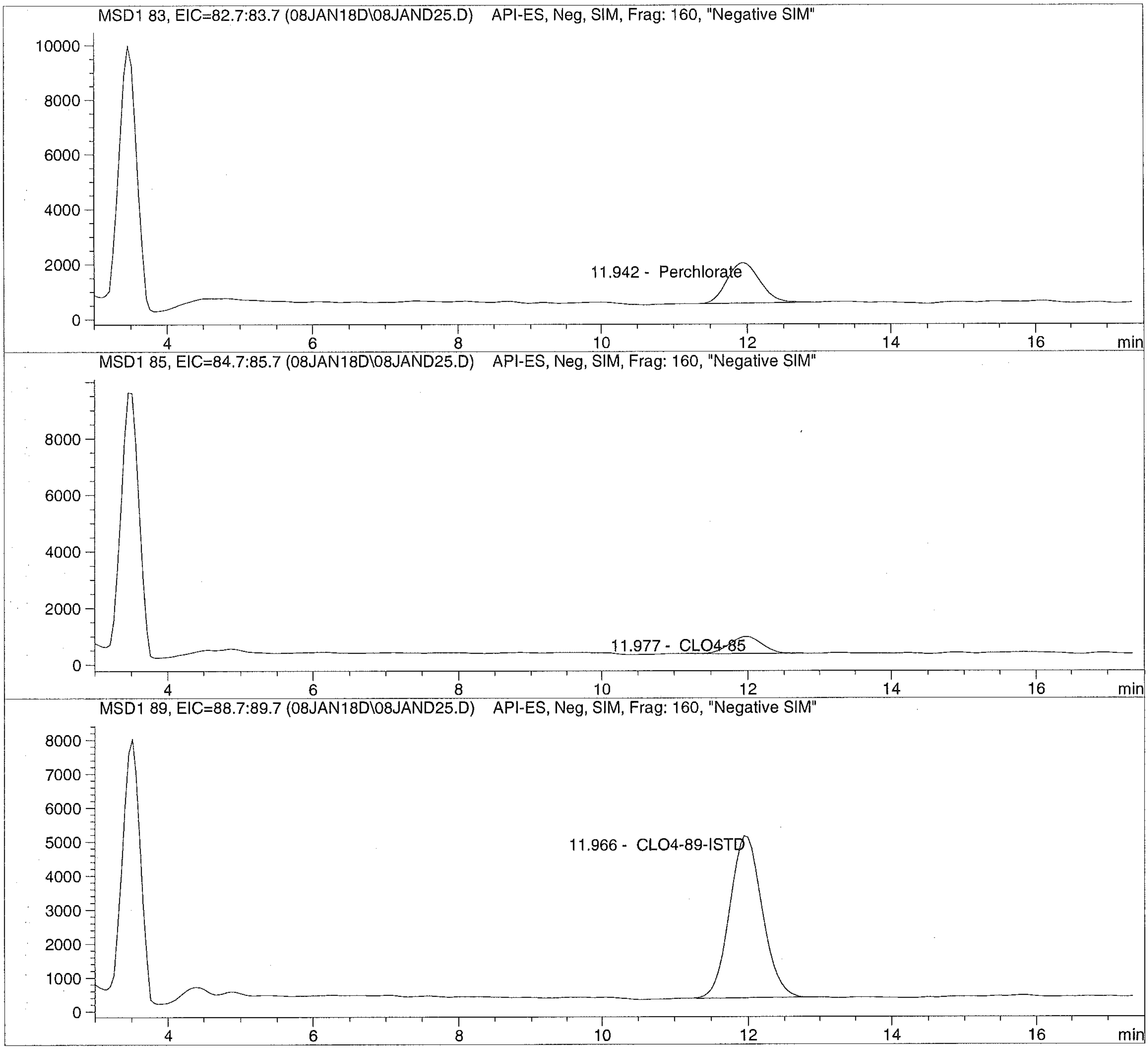
===

Injection Date:	1/08/2018 16:00:36	Seq Line:	25
Sample Name:	1800210001	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

===



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND25.D Sample Name: 1800210001

Injection Date:	1/08/2018 16:00:36	Seq Line:	25
Sample Name:	1800210001	Location:	Vial 92
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 μl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
11.942	BBA	45760.9	1.4594	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
11.977	BBA	18773.2	1.6264	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
11.966	BBA	146856.5	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D   Sample Name: 582609   LODV@1.

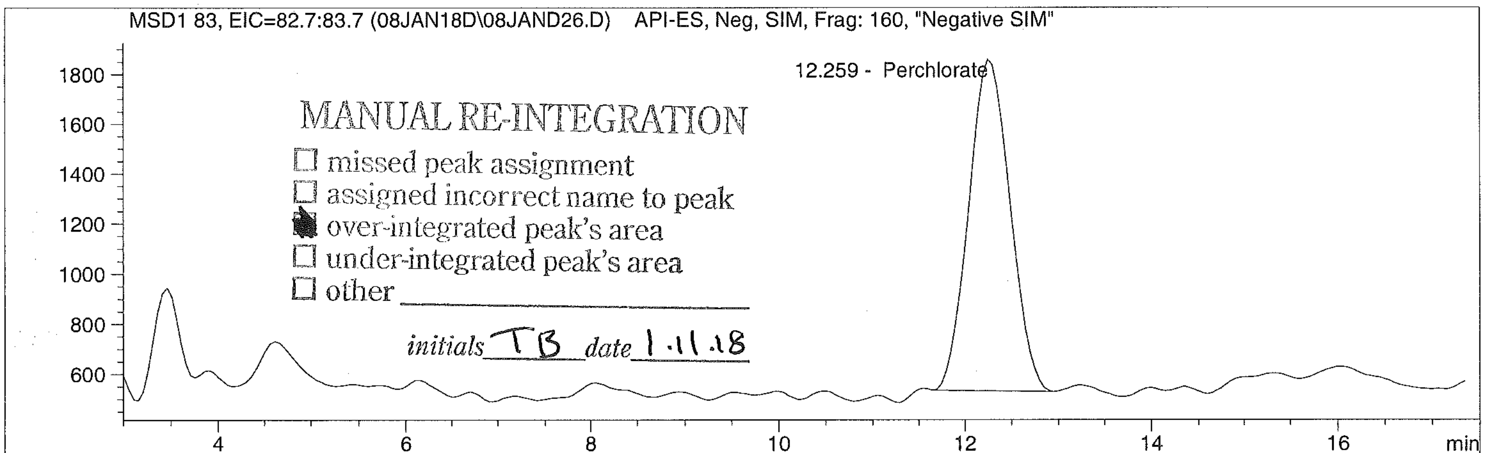
===

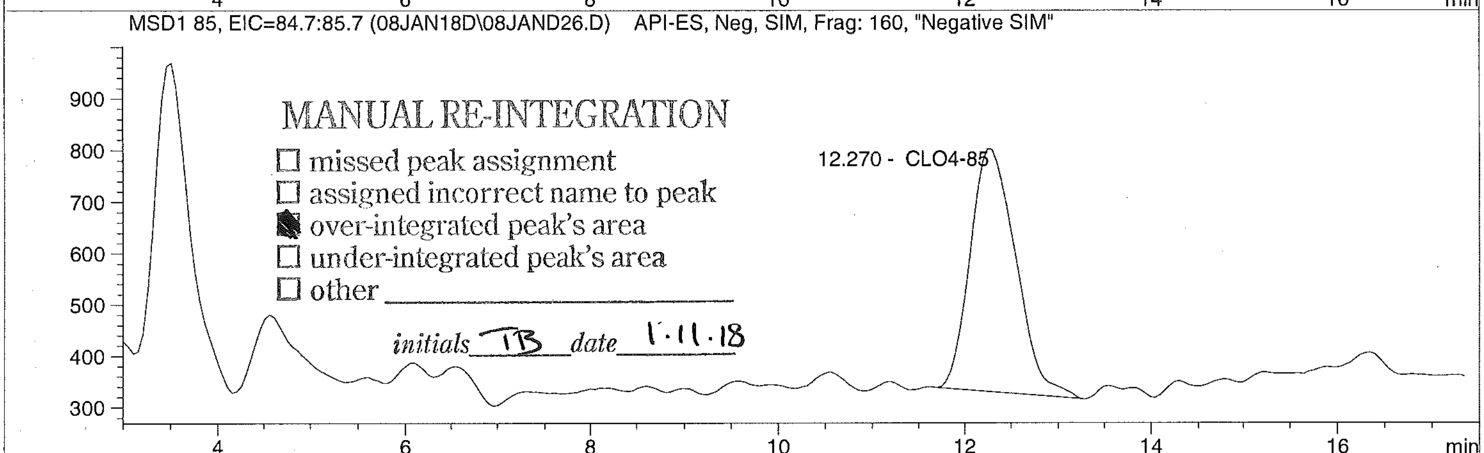
Injection Date:	1/08/2018 16:21:37	Seq Line:	26
Sample Name:	582609 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

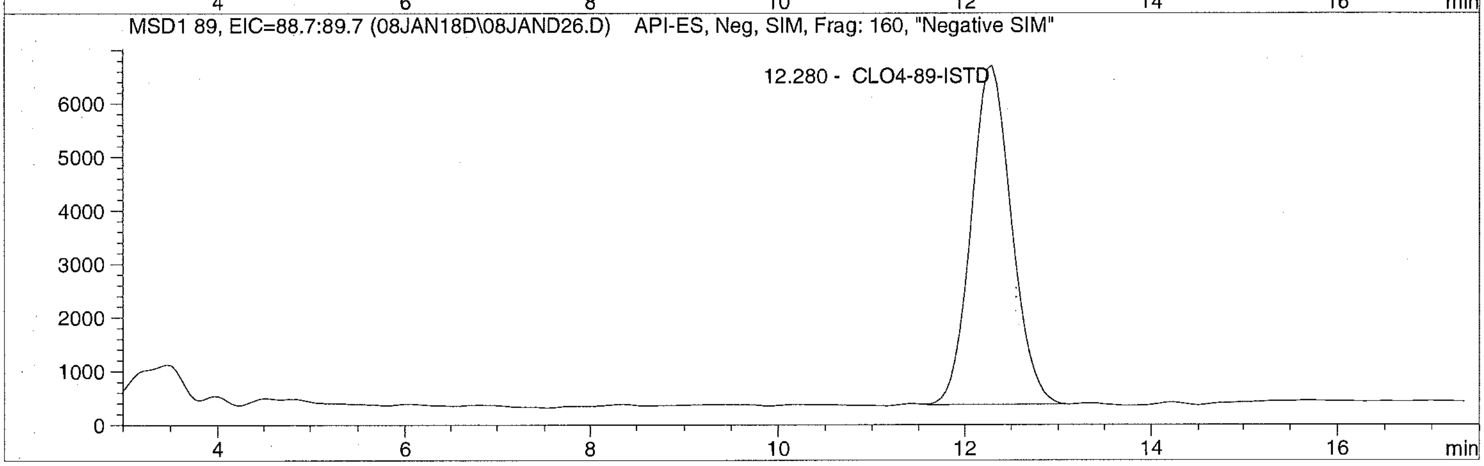
Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

===







Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D   Sample Name: 582609   LODV@1.

Injection Date: 1/08/2018 16:21:37 | Seq Line: 26
Sample Name: 582609 LODV@1. | Location: Vial 72
Acq Operator: TNB | Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.259	MM	40806.9	1.0183	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.270	MM	16046.3	1.0109	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.280	BBA	189512.5	5.0000	CLO4-89-ISTD

*** End of Report ***

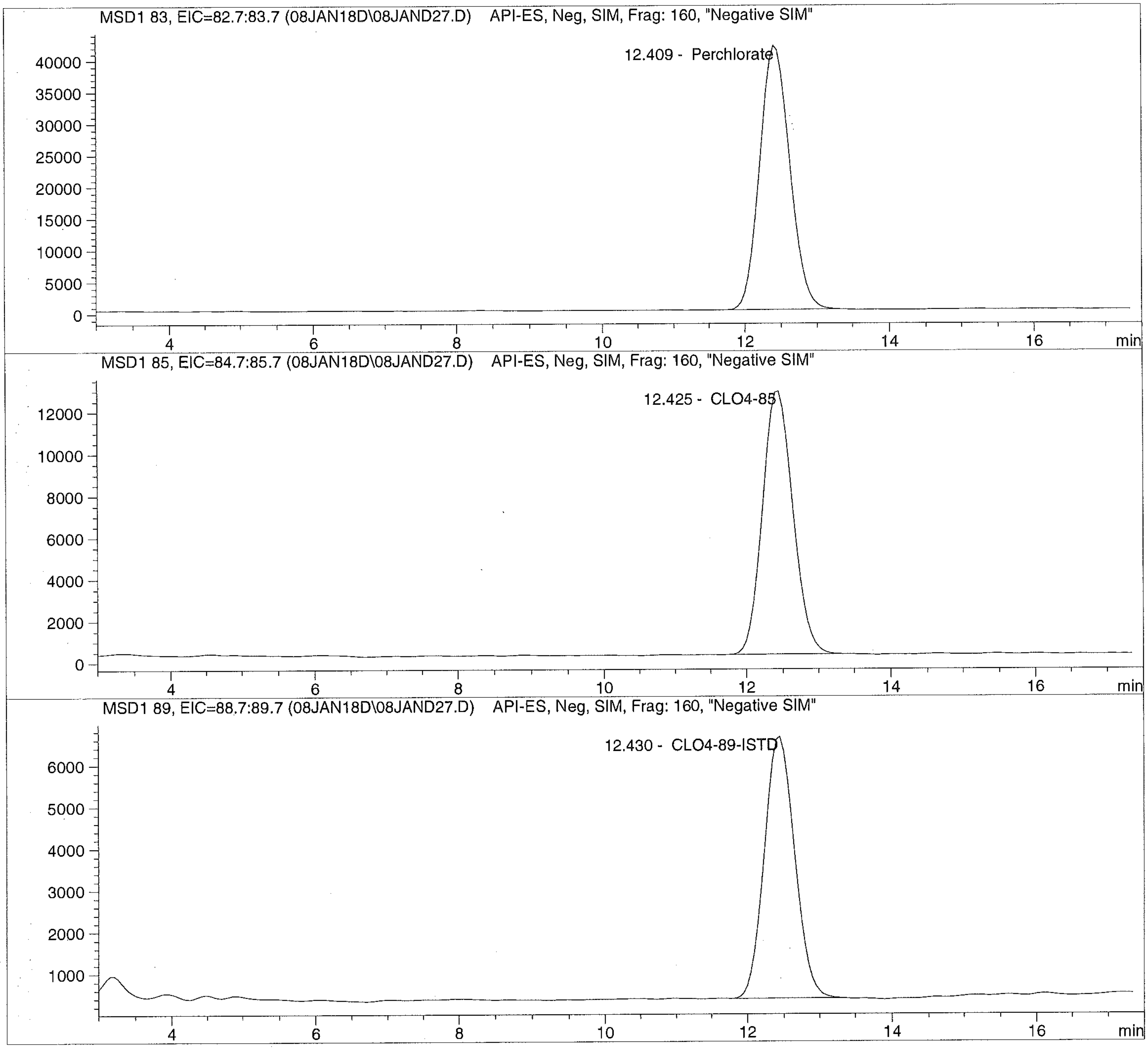
===

Injection Date:	1/08/2018 16:40:46	Seq Line:	27
Sample Name:	582608 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

===



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND27.D   Sample Name: 582608   CCV@25

Injection Date:	1/08/2018 16:40:46	Seq Line:	27
Sample Name:	582608 CCV@25	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.409	PBA	1190044.5	26.6371	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.425	PBA	365901.1	26.0386	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.430	PBA	181695.7	5.0000	CLO4-89-ISTD

*** End of Report ***

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Initial Calibration

ethod C:\HPCHEM\1\METHODS\CLO4-DPR.M

Calibration Table

Perchlorate

```
Calib. Data Modified  :      11/29/2017 8:02:06 AM

Calculate             :      Internal Standard
Based on              :      Peak Area

Rel. Reference Window :     20.000 %
Abs. Reference Window :      0.000 min
Rel. Non-ref. Window  :     20.000 %
Abs. Non-ref. Window  :      0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks    :      not reported
Partial Calibration   :      No recalibration if peaks missing

Curve Type            :      Quadratic (some peaks differ, see below)
Origin                :      Ignored (some peaks differ, see below)
Weight                :      Linear (Amnt) (some peaks differ, see below)

Recalibration Settings:
Average Response      :      Average all calibrations
Average Retention Time:      Floating Average New 75%

Calibration Report Options :
    Printout of recalibrations within a sequence:
        Calibration Table after Recalibration
        Normal Report after Recalibration
    If the sequence is done with bracketing:
        Results of first cycle (ending previous bracket)

Default Sample ISTD Information (if not set in sample table):
```

ISTD #	ISTD Amount	Name
1	5.00000	CLO4-89-ISTD

Signal 1: MSD1 83, EIC=82.7:83.7
Signal 2: MSD1 85, EIC=84.7:85.7
Signal 3: MSD1 89, EIC=88.7:89.7

RetTime [min]	Lvl Sig		Amount	Area	Amt/Area	Ref	Grp	Name
12.090	1	1	1.00000	4.10942e4	2.43343e-5	1		Perchlorate
		2	2.00000	7.74077e4	2.58372e-5			
		3	5.00000	1.92985e5	2.59088e-5			
		4	10.00000	3.91583e5	2.55374e-5			
		5	25.00000	1.09763e6	2.27764e-5			
		6	50.00000	2.29834e6	2.17549e-5			
		7	75.00000	3.73021e6	2.01061e-5			
12.106	2	1	1.00000	1.56787e4	6.37808e-5	1		CLO4-85
		2	2.00000	2.80487e4	7.13046e-5			
		3	5.00000	6.51323e4	7.67668e-5			
		4	10.00000	1.31325e5	7.61471e-5			
		5	25.00000	3.46913e5	7.20642e-5			
		6	50.00000	6.96156e5	7.18230e-5			
		7	75.00000	1.13077e6	6.63264e-5			
12.107	3	1	5.00000	1.88880e5	2.64718e-5	+I1		CLO4-89-ISTD
		2	5.00000	1.81109e5	2.76076e-5			
		3	5.00000	1.75128e5	2.85505e-5			
		4	5.00000	1.80962e5	2.76301e-5			
		5	5.00000	1.75597e5	2.84743e-5			
		6	5.00000	1.69148e5	2.95599e-5			
		7	5.00000	1.64867e5	3.03275e-5			

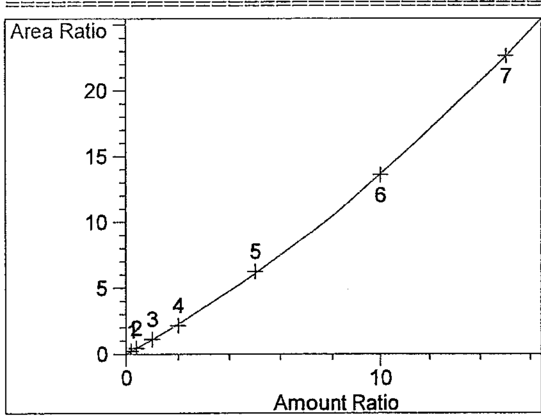
More compound-specific settings:

```
Compound: Perchlorate
  Time Window                : From 8.390 min To 13.052 min
  Curve Type                 : Quadratic
  Origin                     : Ignored
  Calibration Level Weights:/
    Level 1                  : 1
    Level 2                  : 0.5
    Level 3                  : 0.2
    Level 4                  : 0.1
    Level 5                  : 0.04
    Level 6                  : 0.02
    Level 7                  : 0.013333

Compound: CLO4-85
  Time Window                : From 8.366 min To 13.046 min
  Curve Type                 : Quadratic
  Origin                     : Ignored
  Calibration Level Weights:/
    Level 1                  : 1
    Level 2                  : 0.5
    Level 3                  : 0.2
    Level 4                  : 0.1
    Level 5                  : 0.04
    Level 6                  : 0.02
    Level 7                  : 0.013333

Compound: CLO4-89-ISTD
  Time Window                : From 8.457 min To 13.107 min
  Curve Type                 : Linear
  Origin                     : Included
  Calibration Level Weights:/
    Level 1                  : 1
    Level 2                  : 1
    Level 3                  : 1
    Level 4                  : 1
    Level 5                  : 1
    Level 6                  : 1
    Level 7                  : 1
```

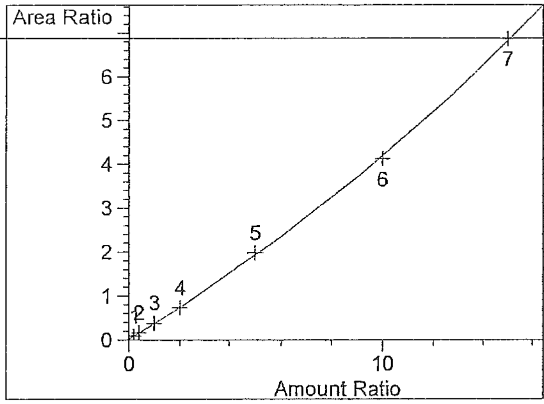
Peak Sum Table

No Entries in table

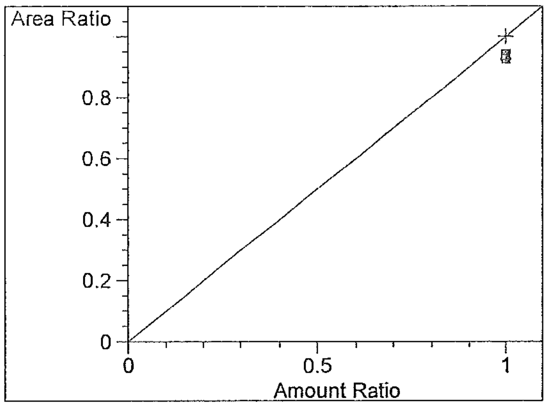
Calibration Curves




```
Perchlorate at exp. RT: 12.090
MSD1 83, EIC=82.7:83.7
Correlation:              0.99991
Residual Std. Dev.:       0.08487
Formula: y = ax² + bx + c
      a:       2.87739e-2
      b:       1.07712
      c:      -5.23718e-3
      x: Amount Ratio
      y: Area Ratio
Calibration Level Weights:
    Level 1    : 1
    Level 2    : 0.5
    Level 3    : 0.2
    Level 4    : 0.1
    Level 5    : 0.04
    Level 6    : 0.02
    Level 7    : 0.013333
```



CLO4-85 at exp. RT: 12.106
MSD1 85, EIC=84.7:85.7
Correlation: 0.99988
Residual Std. Dev.: 0.04548
Formula: y = ax² + bx + c
a: 7.12800e-3
b: 3.46840e-1
c: 1.42573e-2
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 0.5
Level 3 : 0.2
Level 4 : 0.1
Level 5 : 0.04
Level 6 : 0.02
Level 7 : 0.013333



CLO4-89-ISTD at exp. RT: 12.107
MSD1 89, EIC=88.7:89.7
Correlation: 1.00000
Residual Std. Dev.: 0.00000
Formula: y = mx + b
m: 1.00000
b: 0.00000
x: Amount Ratio
y: Area Ratio
Calibration Level Weights:
Level 1 : 1
Level 2 : 1
Level 3 : 1
Level 4 : 1
Level 5 : 1
Level 6 : 1
Level 7 : 1

==

Batch Report: C:\HPCHEM\1\DATA\28NOV17P\28NOV17P.B

Batch Review Method:
C:\HPCHEM\1\METHODS\CLO4-DPR.M

['#' ==> Run has not been reprocessed with Batch Review Method
'*' ==> Run has been saved with batch file]

#*	Sample	Location	Inj	SampleType	Run	Perchlorate Area	Perchlorate RT	Perchlorate Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	4.10942e4	12.029	1.02861
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	7.74077e4	12.054	1.98725
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	1.92985e5	12.090	5.00575
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	3.91583e5	12.084	9.57892
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	1.09763e6	12.065	25.55231
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	2.29834e6	12.065	49.83164
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	3.73021e6	12.090	74.99992
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	3.83615e5	12.163	9.59533

#*	Sample	Location	Inj	SampleType	Run	CLO4-85 Area	CLO4-85 RT	CLO4-85 Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	1.56787e4	12.053	9.87106e-1
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	2.80487e4	12.066	2.01046
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	6.51323e4	12.106	5.05104
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	1.31325e5	12.101	9.85678
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	3.46913e5	12.084	25.58435
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	6.96156e5	12.080	49.18282
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	1.13077e6	12.106	75.33907
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	1.31460e5	12.177	10.08554

#*	Sample	Location	Inj	SampleType	Run	CLO4-89-ISTD Area	CLO4-89-ISTD RT	CLO4-89-ISTD Amount
*	ICAL1@ 1.0ug/L	Vial 71	1	Control	1	1.88880e5	12.050	5.00000
*	ICAL2@ 2.0ug/L	Vial 72	1	Control	2	1.81109e5	12.078	5.00000
*	ICAL3@ 5.0ug/L	Vial 73	1	Control	3	1.75128e5	12.110	5.00000
*	ICAL4@ 10.ug/L	Vial 74	1	Control	4	1.80962e5	12.109	5.00000
*	ICAL5@ 25.ug/L	Vial 75	1	Control	5	1.75597e5	12.084	5.00000
*	ICAL6@ 50.ug/L	Vial 76	1	Control	6	1.69148e5	12.086	5.00000
*	ICAL7@ 75.ug/L	Vial 77	1	Control	7	1.64867e5	12.107	5.00000
*	ICAL Verf@10ug/L	Vial 78	1	Control	8	1.76961e5	12.181	5.00000

*** End of Report ***

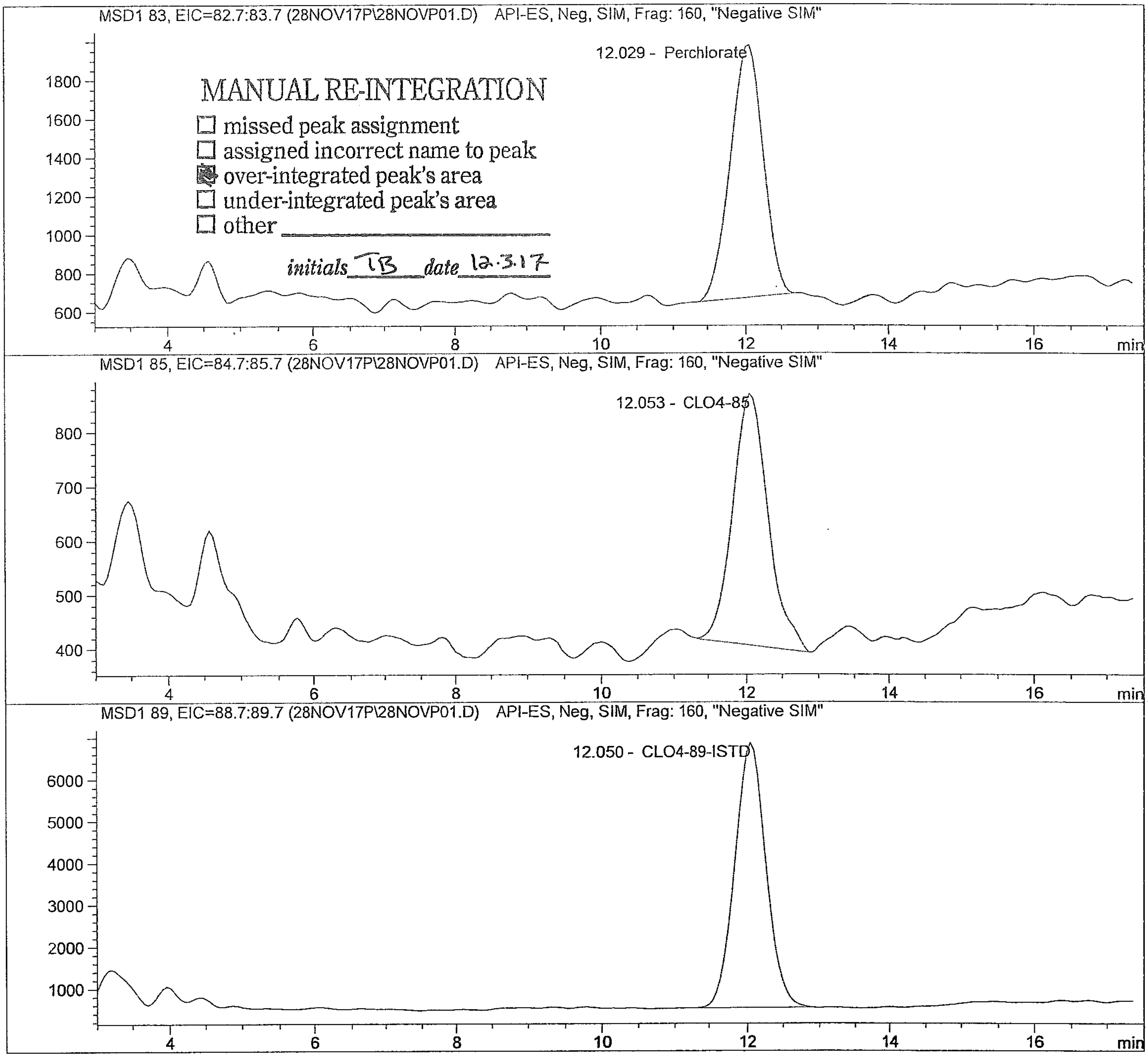
Sequence: C:\HPCHEM\1\SEQUENCE\CLO4\2017\NOV\28NOV17P.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 71	ICAL1@ 1.0ug/L	CLO4-DOD	1	Ctrl Samp		
2	Vial 72	ICAL2@ 2.0ug/L	CLO4-DOD	1	Ctrl Samp		
3	Vial 73	ICAL3@ 5.0ug/L	CLO4-DOD	1	Ctrl Samp		
4	Vial 74	ICAL4@ 10.ug/L	CLO4-DOD	1	Ctrl Samp		
5	Vial 75	ICAL5@ 25.ug/L	CLO4-DOD	1	Ctrl Samp		
6	Vial 76	ICAL6@ 50.ug/L	CLO4-DOD	1	Ctrl Samp		
7	Vial 77	ICAL7@ 75.ug/L	CLO4-DOD	1	Ctrl Samp		
8	Vial 78	ICAL Verf@10ug/L	CLO4-DOD	1	Ctrl Samp		

```
Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP01.D        Sample Name: ICAL1@ 1.0ug/L
=====================================================================================
Injection Date:     11/28/2017 09:08:10          Seq Line:             1
Sample Name:        ICAL1@ 1.0ug/L               Location:          Vial 71
Acq Operator:       TNB                          Inj. No.:             1
                                                 Inj. Vol.:          25 µl

Acq. Method:        CLO4-DOD.M
Analysis Method:    C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:       12/3/2017  11:06:36

Perchlorate analysis
=====================================================================================
```



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	11/28/2017 09:08:10	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.029	MM	41094.2	1.0286	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.053	BBA	15678.7	0.9871	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.050	BBA	188880.3	5.0000	CLO4-89-ISTD

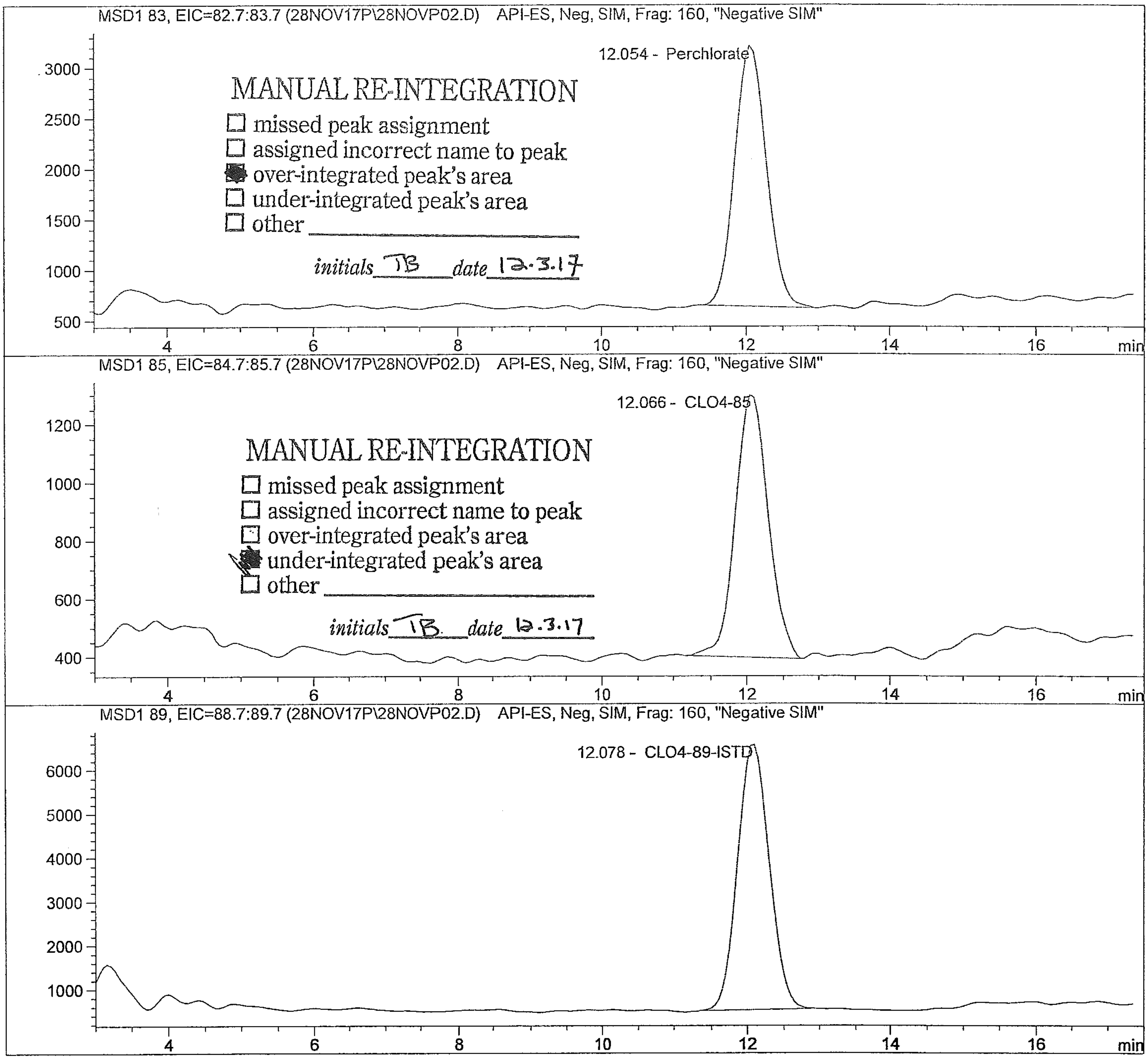
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	11/28/2017 09:33:49	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	11/28/2017 09:33:49	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Wed, 29. Nov. 2017,08:02:06 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.054	MM	77407.7	1.9872	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.066	MM	28048.7	2.0105	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.078	PBA	181109.4	5.0000	CLO4-89-ISTD

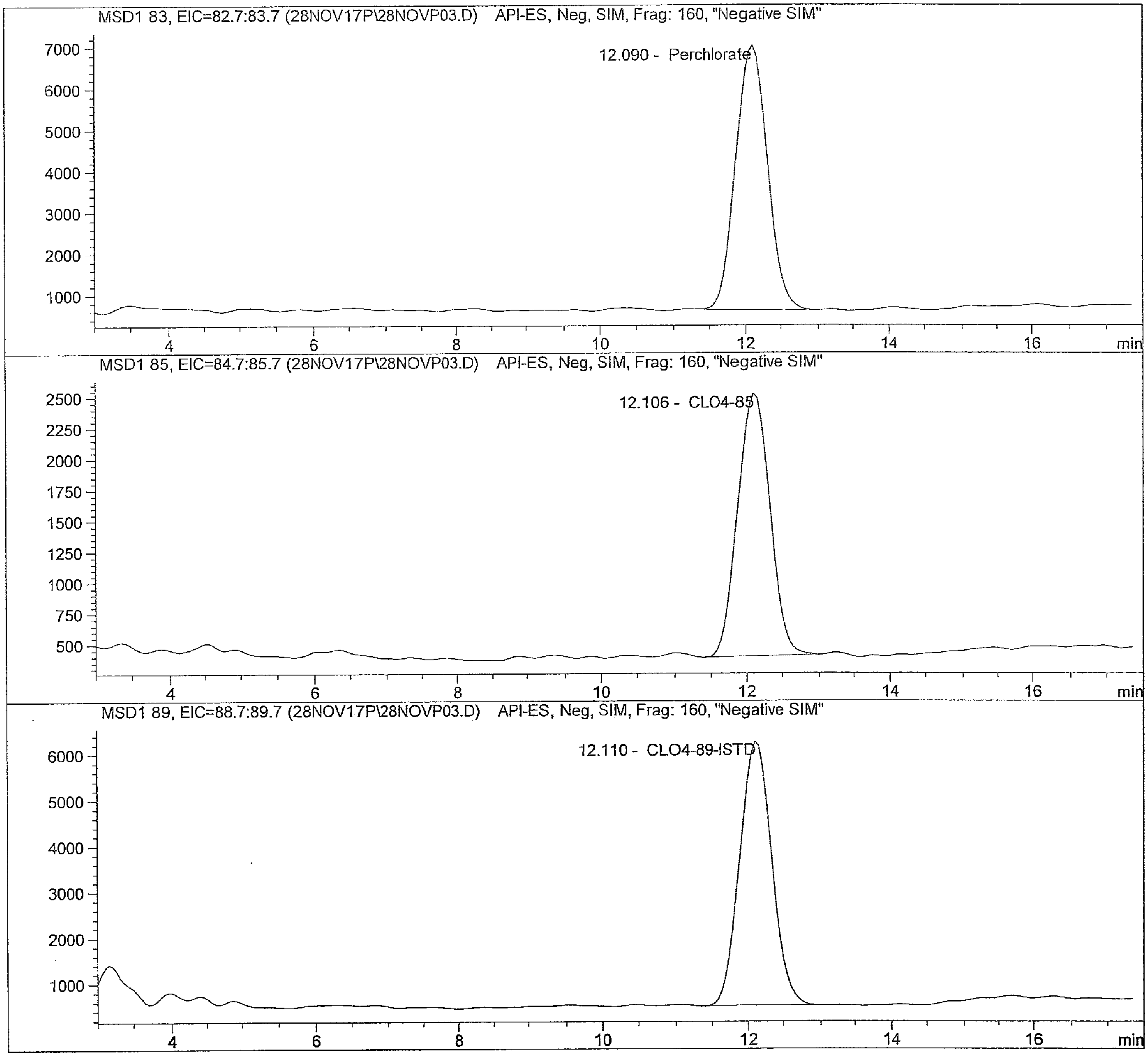
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP03.D   Sample Name: ICAL3@ 5.0ug/L

Injection Date:	11/28/2017 09:53:00	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP03.D   Sample Name: ICAL3@ 5.0ug/L

Injection Date:	11/28/2017 09:53:00	Seq Line:	3
Sample Name:	ICAL3@ 5.0ug/L	Location:	Vial 73
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 5.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.090	BBA	192984.6	5.0058	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.106	PBA	65132.3	5.0510	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.110	PBA	175128.5	5.0000	CLO4-89-ISTD

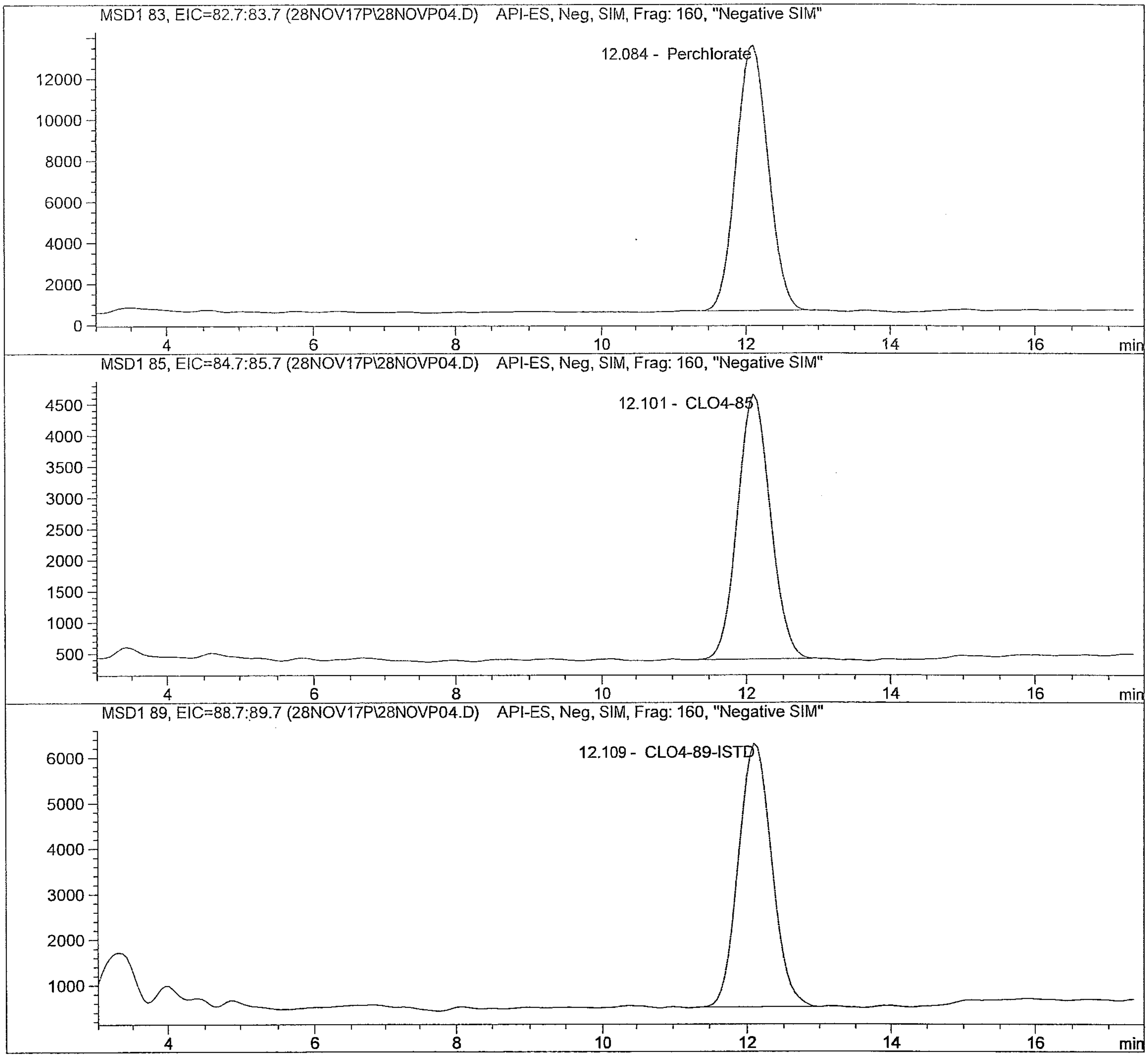
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP04.D   Sample Name: ICAL4@ 10.ug/L

Injection Date:	11/28/2017 10:12:13	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP04.D Sample Name: ICAL4@ 10.ug/L

Injection Date:	11/28/2017 10:12:13	Seq Line:	4
Sample Name:	ICAL4@ 10.ug/L	Location:	Vial 74
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.084	BBA	391582.9	9.5789	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.101	PBA	131324.7	9.8568	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.109	PBA	180962.1	5.0000	CLO4-89-ISTD

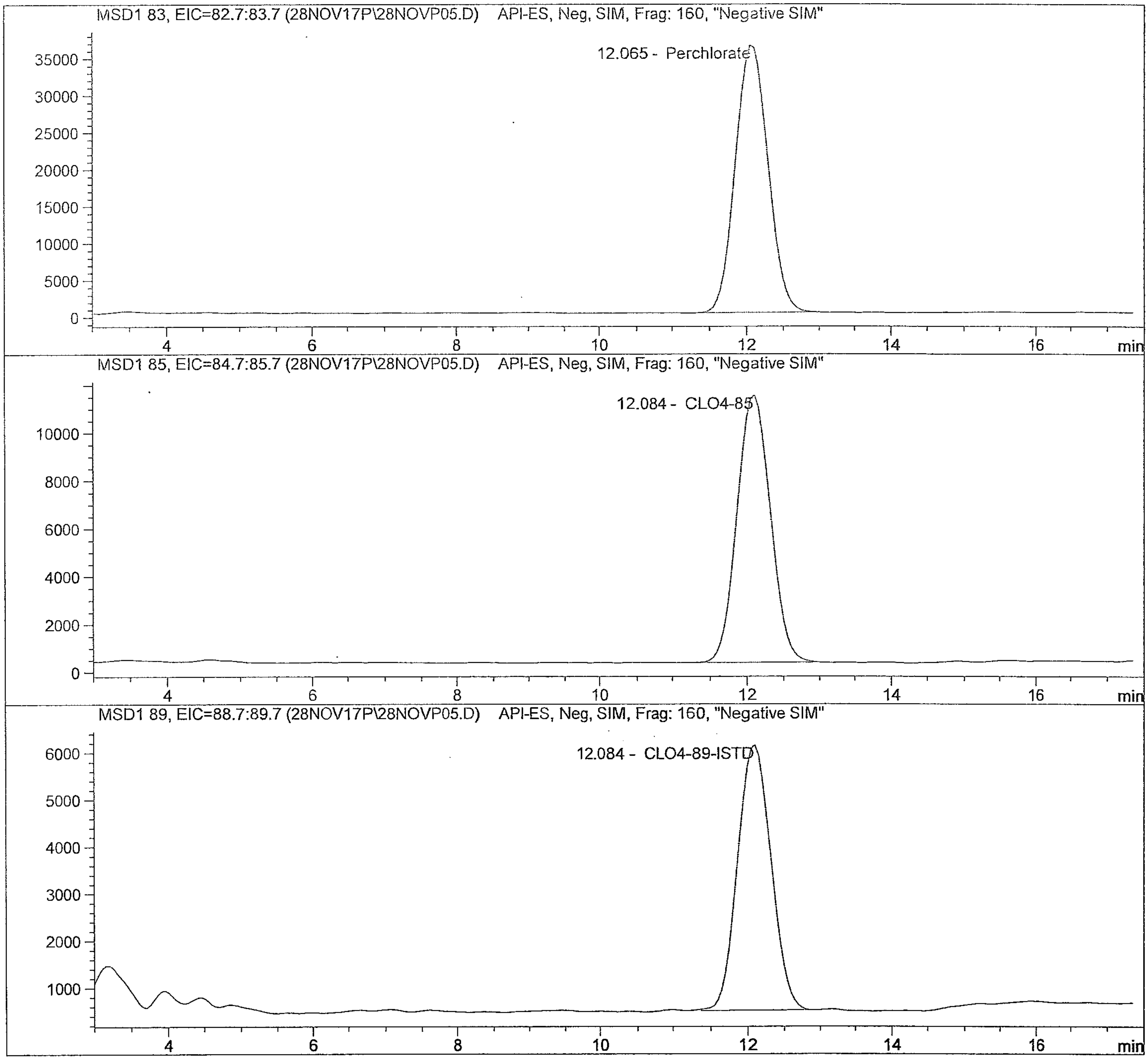
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	11/28/2017 10:31:23	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP05.D Sample Name: ICAL5@ 25.ug/L

Injection Date:	11/28/2017 10:31:23	Seq Line:	5
Sample Name:	ICAL5@ 25.ug/L	Location:	Vial 75
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.065	PBA	1097625.1	25.5523	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

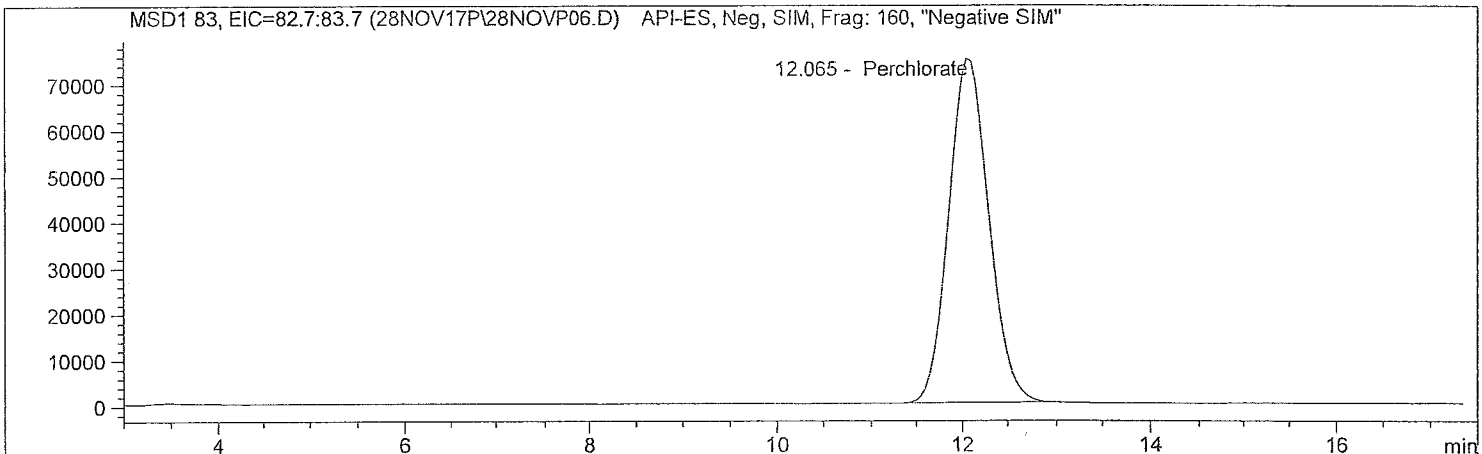
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.084	PBA	346912.7	25.5843	CLO4-85

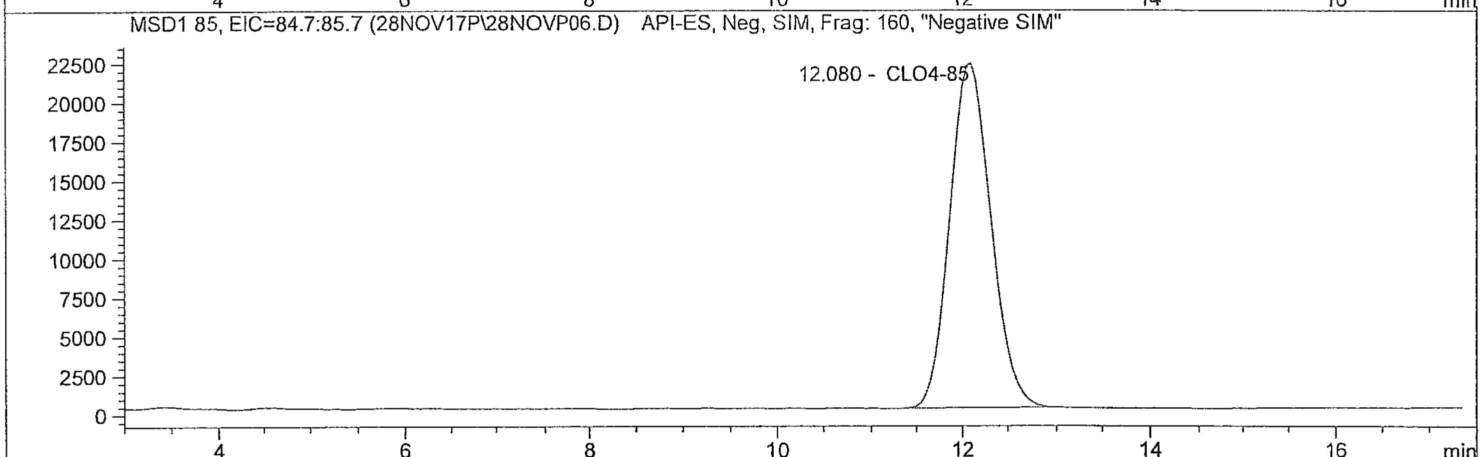
Signal3: MSD1 89, EIC=88.7:89.7

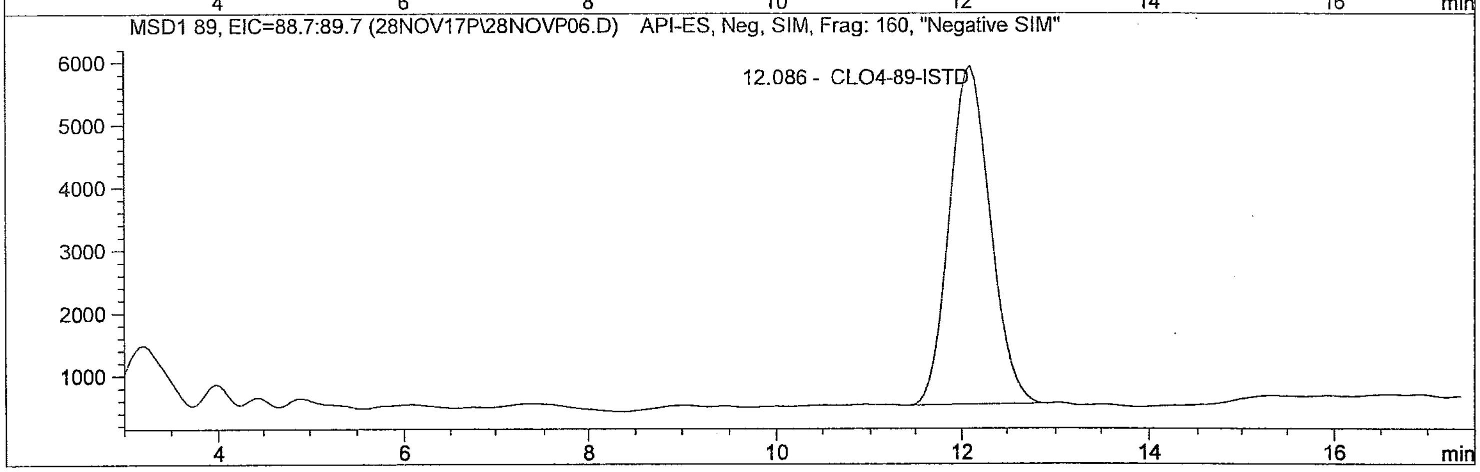
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.084	BBA	175597.1	5.0000	CLO4-89-ISTD

*** End of Report ***

```
Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP06.D        Sample Name: ICAL6@ 50.ug/L
=====================================================================================
Injection Date:    11/28/2017 10:50:33               Seq Line:            6
Sample Name:       ICAL6@ 50.ug/L                    Location:       Vial 76
Acq Operator:      TNB                               Inj. No.:            1
                                                     Inj. Vol.:        25 µl

Acq. Method:       CLO4-DOD.M
Analysis Method:   C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:      12/3/2017  11:06:36

Perchlorate analysis
=====================================================================================
```







Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP06.D Sample Name: ICAL6@ 50.ug/L

Injection Date:	11/28/2017 10:50:33	Seq Line:	6
Sample Name:	ICAL6@ 50.ug/L	Location:	Vial 76
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 50.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.065	BBA	2298336.2	49.8316	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.080	PBA	696155.7	49.1828	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.086	PBA	169148.1	5.0000	CLO4-89-ISTD

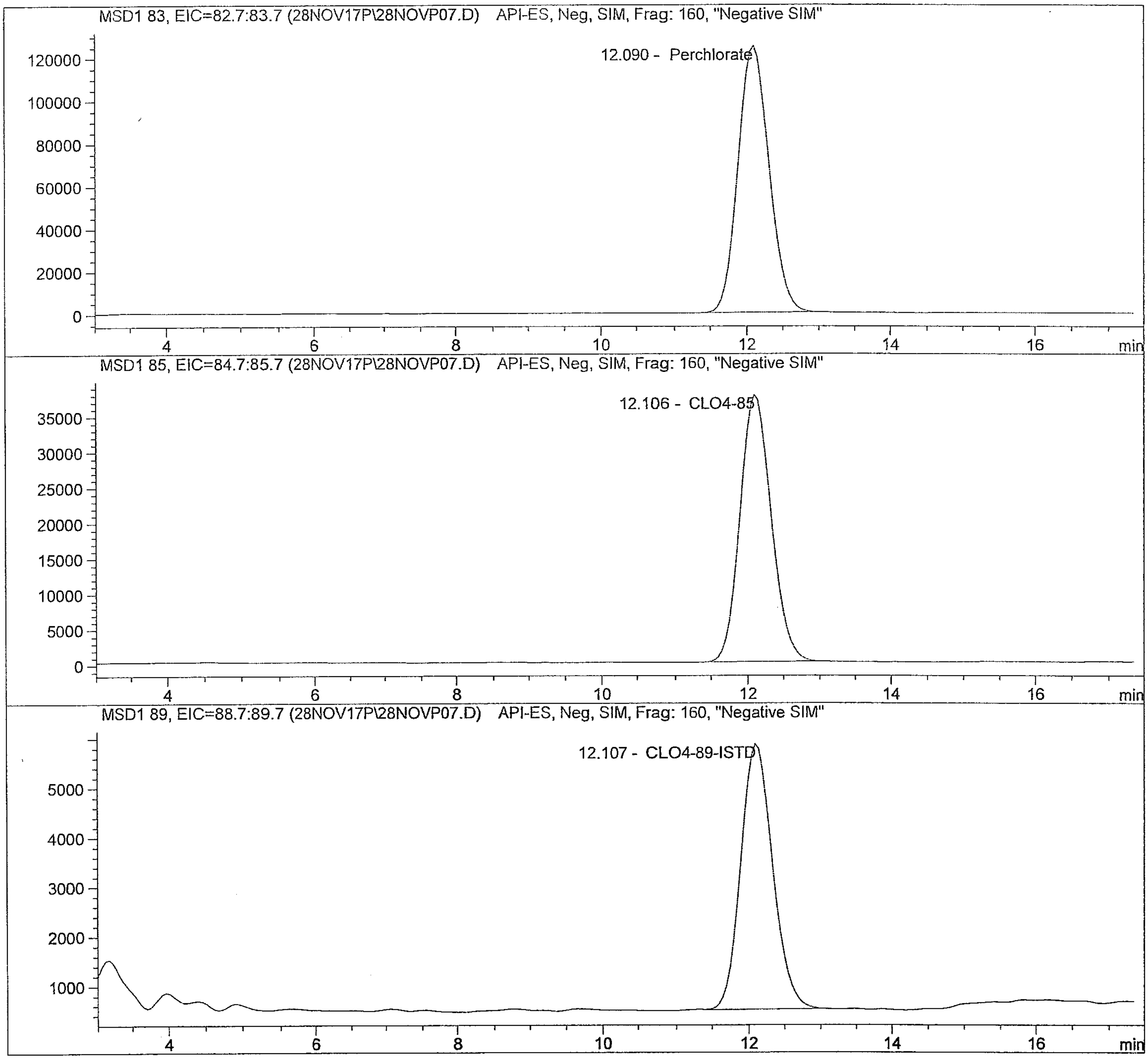
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP07.D   Sample Name: ICAL7@ 75.ug/L

Injection Date:	11/28/2017 11:09:43	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP07.D Sample Name: ICAL7@ 75.ug/L

Injection Date:	11/28/2017 11:09:43	Seq Line:	7
Sample Name:	ICAL7@ 75.ug/L	Location:	Vial 77
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017, 08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 75.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.090	PBA	3730211.3	74.9999	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.106	PBA	1130772.0	75.3391	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.107	BBA	164866.7	5.0000	CLO4-89-ISTD

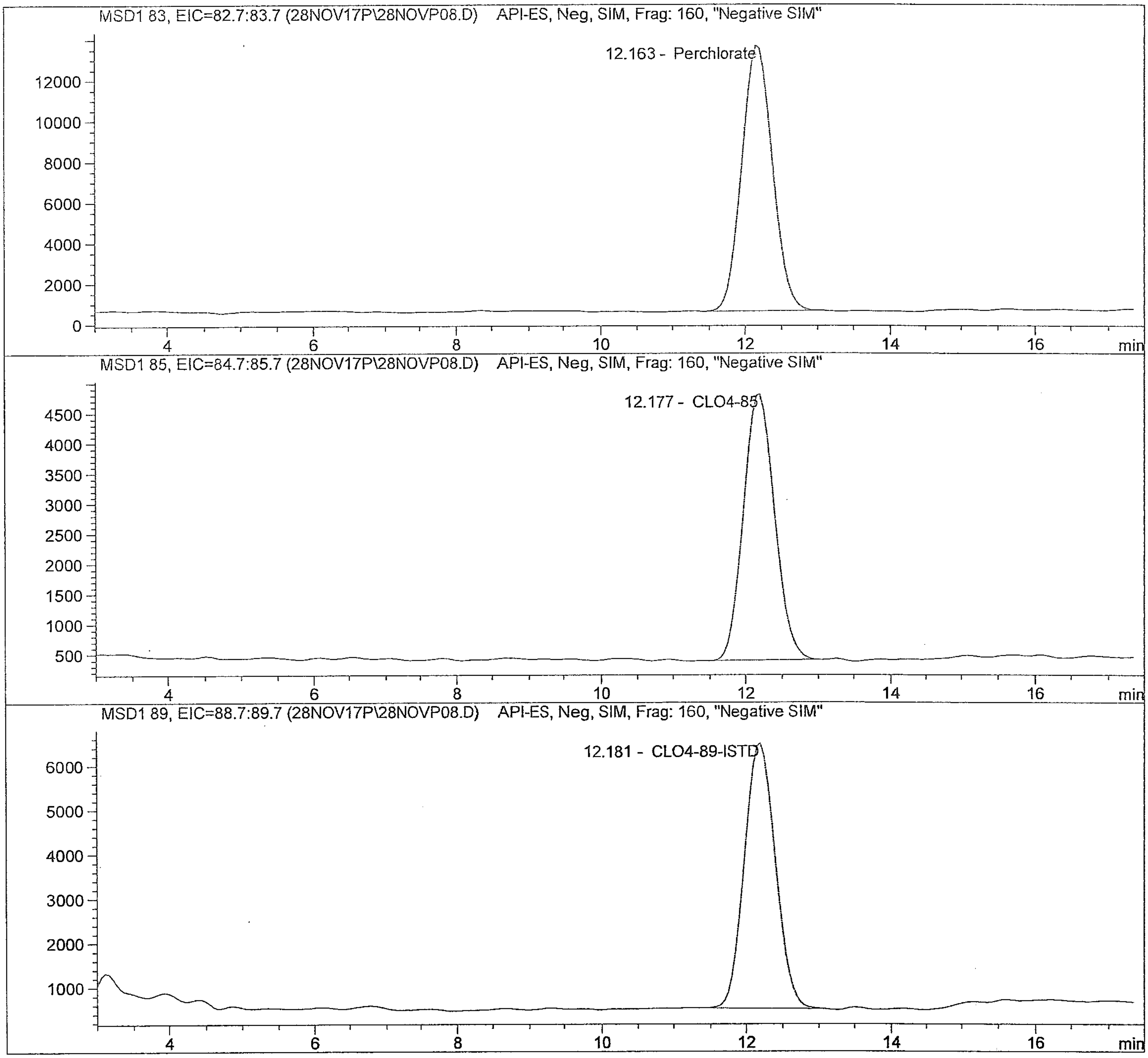
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP08.D   Sample Name: ICAL Verf@10ug/L

Injection Date:	11/28/2017 11:28:53	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP08.D Sample Name: ICAL Verf@10ug/L

Injection Date:	11/28/2017 11:28:53	Seq Line:	8
Sample Name:	ICAL Verf@10ug/L	Location:	Vial 78
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By:	Signal
Calib. Data Modified:	Wed, 29. Nov. 2017,08:02:06 am
Multiplier:	1.000000
Dilution:	1.000000
Sample Amount:	10.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.163	PBA	383615.2	9.5953	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.177	PBA	131459.5	10.0855	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.181	BBA	176961.2	5.0000	CLO4-89-ISTD

*** End of Report ***

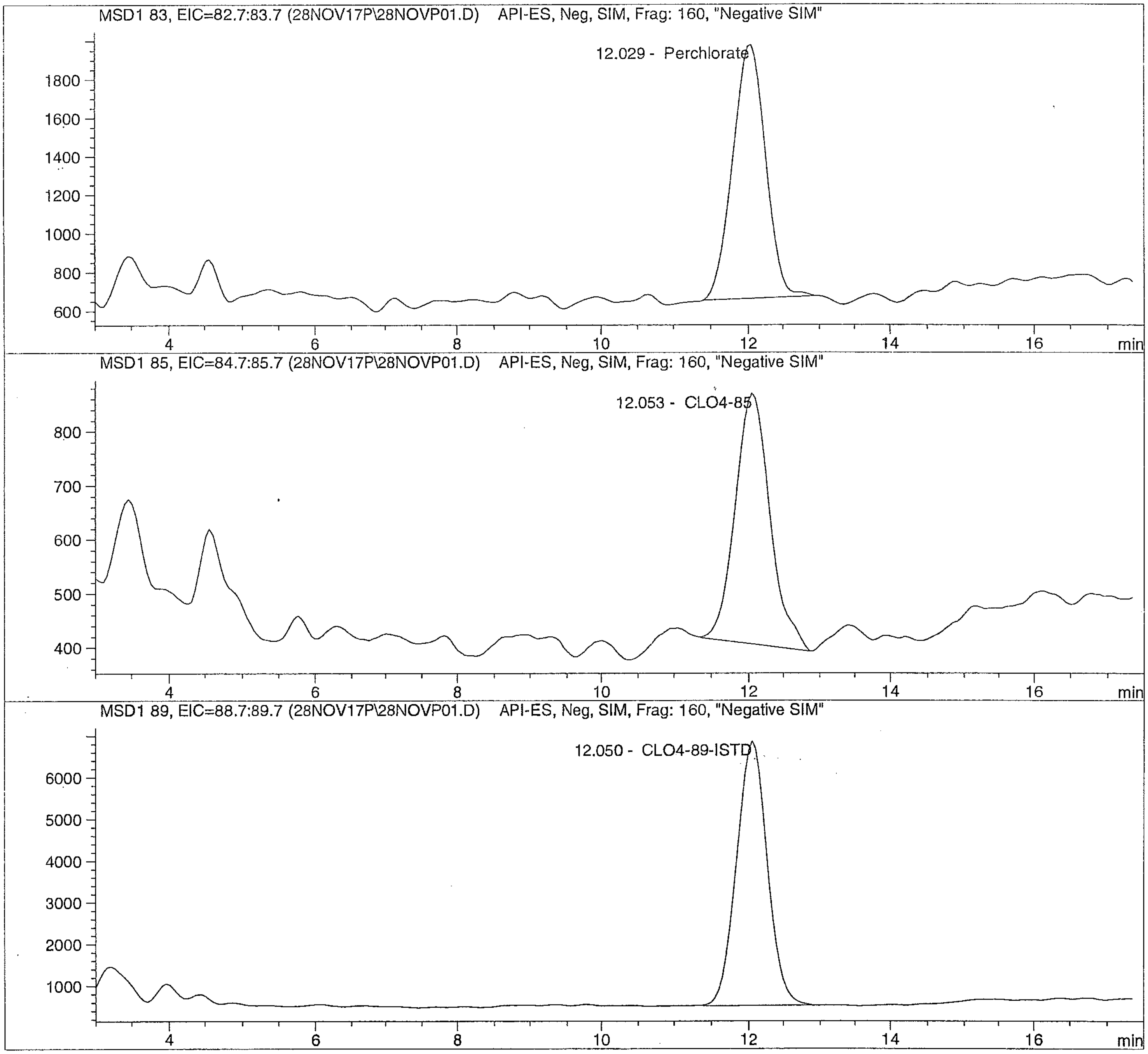
ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Raw Data

Unmodified

```
Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP01.D        Sample Name: ICAL1@ 1.0ug/L
=====================================================================================
Injection Date:    11/28/2017 09:08:10          Seq Line:             1
Sample Name:       ICAL1@ 1.0ug/L                Location:        Vial 71
Acq Operator:      TNB                          Inj. No.:             1
                                                Inj. Vol.:          25 µl

Acq. Method:       CLO4-DOD.M
Analysis Method:   C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:      12/3/2017   11:06:36

Perchlorate analysis
=====================================================================================
```



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP01.D Sample Name: ICAL1@ 1.0ug/L

Injection Date:	11/28/2017 09:08:10	Seq Line:	1
Sample Name:	ICAL1@ 1.0ug/L	Location:	Vial 71
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.029	BBA	42017.4	1.0510	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.053	BBA	15678.7	0.9871	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.050	BBA	188880.3	5.0000	CLO4-89-ISTD

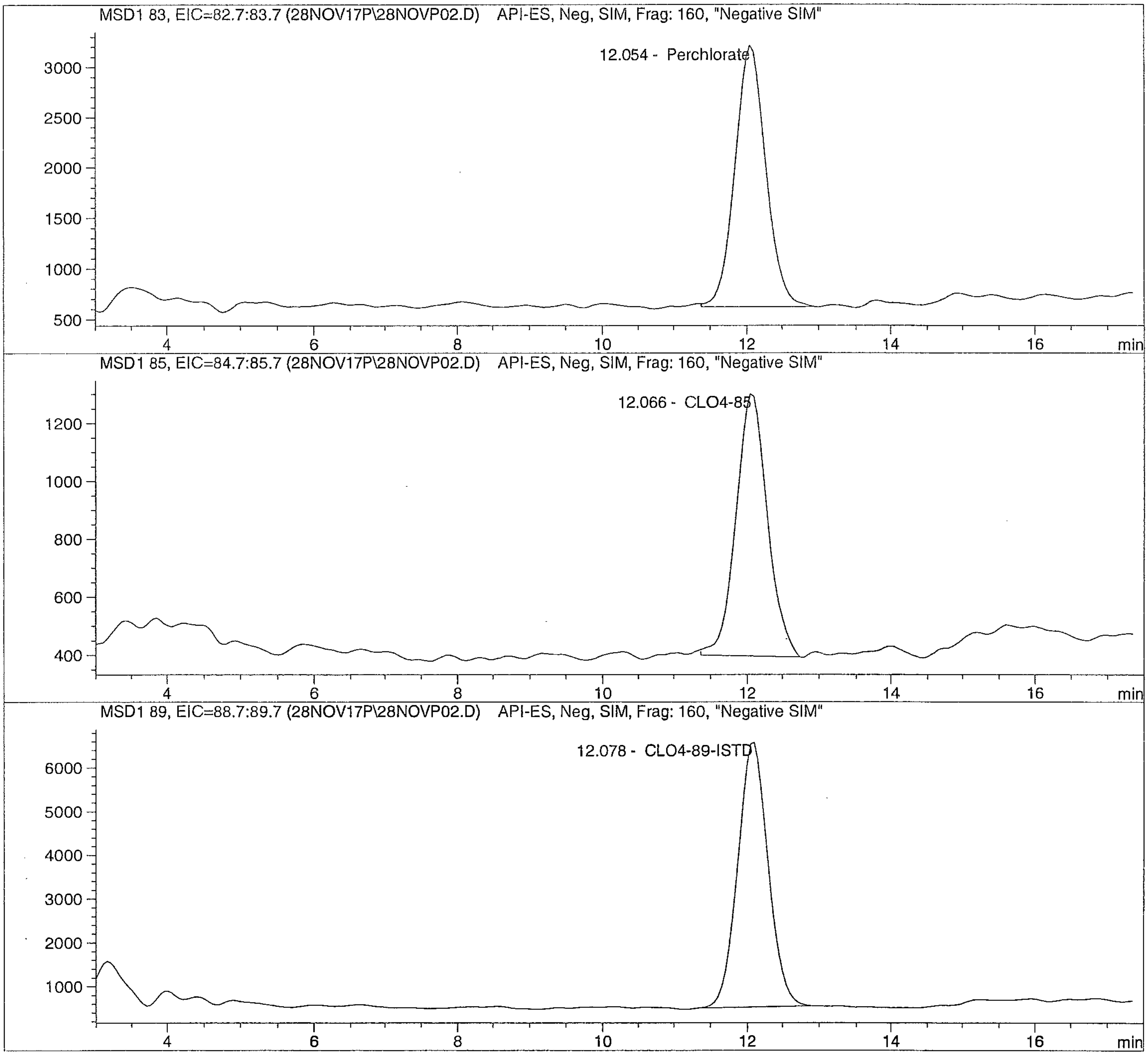
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP02.D Sample Name: ICAL2@ 2.0ug/L

Injection Date:	11/28/2017 09:33:49	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP02.D   Sample Name: ICAL2@ 2.0ug/L

Injection Date:	11/28/2017 09:33:49	Seq Line:	2
Sample Name:	ICAL2@ 2.0ug/L	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/3/2017 11:06:36

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 29. Nov. 2017,08:02:06 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 2.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.054	BBA	78519.1	2.0151	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.066	BBA	28009.6	2.0074	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.078	PBA	181109.4	5.0000	CLO4-89-ISTD

*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D   Sample Name: 582600   LODV@1.

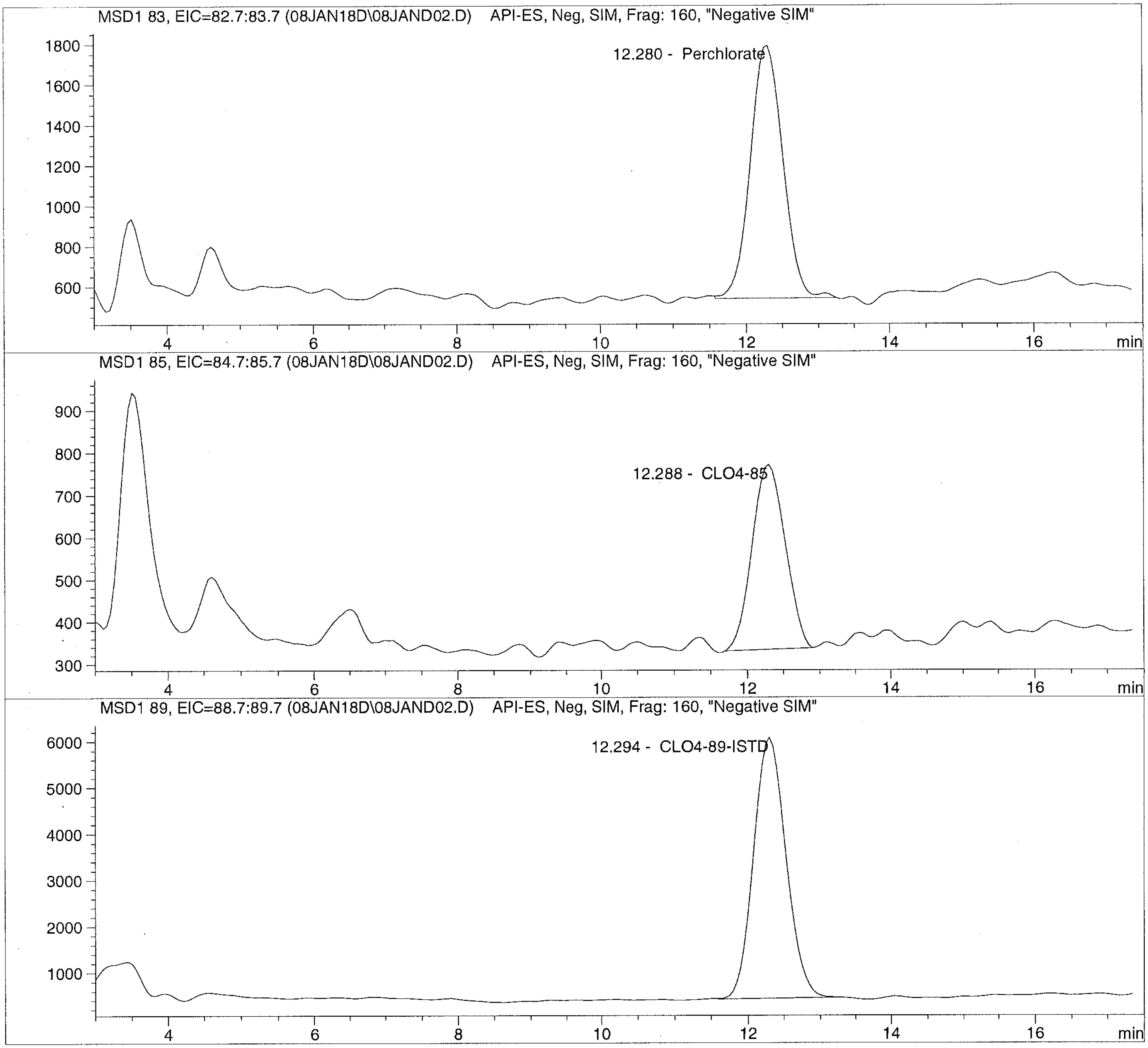
===

Injection Date:	1/08/2018 08:36:51	Seq Line:	2
Sample Name:	582600 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

===



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D Sample Name: 582600 LODV@1.

Injection Date: 1/08/2018 08:36:51 Seq Line: 2
Sample Name: 582600 LODV@1. Location: Vial 72
Acq Operator: TNB Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.280	BBA	39034.0	1.0510	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.288	PBA	13990.1	0.9402	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.294	BBA	175472.0	5.0000	CLO4-89-ISTD

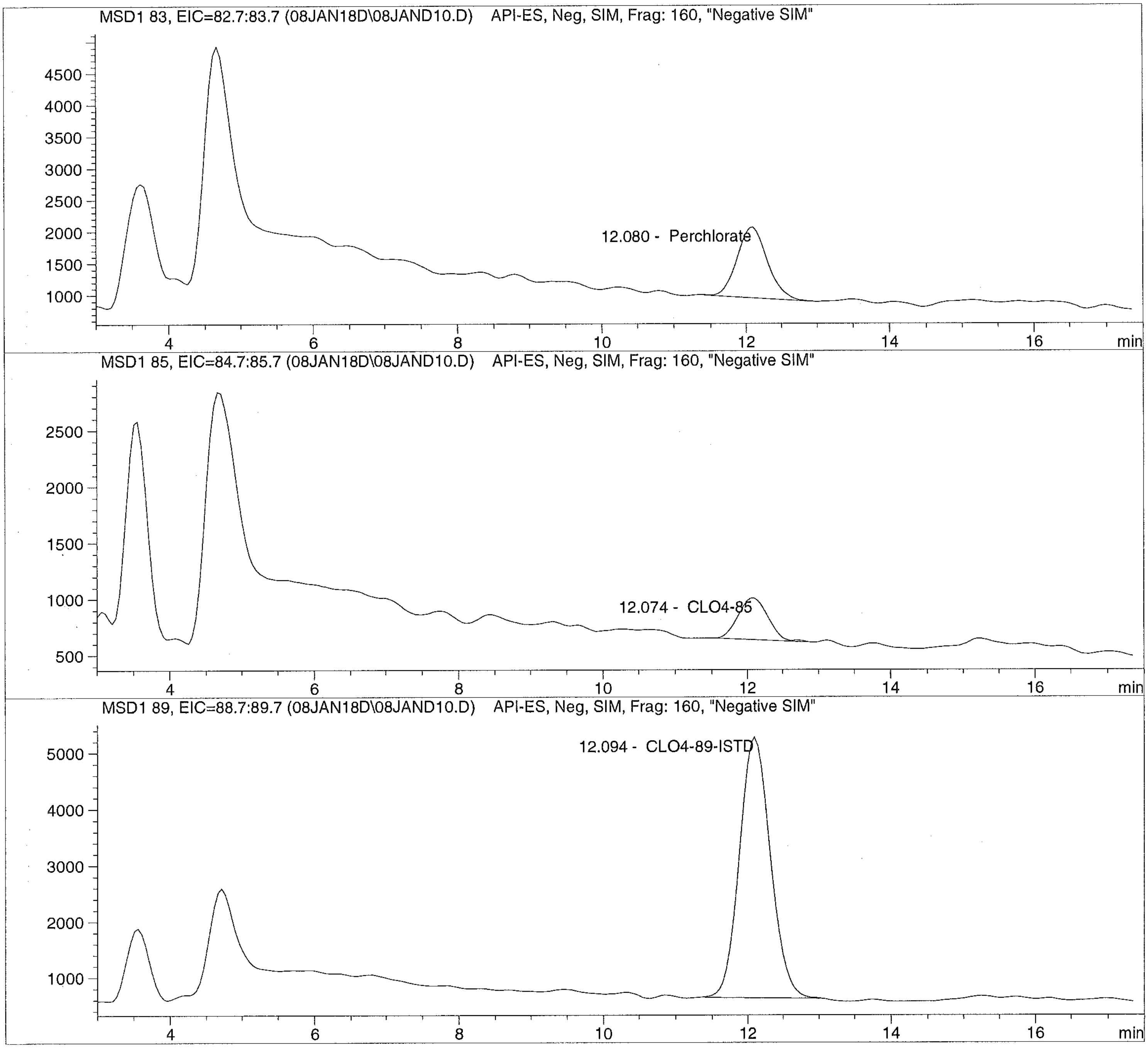
*** End of Report ***

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D Sample Name: 1736221003

Injection Date:	1/08/2018 11:11:49	Seq Line:	10
Sample Name:	1736221003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D   Sample Name: 1736221003

Injection Date:	1/08/2018 11:11:49	Seq Line:	10
Sample Name:	1736221003	Location:	Vial 80
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.080	BBA	33243.2	1.1079	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

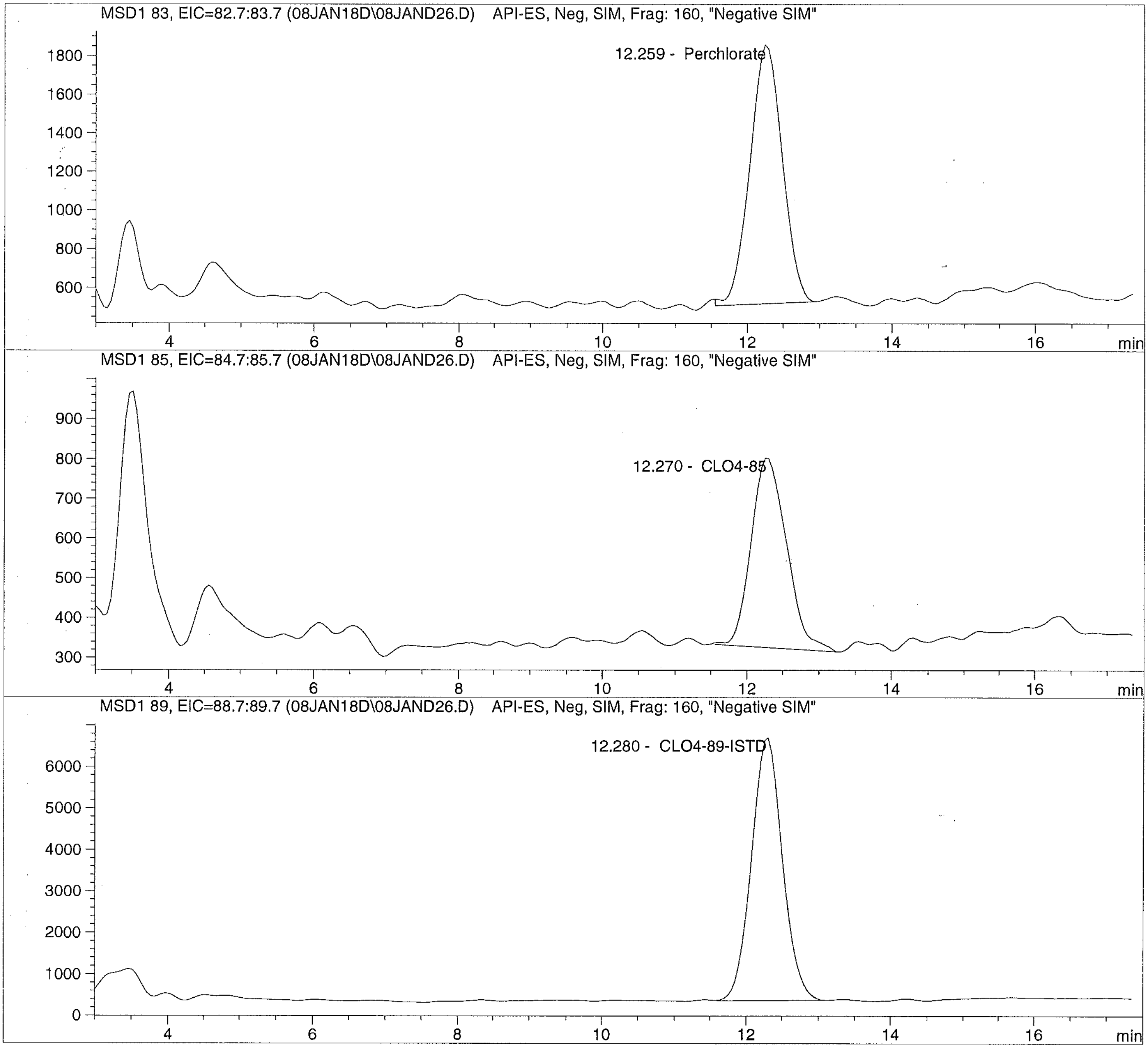
RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.074	PBA	10836.0	0.8947	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.094	BBA	141559.2	5.0000	CLO4-89-ISTD

*** End of Report ***

```
Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D        Sample Name: 582609    LODV@1.
=================================================================================
Injection Date:     1/08/2018   16:21:37               Seq Line:           26
Sample Name:        582609    LODV@1.                  Location:      Vial 72
Acq Operator:       TNB                                Inj. No.:            1
                                                       Inj. Vol.:       25 µl

Acq. Method:        CLO4-DOD.M
Analysis Method:    C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed:       12/20/2017 08:11:26

Perchlorate analysis
=================================================================================
```



Injection Date:	1/08/2018 16:21:37	Seq Line:	26
Sample Name:	582609 LODV@1.	Location:	Vial 72
Acq Operator:	TNB	Inj. No.:	1
		Inj. Vol.:	25 µl

Acq. Method: CLO4-DOD.M
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M
Last Changed: 12/20/2017 08:11:26

Perchlorate analysis

Sample Information

Sorted By: Signal
Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am
Multiplier: 1.000000
Dilution: 1.000000
Sample Amount: 1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.259	BBA	41926.3	1.0454	Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.270	BBA	16347.7	1.0336	CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

RT [min]	Type	Area	Amount [ug/sample]	Compound Name
12.280	BBA	189512.5	5.0000	CLO4-89-ISTD

*** End of Report ***

Subject: **Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **Teleconference; Call-In 515-603-3155 with Code 1063533#**
Date of Meeting: **December 13, 2017 – 10:00 AM CDT**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)
AEC:	Nick Smith (NS)
EPA:	Rich Mayer (RM), Dorelle Harrison (DH), Hayden Crocket, Kent Becher (KB)-USGS Liaison
TCEQ:	April Palmie (AP)
USACE:	Aaron Williams (AW)
Bhate:	Kim Nemmers (KN)
APTIM:	Praveen Srivastav (PS); Susan Watson (SW)
USFWS:	Paul Bruckwicki (PB)

Welcome **RMZ**

Action Items

Army

- Army will provide a schedule of primary document draft submittals following approval of the Project Management Plan. **Ongoing.**
- EPA to provide comments on Standard Operating Procedures (SOPs) previously presented prior to Bhate coming on-board. **Ongoing.**

Bhate/APTIM

- Bhate to provide January dates for LHAAP-17 Pre-Design Investigation (PDI) activities by December 21, 2017.

EPA

- Surface water samplers were deployed on December 12, 2017.
- Comments on the SOPs were discussed. EPA has not provided comments and had understood that comments would be provided once the Draft Installation Wide Work Plan (IWWP) was released. KN requested the comments as soon as possible to incorporate the comments into the IWWP ahead of their review.

TCEQ

- No outstanding action items.

AEC

- The Army Engineer Research and Development Center (ERDC) is ready to train Bhate field personnel on the protocol for perchlorate analysis. AW asked if Bhate had completed the sampling requested by ERDC. KN stated she hadn't seen the request and asked for the email to be sent to her. KN said she would follow up with the field personnel.

USFWS

- No outstanding action items.
- Bridge crew is ready at LHAAP-37 which will allow through access to sites.
- Discussed visiting Star Ranch during January 2018 visit.

Defense Environmental Restoration Program (DERP) PBR Update **Bhate**

KN asked everyone to refer to the Document and Issue (DI) Tracking Table dated December 13, 2017.

- **Task 1** (Project Management)
  - November 2017 MMM Minutes – KN stated that the MMM minutes were issued final on December 6, 2017.
  - IWWP - KN indicated that the document is under Army review and that the December 27, 2017 date listed in the DI Tracking table may not occur with the coming holiday schedules and addressing comments from the Army. AP stated that TCEQ required more than the normal 30 day review of this document due to the IWWP containing the Uniform Federal Policy- Quality Assurance Project Plan (UFP-QAPP). AP stated that a 45 day review by TCEQ is more likely. RM asked if the Army requires UFP-QAPPs; AW stated that the Army has required UFP-QAPPs for several years.
- **Task 2** (LHAAP-02 Semi-Annual Groundwater Monitoring Report) – KN stated that the groundwater sampling event was completed in November 2017. AP requested that the validated data provided ahead of the meeting include a cover sheet as has been done previously. KN stated that she would revise and resend this following the call.
- **Task 3** (LHAAP-03 Record of Decision [ROD] and Explanation of Significant Difference [ESD]) – PS stated the ROD and ESD are currently under Army review.
- **Task 4** (LHAAP-04 Remedial Design [RD]/Remedial Action Work Plan [RAWP]) – PS stated that APTIM is onsite installing the three monitoring wells. Monitoring well installation by Bhate/APTIM was observed at Site LHAAP-04 by the EPA. RM indicated that no tape measure was used while logging the core for the shallow well installation. RM also did not notice, decontamination of the core barrel being performed. He added that while soils were not being analyzed, decontamination should be performed during the well installations but he wasn’t sure what the SOP called for. PS stated that the SOPs would be reviewed and addressed with the field crew.
- **Task 5** (LHAAP-12 Annual Remedial Action – Operation [RA-O] Report) – PS confirmed that groundwater sampling was completed in early December 2017.
- **Task 6** (LHAAP-16 RAWP) – The RAWP for in situ enhanced bioremediation is continuing to be prepared.
- **Task 7** (LHAAP-17 PDI Report) –
  - SW presented preliminary groundwater data from the November 2017 sampling of the monitoring wells at LHAAP-17. SW also stated that three piezometers are in the process of being installed.
  - SW stated that the groundwater flow in the shallow zone is to the west across the site; however, there is a question on the field notes as some water levels were off from what has been observed previously at the site. So, two wells are being resampled and evaluated. In the intermediate zone, the groundwater flow is north-northwest. SW stated that the results for the shallow groundwater are preliminary but are not likely to change. She noted that concentrations appear to be reducing on

the eastern side of the site but are higher on the western side of the site, especially near monitoring well 17WW06. SW presented the request to install a shallow well approximately 45 to 50 feet west of the location presented on Figure 3. SW stated that APTIM would like to install the new monitoring well this week if concurrence could be reached. AP stated she was okay with the proposed monitoring well location; and following further discussion, RM also concurred with the proposed monitoring well location. KB stated that the far eastern well, MW-20 was known to be a perched well and should not be used for determination of potentiometric maps. AP pointed out that it was not used in the development of the contours.

- SW then continued to explain that no contamination was identified in the intermediate zone. There was one dry well that did not previously have contamination. Monitoring well 17WW11 had perchlorate detected but is now non-detect so APTIM is resampling this week to confirm the results. AP stated that she was concerned with where the perchlorate has gone since it didn't break down. AP stated that she was not convinced that a monitoring well was not required. AP stated that the data suggests to her that an intermediate monitoring well northwest of monitoring well 17WW11 is needed. With no official documents to comment on, AP stated that it is difficult to provide input on the intermediate well sampling results. PS stated that the resampling would confirm if the perchlorate was truly not present in the monitoring well and that further discussion regarding installation of a monitoring well into the intermediate zone could occur during the January 2018 MMM.
- RMZ summarized that approval to install a monitoring well in the shallow zone at the proposed location was approved, but further discussion following additional groundwater analysis was needed.
- SW then concluded with the deep aquifer zone, by stating that no impacts were identified, which was expected based upon historical results, and no wells are proposed for the deep zone. There were no comments from the regulators.

- **Task 9** (LHAAP-37) – Groundwater sampling was completed in November 2017 and the validated data will be provided in January 2018.
- **Task 10** (LHAAP-46) – Groundwater sampling is scheduled for February 2018.
- **Task 11** (LHAAP-50 RA-O Reports) – The Year 3 RA-O Report is being prepared and will then be submitted for Army review. Groundwater sampling at LHAAP-50 was completed in November 2017, and the validated data package will be provided in January 2018.
- **Task 12** (LHAAP-58 ESD and RA-O Report) – Groundwater sampling was completed in November 2017. The Year 3 RA-O Report is under Army Review. KN stated that the Revised Final RAWP/RD was issued to the Regulators. RMZ stated that all changes to the Final RAWP/RD were highlighted in yellow so it should be an easy review. RMZ also stated that the title can be changed if a more clear title can be determined. AP stated that she was okay with the title so long as it was known that the document is not truly final at this time.
- **Tasks 14 and 15** (MMRP Sites' RD) – The Land Use Control (LUC) Remedial Designs for LHAAP-001-R-01 and LHAAP-003-R-01 will be provided in the next week. RMZ stated that the recordation had just been sent to Army legal, and she didn't expect a response until early January 2018. RMZ asked AP if sending the document with a preliminary draft recordation would be a problem with TCEQ legal review. AP stated that legal would then have to review both the preliminary draft and the draft so she preferred to wait for the draft

recordation. RMZ then clarified that it would likely be recorded in April 2018 and not in January 2018 as she had hoped. RMZ also stated that this was not an issue.

  - Groundwater sampling was completed in November 2017 and the validated data would be provided with the coversheet following the call.

- **Task 16 (Groundwater Treatment Plant [GWTP])**
  - KN discussed plans to replace the programmable logic control (PLC) system and two air compressors at the plant in January. KN stated that she would have more information for the January 2018 MMM.
  - Due to no or little precipitation, there has not been any discharge to the Harrison Bayou. KN stated that there is still freeboard at INF Pond but that notification would likely be made to request reduction of freeboard soon.
- **Task 18** (Surface Water) –The next surface water sampling event is scheduled for December 2017; however, drought conditions continue so Bhate is unsure if or when sampling of surface water will occur.

Schedule Next Managers' Meeting

- January 2018 MMM will be held January 18, 2017 at LHAAP at 10:30 AM CDT.

Adjourned at 11:33 AM CST.

ACRONYM LIST

AEC	United States Army Environmental Command
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BRAC	Base Realignment and Closure
CST	Central Standard Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
DI	Document and issues
ECP	Environmental Condition of Property
EPA	United States Environmental Protection Agency
ERDC	Engineer Research and Development Center
ESD	Explanation of Significant Differences
GWTP	Ground Water Treatment Plant
IWWP	Installation Wide Work Plan
KB	Kent Becher
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MMM	Monthly Managers' Meeting
MMRP	Military Munitions Response Program
NS	Nick Smitch
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation

PLC	Programmable Logic Controller
PS	Praveen Srivastav
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
RS	Rick Smith
SOP	Standard Operating Procedure
SW	Susan Watson
TCEQ	Texas Commission on Environmental Quality
UFP-QAPP	Uniform Federal Policy-Quality Assurance Policy Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

LHAAP Data Validated
November 2017

LHAAP Site 001-R-01	*Annual Perchlorate Sampling – November 2017* Perchlorate (6850)	
LHAAP 02	*Semi-Annual Sampling – November 2017* Metals (6020A) – Arsenic and Lead	
GWTP Effluent	*Weekly Perchlorate Sampling – October 2017* Perchlorate (6850)	
GWTP Effluent	*Weekly, Bi-Weekly, and Monthly Sampling – October 2017* Ammonia (350.3/SM4500 NH3) Ortho-Phosphate (365.3/SM4500 P) Organic Carbon (415.1/SM5310) VOC (8260C)	 Metals (6020A) Hexavalent Chromium (7196A) 1,4-Dioxane (8270D-SIM) Anions (9056)
GWTP Influent	*Monthly Sampling – October 2017* Metals (6020A) Perchlorate (6850) Hexavalent Chromium (7196A)	

LHAAP-001 November 2017

Location ID: Sample Date:	Units	TRRP PCL	27WW02-112017 11/20/17	27WW04-112017 11/20/17	131-112117 11/21/17	132-112117 11/21/17	27WW03-112117 11/21/17	27WW01-112117 11/21/17	27WW01-112117-a 11/21/17
			NW, inside site boundary.	NW, inside site boundary.	N, inside OB/OD area.	S, inside OB/OD area.	W, inside OB/OD area.	NW, inside site boundary.	NW, inside site boundary. Field duplicate.
Perchlorate (6850)									
Perchlorate	µg/L	17	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U

µg/L - micrograms per liter

TRRP PCL - Texas Risk Reduction Program Tier 1 Groundwater Residential Protective Concentration Limit

U- Undetected: The analyte was analyzed for, but not detected

LHAAP-02 November 2017

Location ID: Sample Date:	Units	35AWW13_111617 11/16/17	35AWW13_111617_a 11/16/17
		Parent	Field Duplicate
		Shallow zone, unimpacted downgradient. Field filtered w/10 micron filter.	Shallow zone, unimpacted downgradient. Field filtered w/10 micron filter. Field Duplicate
Metals (6020A)			
Arsenic	mg/L	0.00117 J	0.00120 J
Lead	mg/L	0.00306	0.00353

mg/L - milligrams per liter

J - estimated value between the limit of quantitation and the detection limit

GWTP Weekly/Effluent Perchlorate Sampling - October 2017

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_1017W 10/5/17	LH18/24-SP650_101217 10/12/17	LH18/24-SP650_101217 10/12/17	LH18/24-SP650_101817 10/18/17	LH18/24-SP650-102517 10/25/17
			Collected from a spigot on the discharge of effluent TK-650.				
Location Description			Weekly	Monthly EFF	Weekly	Weekly	Weekly
Perchlorate (6850)							
Perchlorate	µg/L	17	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected

GWTP Weekly Sampling - October 2017

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_1017W 10/5/17	LH18/24-SP650_101217 10/12/17	LH18/24-SP650_101817 10/18/17	LH18/24-SP650-102517 10/25/17
			GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.			
Ammonia as N (350.3/SM4500 NH3)						
Ammonia as N	mg/L		37.3	24	15	20
Ortho-Phosphate (365.3/SM4500 P)						
Ortho-Phosphate	mg/L		2.84	1.72	2.06	2.18
Organic Carbon (415.1/SM5310)						
Total Organic Carbon (TOC)	mg/L		116	80	42.3	62

mg/L - milligrams per liter

GWTP Bi-Weekly Sampling - October 2017

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_1017B 10/5/17	LH18/24-SP650_101817 10/18/17
			Collected from a spigot on the discharge of effluent TK-650 Sampled Biweekly.	
Volatile Organic Compounds (8260C)				
1,1,1-Trichloroethane	µg/L	7,230	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	216.9	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	14,032	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	253	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	181	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	NA	< 1.0 U
Acetone	µg/L	2,395	**9**	< 2.0 U
Benzene	µg/L	181	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/L	181	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	47,180	< 1.0 U	< 1.0 U
Chloroform	µg/L	3,615	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	57,025	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	83.6	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	1,699	< 5.0 U	< 2.0 U
o-Xylene	µg/L	83.6	< 1.0 U	< 1.0 U
Styrene	µg/L	5,987	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	180.7	< 1.0 U	< 1.0 U
Toluene	µg/L	4,189	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	181	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	72	**1.58**	**0.90 J**
Anions (9056)				
Chloride	mg/L		**652**	**601**
Sulfate	mg/L		**212**	**178**

J - estimated value between the limit of quantitation and the detection limit

NA - not analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected

GWTP Monthly Effluent Sampling - October 2017

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_101217 10/12/17
			Collected from a spigot on the discharge of effluent TK-650 Sampled monthly.
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 1.0 U
1,1,2-Trichloroethane	µg/L	216.9	< 1.0 U
1,1-Dichloroethane	µg/L	14,032	< 1.0 U
1,1-Dichloroethene	µg/L	253	< 1.0 U
1,2-Dichloroethane	µg/L	181	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U
Acetone	µg/L	2,395	**9.1**
Benzene	µg/L	181	< 1.0 U
Carbon tetrachloride	µg/L	181	< 1.0 U
Chlorobenzene	µg/L	47,180	< 1.0 U
Chloroform	µg/L	3,615	< 1.0 U
Ethylbenzene	µg/L	57,025	< 1.0 U
m,p-Xylene	µg/L	83.6	< 2.0 U
Methylene chloride	µg/L	1,699	< 2.0 U
o-Xylene	µg/L	83.6	< 1.0 U
Styrene	µg/L	5,987	< 1.0 U
Tetrachloroethene	µg/L	180.7	< 1.0 U
Toluene	µg/L	4,189	< 1.0 U
Trichloroethene	µg/L	181	< 1.0 U
Vinyl chloride		72	**1.3**
Metals (6020A)			
Barium	mg/L	2	**0.125**
Lead	mg/L	0.0046	< 0.00200 U
Selenium	mg/L	0.012	< 0.00200 U
Silver	mg/L	0.003	< 0.00200 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**14**

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected

GWTP Monthly Influent Sampling - October 2017

Location ID: **Sample Date:**	**Units**	**LH18/24-SP140_101217** **10/12/17**
		Collected from a spigot on the influent to TK-140 Sampled monthly.
Metals (6020A)		
Selenium	mg/L	< 0.00200 U
Silver	mg/L	< 0.00200 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**4,800**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected

00864635

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BO 220
RATCLIFF, AR 72 1

January 11, 2018

DAIM-ODB-LO

Mr. Rich Mayer
US Environmental Protection Agency
Federal Facilities Section R6
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Revised Final Remedial Action Work Plan Contingency Remedy for Western Plume LHAAP-35A(58), Shops Area, Group 4, Longhorn Army Ammunition Plant, Karnack, Texas, Revised January 2018

Dear Mr. Mayer,

The above-referenced document is being transmitted to you for your records. This document presents revision to the Final Remedial Action Work Plan Contingency Remedy for the Western Plume to incorporate 2016 groundwater data along with changing the substrate from sodium lactate to emulsified vegetable oil.

The document was revised by Bhate Environmental Associates, Inc., (Bhate) 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

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

Copies furnished:
A. Palmie, TCEQ, Austin, TX
P. Bruckwicki, Caddo Lake NWR, TX
R. Smith, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
N. Smith, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO (for project files)

00864636

DEPARTMENT OF THE ARMY
LONGHORN ARMY AMMUNITION PLANT
POST OFFICE BO 220
RATCLIFF, AR 72 1

January 11, 2018

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: Revised Final Remedial Action Work Plan Contingency Remedy for Western Plume LHAAP-35A(58), Shops Area, Group 4, Longhorn Army Ammunition Plant, Karnack, Texas, Revised January 2018

Dear Ms. Palmie,

The above-referenced document is being transmitted to you for your records. This document presents revision to the Final Remedial Action Work Plan Contingency Remedy for the Western Plume to incorporate 2016 groundwater data along with changing the substrate from sodium lactate to emulsified vegetable oil.

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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

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

Copies furnished:
R. Mayer, USEPA Region 6, Dallas, TX
P. Bruckwicki, Caddo Lake NWR, TX
R. Smith, USACE, Tulsa District, OK
A. Williams, USACE, Tulsa District, OK
N. Smith, USAEC, San Antonio, TX
K. Nemmers, Bhate, Lakewood, CO (for project files)

REVISED FINAL
REMEDIAL ACTION WORK PLAN
CONTINGENCY REMEDY FOR WESTERN PLUME
LHAAP-35A (58), SHOPS AREA, GROUP 4
LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Prepared For:

U.S. Army Corps of Engineers

Tulsa District

Prepared By:

AECOM Technical Services, Inc.
Contract No. W912DY-09-D-0059
Task Order No. DS01

Revised By:
Bhate Environmental Associates, Inc.
Contract No. W9128F-13-D-0012
Task Order No. W912BV17F0150

July 2016
Revised January 2018 (as noted in headers)

Table of Contents

List of Figures

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Acronyms and Abbreviations

µg/L	Micrograms Per Liter
AECOM	AECOM Technical Services, Inc.
ARAR	Applicable or Relevant and Appropriate Requirements
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-Dichloroethene
COC	Chemical of Concern
DCA	1,1-Dichloroethane
DCE	1,1-Dichloroethene
DHB	Dehalobacter
DHC	Dehalococcoides Ethenogens
DoD	Department Of Defense
DPT	Direct Push Technology
EISB	Enhanced In-Situ Bioremediation
EVO	Emulsified Vegetable Oil
FFA	Federal Facility Agreement
ft	Feet
gpm	Gallons Per Minute
IDW	Investigation Derived Waste
LHAAP	Longhorn Army Ammunition Plant
LTM	Long-Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
msl	Mean Sea Level
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PCE	Tetrachloroethene
PPE	Personal Protective Equipment

PSI	Pounds per Square Inch
RA	Remedial Action
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RA(O)	Remedial Action-Operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
SRS	Small Droplet Emulsified Vegetable Oil
TBD	To Be Determined
TCA	1,1,2-Trichloroethane
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
TD	Total Depth
TOC	Total Organic Carbon
TS	Treatability Study
U.S.	United States
U.S. Army	U.S. Department of the Army
USEPA	U.S. Environmental Protection Agency
UU/UE	Unrestricted Use and Unlimited Exposure
VC	Vinyl Chloride
VOC	Volatile Organic Compound

1 INTRODUCTION

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

LHAAP was placed on the U.S. Environmental Protection Agency (USEPA) National Priorities List (NPL) on August 9, 1990. Activities to remediate contamination began in 1990. After its listing on the NPL, the U.S. Army, the USEPA, and the Texas Water Commission (currently known as the 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. The majority of LHAAP has been transferred by the U.S. Army to the U.S. Fish and Wildlife Service for management as the Caddo Lake National Wildlife Refuge.

Remedial activities are required under the Record of Decision (ROD) issued for the LHAAP-35A (58) site in September 2010 (Shaw, 2010). The Remedial Action Work Plan (RAWP) for the entire site was prepared in August 2013 in accordance with the ROD and was implemented in September 2013. The monitored natural attenuation (MNA) remedy for the western plume at this site, as presented in the ROD, calls for an evaluation of the remedy after two years of MNA remedial action-operation (RA(O)) implementation. The ROD also provides for implementation of a contingency remedy to enhance MNA if MNA is found to be ineffective. RA(O) implementation for the site was completed between October 2013 and October 2015 and the 2nd year RA(O) report was finalized in May 2016. After two years of MNA, the 2nd year RA(O) report concludes that MNA is ineffective and implementation of a contingency remedy is appropriate. The contingency remedy for the western plume at the site is enhanced in-situ bioremediation (EISB). Therefore, this RAWP addendum addresses EISB implementation for the groundwater plume located on the western side of the site, based on the Remedial Design (RD) for the LHAAP-35A (58) site, which was approved by the regulatory agencies in September 2011 (Shaw, 2011).

1 1 Organi ation of Work Plan

This work plan is comprised of the following sections:

- Section 1: "Introduction" presents the site background, proposed remedy including the chemicals of concern (COCs) and their respective cleanup levels, the nature and extent of contamination, and Remedial Action Objectives (RAOs).
- Section 2: "Land Use Control Plan" references the Final RAWP for LHAAP-35A (58) (AECOM, August 2013), wherein the Land Use Control Plan is presented.

- Section 3: "Enhanced In-Situ Bioremediation" describes the injection of amendments to enhance microbial degradation of contaminants and groundwater monitoring associated with EISB in the western plume.
- Section 4: "Field Preparation and Methods" describes the activities that will be performed prior to the start of field work and the methods that will be followed to complete field work.
- Section 5: "Remedy Performance Evaluation and Reporting" describes the EISB performance evaluation reporting and five-year reviews to be performed for the contingency remedy.
- Section 6: "Schedule" presents the proposed implementation schedule for the EISB contingency remedy.
- Section 7: "References" provides a list of references cited in this document.

Activities specified in this work plan will be conducted in accordance with the Installation-Wide Work Plan (July 2014) in place when field work is executed.

1 2 LHAAP- A ( ) Background

The LHAAP-35A (58) site, also known as the Shops Area, is located in the north-central portion of LHAAP and currently covers an area of approximately 11 acres (**Figure 1-2**) (USACE, 2010). The surface features include asphalt-paved roads, a parking area, and areas that are wooded and overgrown with grasses and other vegetation. The topography is relatively flat with the surface drainage flowing into the tributaries of Goose Prairie Creek, which eventually discharges into Caddo Lake.

The Shops Area, which is now designated as LHAAP-35A (58), was established in 1942 as part of the installation's initial construction (Shaw, 2011). The facility was used to provide plant-operated laundry, automotive, woodworking, metalworking, painting, refrigeration, and electrical services. The site was active throughout the LHAAP's mission and was deactivated along with the rest of the installation in 1996-1997. The LHAAP-35A (58) site boundary has changed over the years. Earlier investigations for LHAAP-35A (58) were performed in areas to the south that are no longer included within the site boundary. LHAAP-35A (58) includes the following sites:

- LHAAP-02, vacuum truck overnight parking;
- LHAAP-03, Paint Shop Building 722 (waste collection);
- LHAAP-60, Former Storage Building 714;
- LHAAP-68, mobile storage tank parking area; and
- LHAAP-69, service station with underground storage tanks.

The following sites were within the historical LHAAP-35A (58) site boundary, but are not within the current site boundary:

- LHAAP-04, former Pilot Wastewater Treatment Plant
- LHAAP-56, vehicle wash rack and oil/water separator Building 744-A

- LHAAP-59, Storage Building 725
- LHAAP-60, Building 411
- LHAAP-61, Water Treatment Plant
- LHAAP-66

The following sites are within the land use control (LUC) boundary for LHAAP-35A (58):

- LHAAP-02, vacuum truck overnight parking;
- LHAAP-03, Paint Shop Building 722 (waste collection);
- LHAAP-56, vehicle wash rack & oil/water separator Building 744-A
- LHAAP-59, Storage Building 725
- LHAAP-60, Former Storage Building 714;
- LHAAP-65, Former Building 209 (flammable materials storehouse);
- LHAAP-68, mobile storage tank parking area; and
- LHAAP-69, service station with underground storage tanks.

LHAAP-60, Building 411, which is located within the historical site boundary of LHAAP-35A (58), will be included within the LUC boundary for LHAAP-04.

Between 1992 and 2015, multiple investigations were conducted in a phased approach to determine the nature and extent of contamination at LHAAP-35A (58). In 2009, a Feasibility Study was completed, which includes a natural attenuation evaluation (Shaw, 2009). These investigations concluded that the Shallow Zone groundwater was impacted with volatile organic compounds (VOCs), however, the soil and former sump/waste rack sump areas posed no unacceptable threat to human health or the environment (Shaw, 2011).

The previous remedy implemented at LHAAP-35A (58) was developed and selected in accordance with the CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, and, to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP) (40 Code of Federal Regulations 300). The selected remedy, finalized in the ROD was developed based on the industrial land use scenario, which is consistent with the anticipated future use as a national wildlife refuge (Shaw, 2010). A deed notice was recorded at the Harrison County Courthouse stating that the site is suitable for non-residential use. A groundwater use restriction was also recorded in the Harrison County Courthouse to ensure that there is no withdrawal or use of groundwater beneath the site for anything other than environmental monitoring and testing until the cleanup levels are met. A restriction against residential use of groundwater will remain in effect until the levels of the COCs in groundwater allow unrestricted use and unlimited exposure (UU/UE). The restriction and notification encompasses the sites within the LUC boundary of LHAAP-35A (58) listed above.

1 2 1 Contingency Remedy

The description of the proposed remedy for the LHAAP-35A (58) site was presented for two separate geographic areas: 1) eastern plume; and 2) western plume. **Figure 1-3** shows monitoring wells installed at the LHAAP-35A (58) site. **Figure 1-4** presents the most recent (October 2016) potentiometric surface information for the site and **Figure 1-5** presents analytical results from monitoring wells during the October 2016 sampling event. EISB was performed in the eastern plume in September 2013 and the eastern plume appears to be shrinking. The proposed EISB remedy described herein applies to the western plume only.

As discussed in the ROD and in the 2nd Annual Remedial Action Operation Report (May 2016), the western groundwater plume at LHAAP-35A (58) is impacted with the following COCs: tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC) (**Figure 1-5**).

The Safe Drinking Water Act maximum contaminant levels (MCLs) will be used as cleanup levels for VOCs in groundwater, as presented in **Table 1-1**.

Table 1-1: Groundwater Cleanup Levels

Chemical of Concern (COC)	Concentration	Basis
Groundwater (µg/L)		
Tetrachloroethene	5	MCL
Trichloroethene	5	MCL
1,1-Dichloroethene	7	MCL
Cis-1,2-dichloroethene	70	MCL
Vinyl chloride	2	MCL
1,1,2-trichloroethane[a]	5	MCL
1,2-dichloroethane[a]	5	MCL

Notes and Abbreviations:
µg/L – micrograms per liter
MCL – maximum contaminant level
[a] Not currently classified as a constituent of concern, but will be included in the list of chemicals for Long-Term Monitoring

Although arsenic has not been designated as a COC, groundwater will be monitored for arsenic as described in the 2nd Year RA(O) report (AECOM, May 2016). Monitoring for arsenic will allow evaluation of any arsenic concentration trends after implementation of EISB in the western plume. The MCL for arsenic is 10 µg/L.

In the western plume area, the highest concentrations of COCs have been observed in the Shallow Zone groundwater near monitoring well 35AWW20, which is located in a former vehicle wash rack and oil/water separator Building 744-A area (**Figure 1-5**). This area is also within the primary target area of the western plume, which is located in the western portion of the western plume, near wells 35AWW20, LHSMW07, and 35AWW06. In addition, 1,1-DCE has been detected above its MCL in monitoring wells 35AWW11 and 35AWW19, located on eastern and southern boundaries of the western plume, respectively. The western plume contingency remedy will include EISB in the area with the highest levels of contamination.

The remedy for the western plume at LHAAP-35A (58) is intended to protect human health and the environment by preventing human exposure to the contaminated groundwater and preventing contaminated groundwater from migrating into nearby surface water. The final western plume remedy will consist of LUC (already implemented), EISB, MNA (ensuing EISB), and Long Term Monitoring (LTM)/Five-year Reviews.

The specific remedy components are discussed below:

- LUC in the impacted area will ensure protection of human health by restricting the use of groundwater to environmental monitoring and testing until cleanup levels are met. The LUC restricting residential use of groundwater will remain in effect until the levels of the COCs in groundwater allow for UU/UE.
- EISB will be implemented in the western plume area. At LHAAP-35A (58), the highest concentrations of contaminants have been observed in the Shallow Zone groundwater in the vicinity of wells 35AWW20, LHSMW07, and 35AWW06. This area is designated as the western plume primary target area (**Figure 1-5**). EISB will be also implemented near monitoring wells 35AWW11, 35AWW14, and near one proposed new monitoring well (35AWW23) location.

  EISB is the process of removing contaminant mass as a result of microbes utilizing contaminants in the groundwater during respiratory or metabolic activities. The treatment involves injecting amendments which may include microbial cultures, electron donor sources, and nutrients, into the subsurface.
- MNA constitutes a passive remedy that relies on natural biological, chemical, and physical processes that act to reduce the mass and concentrations of groundwater contaminants under favorable conditions. MNA will be implemented to verify that the western VOC plume is stable or shrinking and will not migrate to nearby surface water at levels that pose an unacceptable risk to human health or the environment. Natural attenuation is expected to reduce contaminant concentrations to their respective clean-up levels, and return groundwater to its beneficial use, wherever practicable, after the successful implementation of the EISB. MNA will be evaluated annually, with groundwater monitoring performed on a quarterly basis.
- LTM/Five-year Reviews: If MNA is effective, MNA monitoring will be performed at a semi-annual frequency for three years, then annually until the next five-year review. However, LTM will continue at least once every five years until cleanup levels are achieved. A cleanup time has not been estimated for the western plume and will be evaluated following implementation of EISB.

1 2 2 Nature and Extent of Contamination

Figure 1-6 presents the current estimated extent of the VOC plumes in groundwater. The source of the western plume area is centered near well 35AWW20. Based on the October 2016 isoconcentration map, the western plume has an area of approximately 325,000 square feet, and a vertical extent of approximately five feet. Using an estimated effective porosity of 0.3, the calculated volume of contaminated groundwater in the western plume is 3.65 million gallons.

Site-specific porosity values for this site are not available. The highest effective porosity value typical for unconsolidated material is 0.3 (Driscoll, 1986). This typical value is likely higher than the actual effective porosity values for the subsurface lithologies present at the site. In the absence of site-specific data, a conservative value of 0.3 is utilized to avoid underestimation of impacted water volume.

A value of five feet is used for the average saturated thickness at the site for estimation of impacted groundwater volume. The actual thicknesses, based on the lithologic information, could be higher or lower than the average estimated thickness of five feet. However, for the purposes of estimating impacted groundwater volume, a value of five feet was used.

1 2 Site Geology and Hydrogeology

The surface geology at LHAAP-35A (58) consists predominantly of clay and silty clays, with thin lenses of sand. The sand lenses are approximately 3 to 5 feet thick and the depth of occurrence varies across the site.

The site hydrogeology, as presented in the Draft Final RACR (AECOM 2015), includes three water-bearing zones identified as the Shallow Zone, Intermediate Zone, and Deep Zone. The Shallow Zone extends to approximately 40 feet (ft) below ground surface (bgs). The lithology of the Shallow Zone is characterized by discontinuous, fine-grained layers of interbedded silt, sand, and clay. Groundwater elevations in the Shallow Zone in October 2016 ranged from 186.47 ft above mean sea level (msl) to 204.27 ft above msl. Groundwater surface elevation contours for the Shallow Zone, based on October 2016 groundwater level measurements, are shown in **Figure 1-4**.

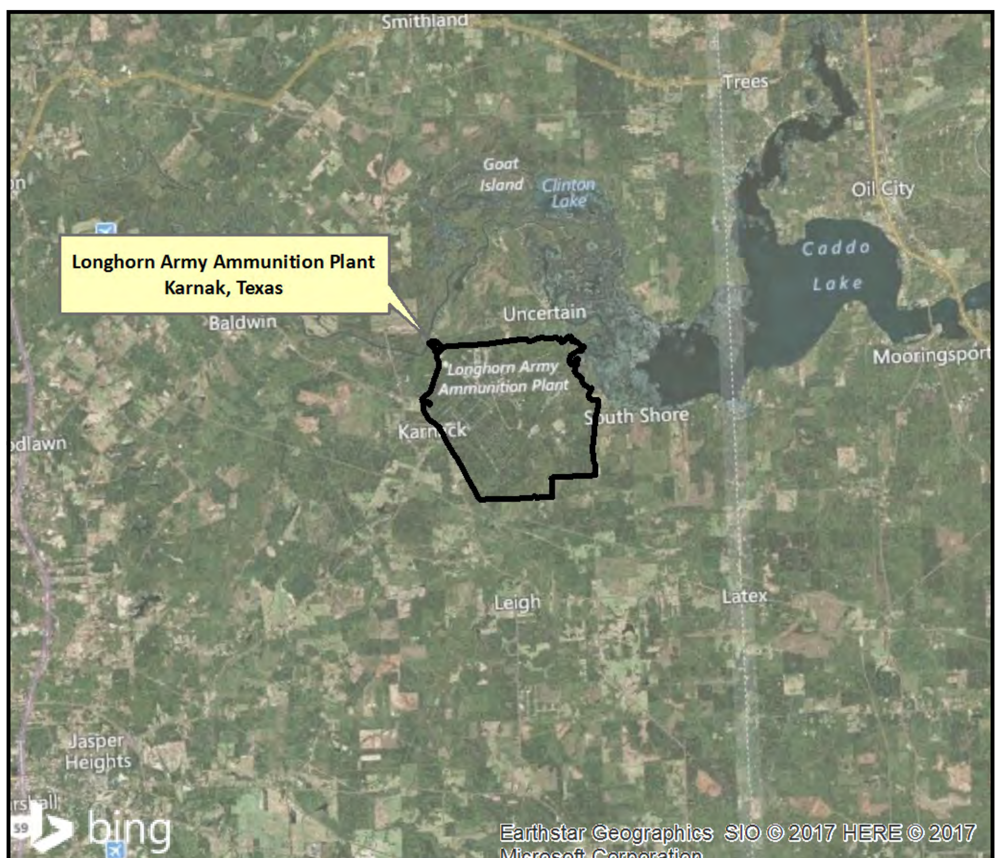
Boring logs from 35AWW02, which was drilled to a total depth (TD) of 140 ft bgs in the Deep Zone; and 35AWW05, which was drilled to a TD of 75.75 ft bgs in the Intermediate Zone demonstrate that the geology of the Intermediate and Deep Zones consists mostly of clay, with occasional silt and sand layers. The predominance of clay below the Shallow Zone creates a basal aquitard that impedes downward migration of groundwater from the Shallow Zone. Groundwater surface measurements for all three units are available for October 2013. The groundwater elevations for the Shallow Zone ranged from approximately 194 ft to 202 ft above msl. The elevation of the Intermediate Zone potentiometric surface was approximately 178 ft above msl, and the elevation of Deep Zone potentiometric surface was 175.75 ft above msl. The differences in groundwater elevations between the Intermediate and Deep Zones reflect an upward groundwater gradient between these two units.

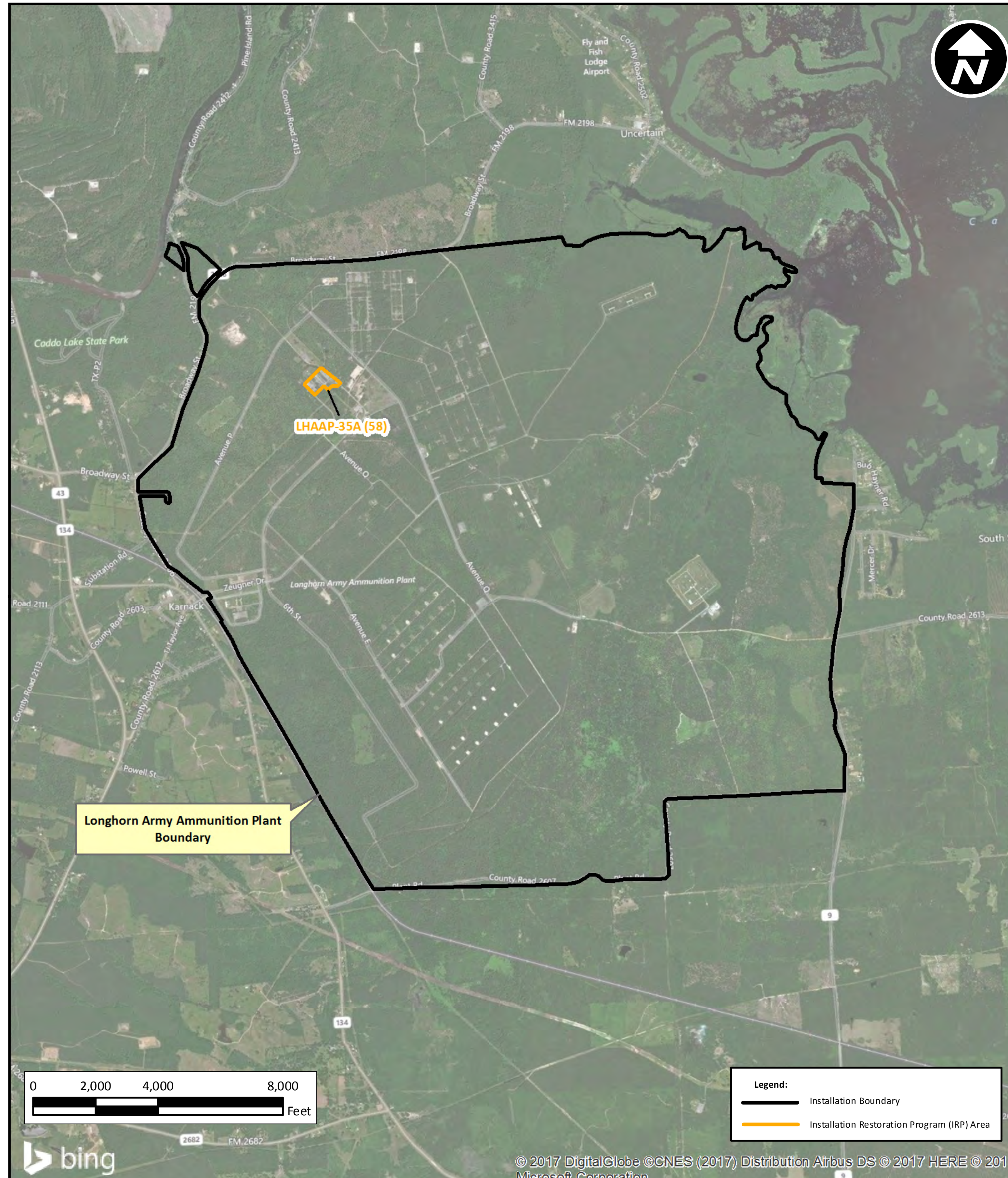
Hydraulic conductivities in the Shallow Zone wells range from 3.5×10^{-5} to 1.4×10^{-3} centimeters per second (Jacobs, 2002). Using an estimated hydraulic gradient of 0.022 feet per foot from **Figure 1-4** and the range of hydraulic conductivities (Jacobs, 2002), the calculated groundwater flow velocity in the Shallow Zone ranges from 2.66 to 114 ft per year.

1 2 4 Remedial Action Ob ectives

The final remedy for groundwater at LHAAP-35A (58) will protect human health and meet Applicable or Relevant and Appropriate Requirements (ARARs). The site was determined to pose no significant ecological risks (Shaw, 2011). The RAOs for LHAAP-35A (58) are consistent with the reasonably anticipated future use of the site as a national wildlife refuge and include:

- Protection of human health by preventing human exposure to the contaminated groundwater.
- Protection of human health and the environment by preventing contaminated groundwater from migrating to nearby surface water.
- Return of groundwater to its potential beneficial use as drinking water, wherever practicable.





Site Area Map

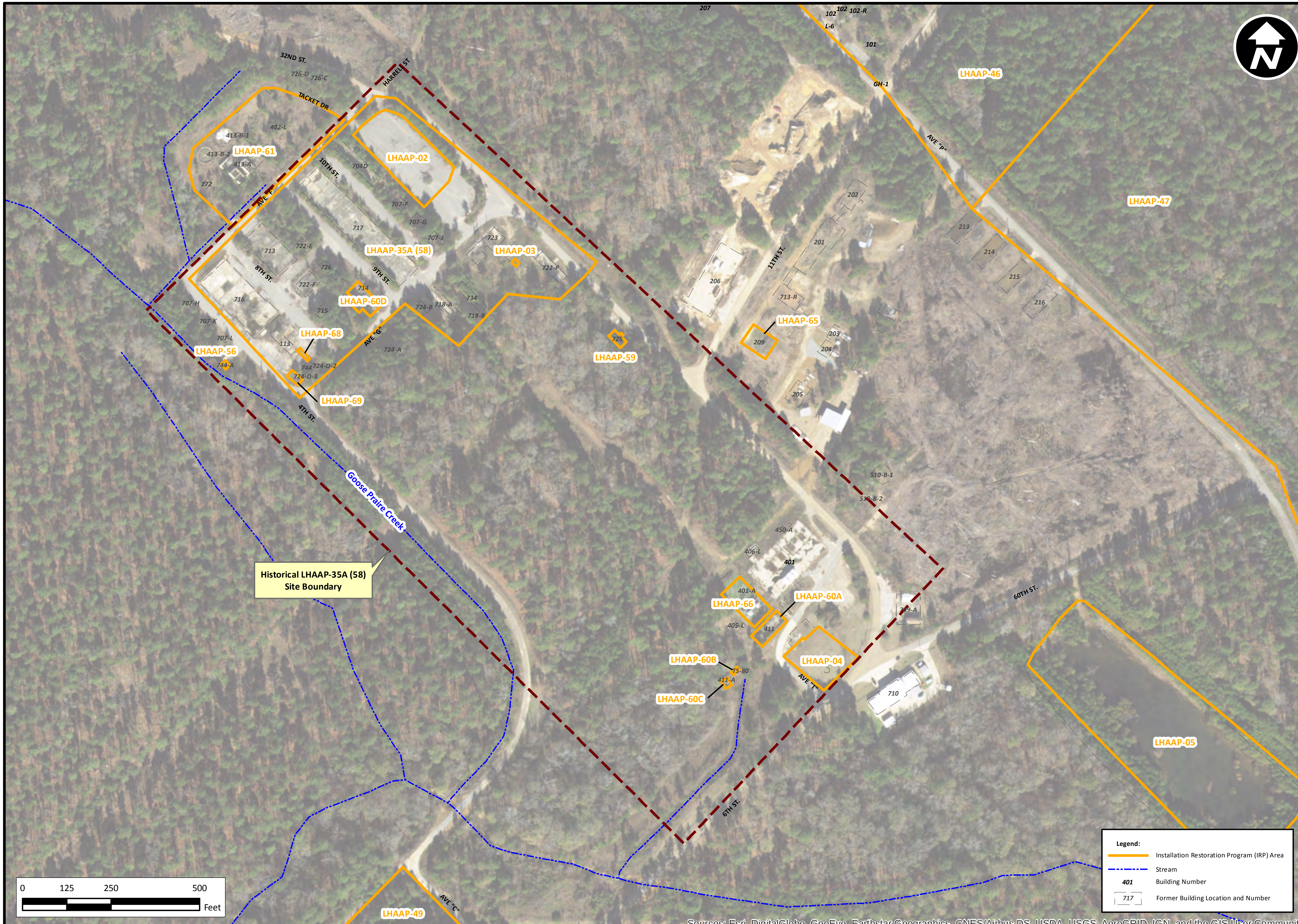
Figure 1-1

LHAAP-35A(58) Remedial Action Work Plan
Contingency Remedy for Western Plume
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY:	MRM
DATE:	1/9/2018
SCALE:	As Shown
PROJECT NO:	NWO1312.0150.012.0001.01

bhate
ENVIRONMENT & INFRASTRUCTURE

00864650



LHAAP-35A(58) Site Vicinity Map

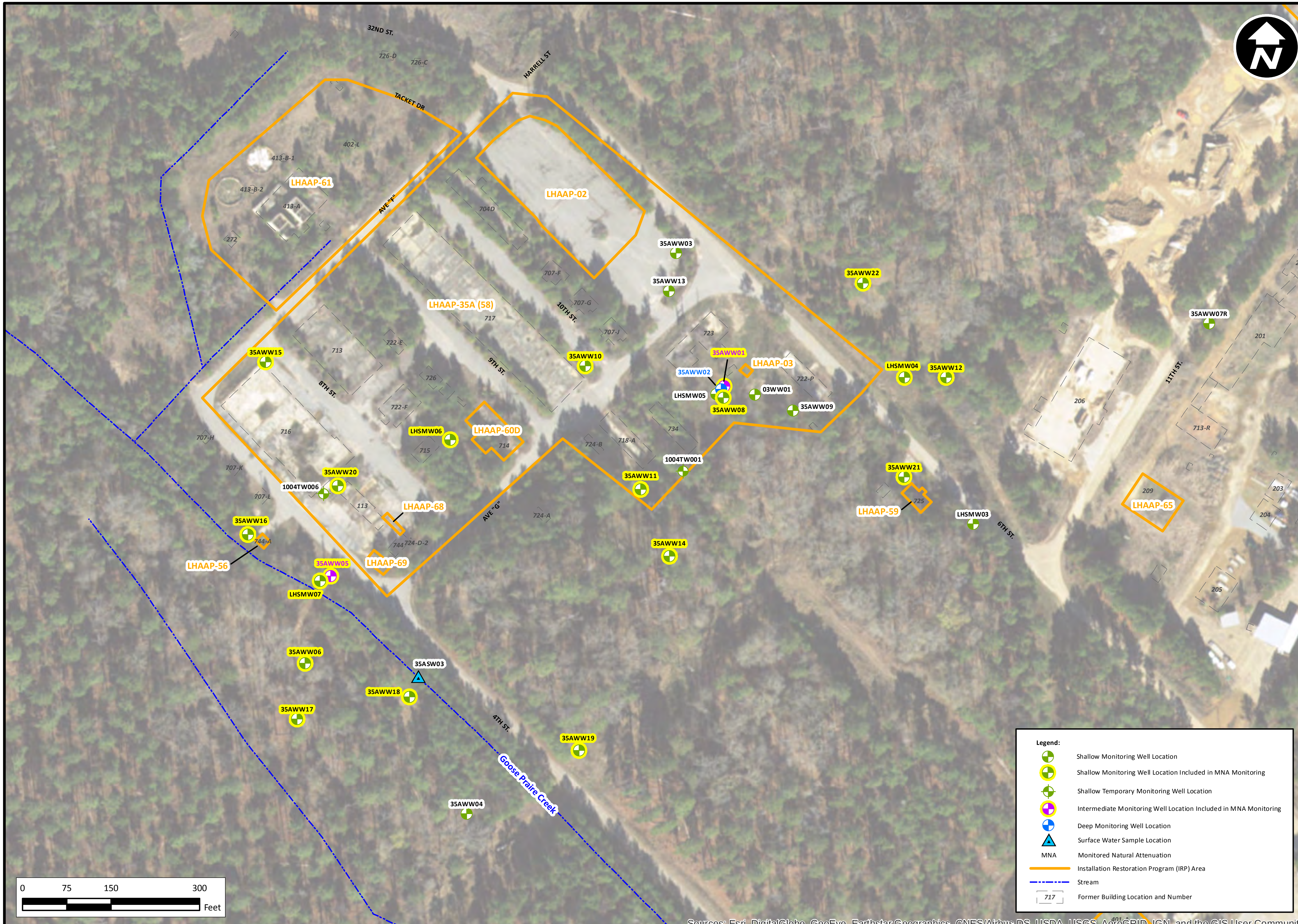
Figure 1-2

LHAAP-35A(58) Remedial Action Work Plan
Contingency Remedy for Western Plume
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY:	MRM
DATE:	1/9/2018
SCALE:	As Shown
PROJECT NO:	NWO1312.0150.012.0001.01

bhate ENVIRONMENT & INFRASTRUCTURE

00864651



Location of Monitoring Wells

Figure 1-3

LHAAP-35A(58) Remedial Action Work Plan
Contingency Remedy for Western Plume
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

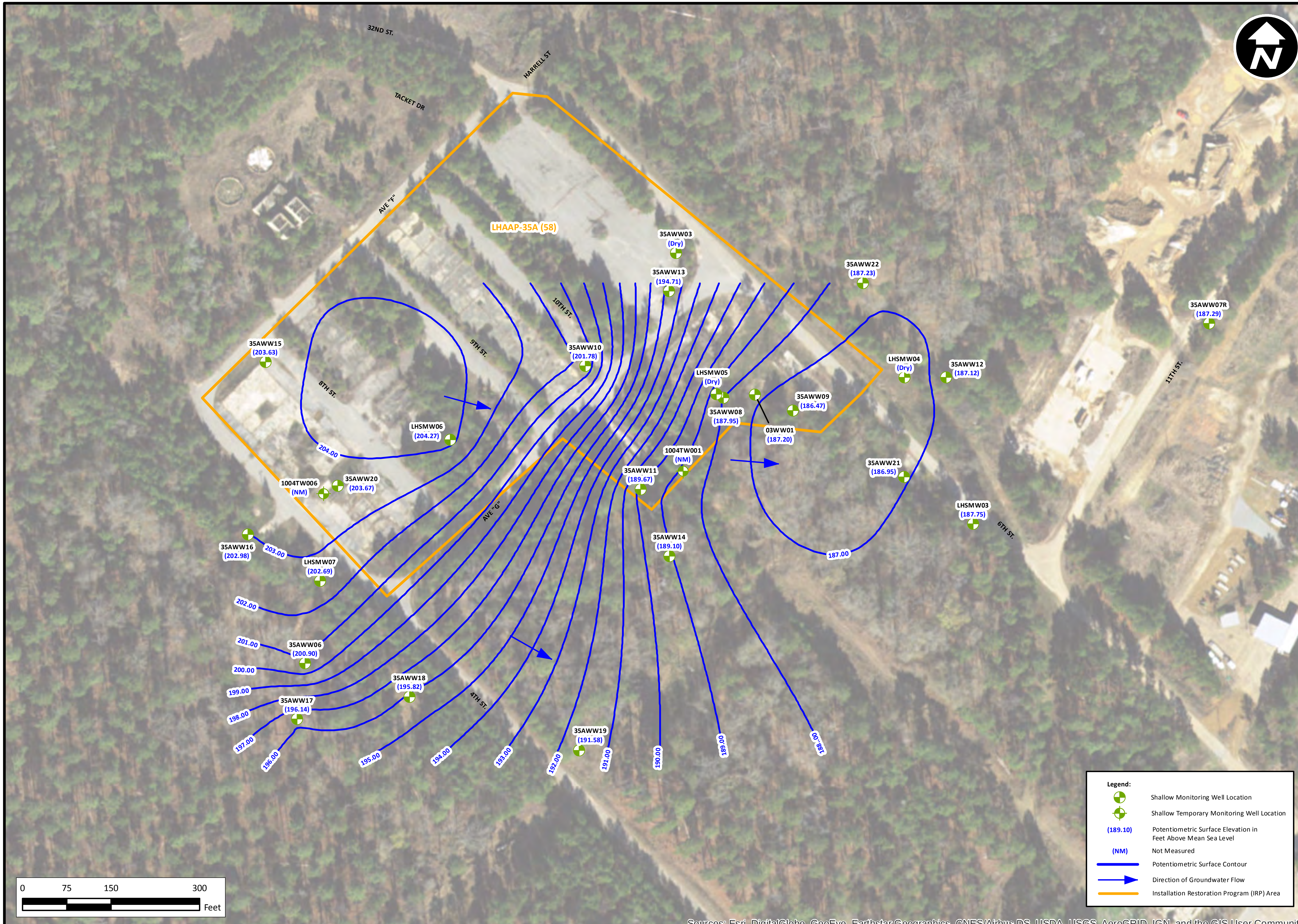
DATE: 1/9/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.01

bhate ENVIRONMENT & INFRASTRUCTURE

00864652



Shallow Zone Potentiometric Map
(October 2016)

Figure 1-4

LHAAP-35A(58) Remedial Action Work Plan
Contingency Remedy for Western Plume
Longhorn Army Ammunition Plant
Karnack, Texas

DRAWN BY: MRM

DATE: 1/9/2018

SCALE: As Shown

PROJECT NO: NWO1312.0150.012.0001.01

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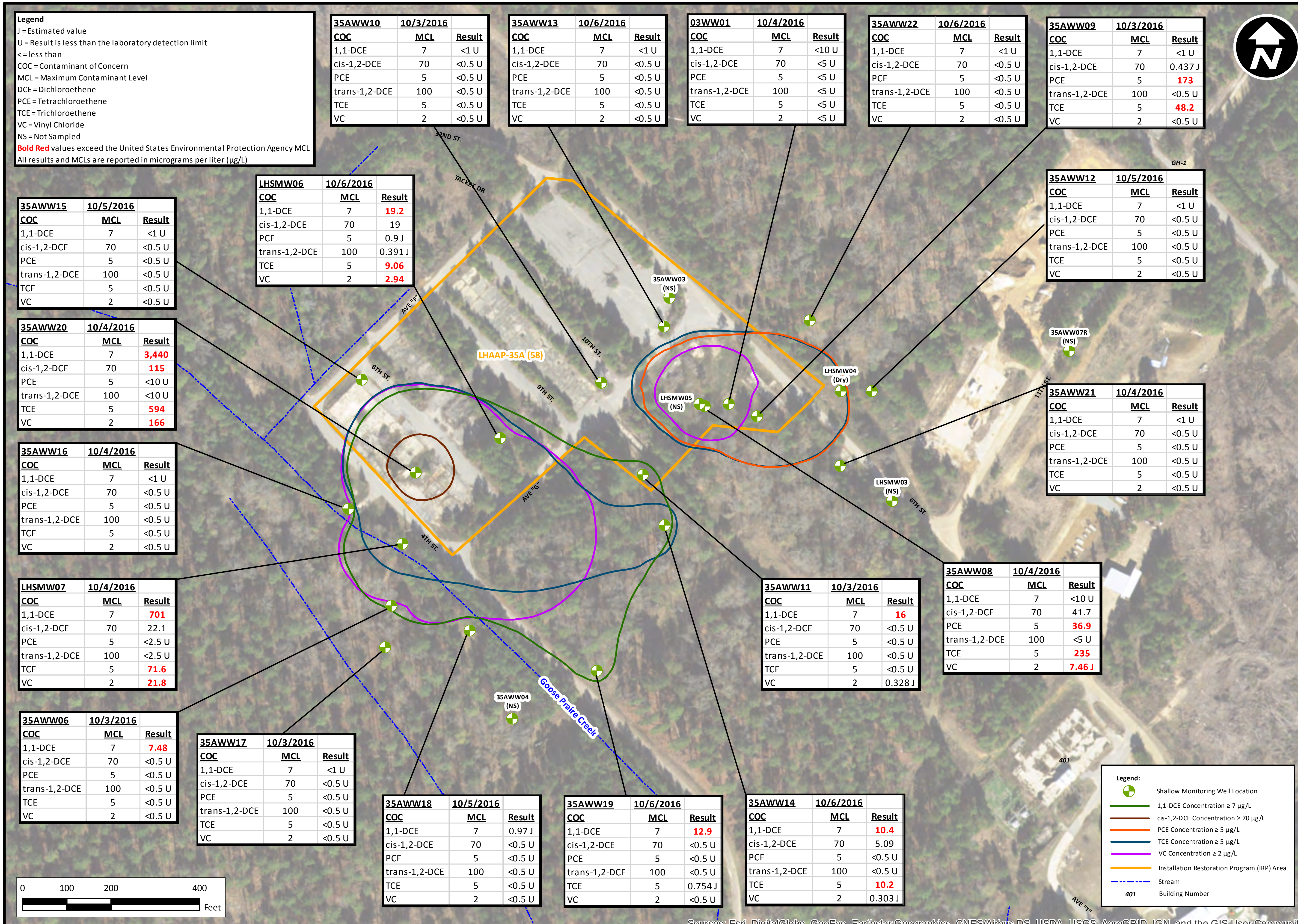
Legend
J = Estimated value
U = Result is less than the laboratory detection limit
< = less than
COC = Contaminant of Concern
MCL = Maximum Contaminant Level
DCE = Dichloroethene
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl Chloride
NS = Not Sampled
Bold Red values exceed the United States Environmental Protection Agency MCL
All results and MCLs are reported in micrograms per liter (µg/L)



35AWW10	10/3/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW13	10/6/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

03WW01	10/4/2016	
COC	MCL	Result
1,1-DCE	7	<10 U
cis-1,2-DCE	70	<5 U
PCE	5	<5 U
trans-1,2-DCE	100	<5 U
TCE	5	<5 U
VC	2	<5 U

35AWW22	10/6/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW09	10/3/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	0.437 J
PCE	5	**173**
trans-1,2-DCE	100	<0.5 U
TCE	5	**48.2**
VC	2	<0.5 U

35AWW12	10/5/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

LHSMW06	10/6/2016	
COC	MCL	Result
1,1-DCE	7	**19.2**
cis-1,2-DCE	70	19
PCE	5	0.9 J
trans-1,2-DCE	100	0.391 J
TCE	5	**9.06**
VC	2	**2.94**

35AWW15	10/5/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW20	10/4/2016	
COC	MCL	Result
1,1-DCE	7	**3,440**
cis-1,2-DCE	70	**115**
PCE	5	<10 U
trans-1,2-DCE	100	<10 U
TCE	5	**594**
VC	2	**166**

35AWW16	10/4/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

LHSMW07	10/4/2016	
COC	MCL	Result
1,1-DCE	7	**701**
cis-1,2-DCE	70	22.1
PCE	5	<2.5 U
trans-1,2-DCE	100	<2.5 U
TCE	5	**71.6**
VC	2	**21.8**

35AWW06	10/3/2016	
COC	MCL	Result
1,1-DCE	7	**7.48**
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW17	10/3/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW18	10/5/2016	
COC	MCL	Result
1,1-DCE	7	0.97 J
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

35AWW19	10/6/2016	
COC	MCL	Result
1,1-DCE	7	**12.9**
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	0.754 J
VC	2	<0.5 U

35AWW14	10/6/2016	
COC	MCL	Result
1,1-DCE	7	**10.4**
cis-1,2-DCE	70	5.09
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	**10.2**
VC	2	0.303 J

35AWW11	10/3/2016	
COC	MCL	Result
1,1-DCE	7	**16**
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	0.328 J

35AWW08	10/4/2016	
COC	MCL	Result
1,1-DCE	7	<10 U
cis-1,2-DCE	70	41.7
PCE	5	**36.9**
trans-1,2-DCE	100	<5 U
TCE	5	**235**
VC	2	**7.46 J**

35AWW21	10/4/2016	
COC	MCL	Result
1,1-DCE	7	<1 U
cis-1,2-DCE	70	<0.5 U
PCE	5	<0.5 U
trans-1,2-DCE	100	<0.5 U
TCE	5	<0.5 U
VC	2	<0.5 U

COC Concentrations in Shallow Groundwater (October 2016)

Figure 1-5

LHAAP-35A(58) Remedial Action Work Plan
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Longhorn Army Ammunition Plant
Karnack, Texas

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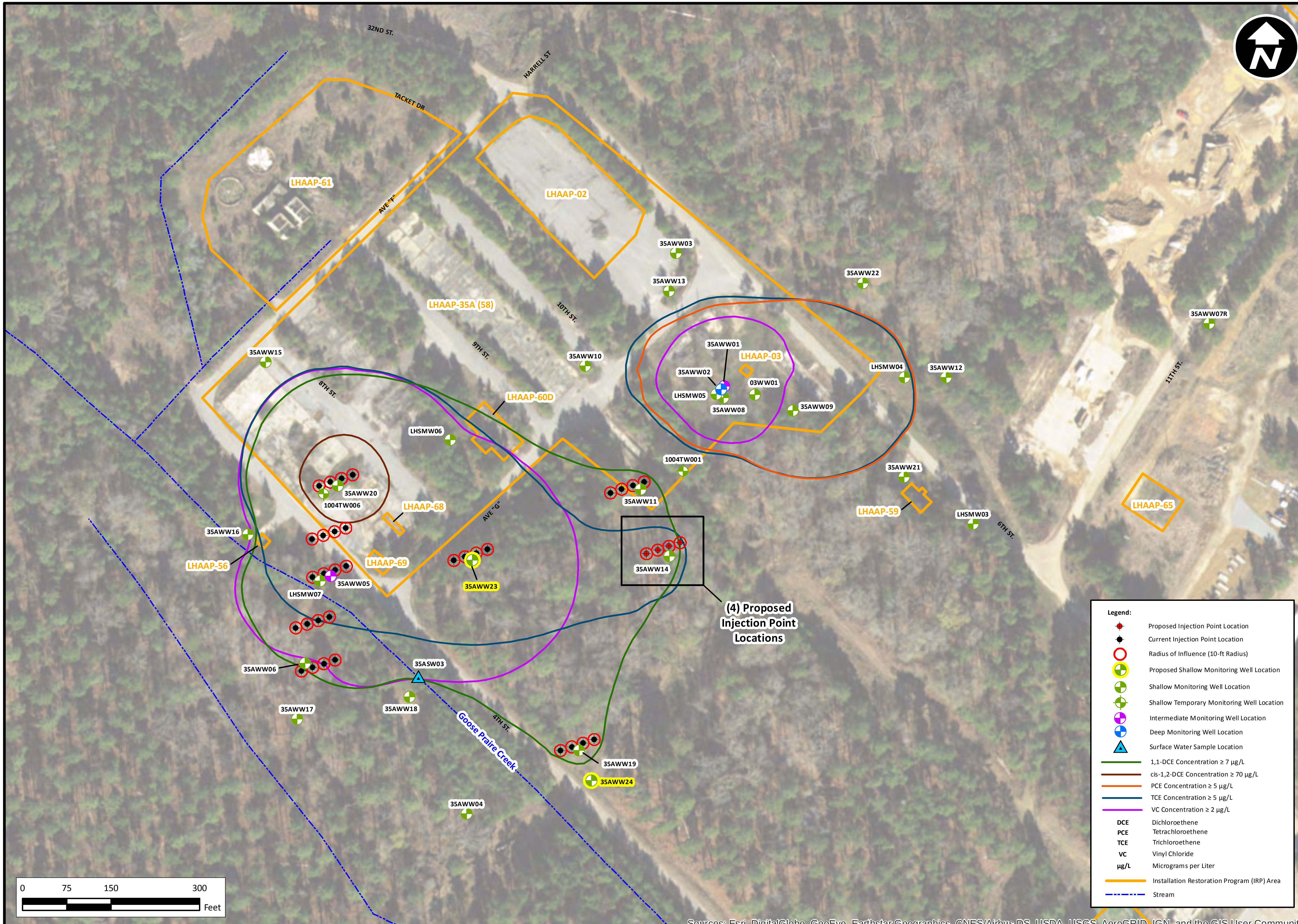

Proposed Injection Locations

Figure 1-6

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2 LAND USE CONTROL PLAN

The U.S. Army or its representatives are responsible for LUC implementation and certification, reporting, and enforcement. The U.S. Army will address any LUC problems within its control that are likely to impact remedy integrity as soon as practicable. The details of LUC components are provided in the RAWP (August 2013). The continued successful implementation of LUC is presented in the annual RA(O) reports.

ENHANCED IN-SITU BIOREMEDIATION

This section discusses the objectives and details of the EISB component of this RAWP addendum.

EISB will be performed in the western plume target area. The purpose of EISB is to accelerate the rate of biological degradation of chlorinated ethenes and ethanes in the Shallow Zone groundwater and to create subsurface conditions that are favorable for MNA. EISB will be implemented in the western plume target area encompassing the Shallow Zone wells 35AWW20, 35AWW06, and LHSMW07. This area is characterized by relatively high concentrations of TCE, 1,1-DCE, cis-1,2-DCE, and VC. 1,1-DCE was also reported above the MCL in monitoring wells located in the eastern (35AWW11) and southern (35AWW19) portions of the western plume. Therefore, EISB will also be implemented near these wells and one proposed monitoring well location (35AWW23) in the area (see **Figure 1-6**).

In September 2013, EISB was implemented by injecting Wilclear Plus in the eastern plume in the vicinity of monitoring wells 03WW01 and 35AWW08, followed by bioaugmentation using KB-1® Plus in November 2013. Groundwater samples collected in October 2013 show increases in ferrous iron, alkalinity, and *dehalococcoides/dehalobacter* species; and decreases in PCE and TCE concentrations. These changes indicate reductive dechlorination of chlorinated VOCs was occurring in the EISB treatment area. Similarly, it is anticipated that EISB implementation will reduce contaminant mass in the western plume and create more favorable conditions for natural attenuation.

In general, EISB treatment will include injection of a carbon substrate and a microbial consortium, if needed, which will include *dehalococcoides ethenogenes* (DHC) and *dehalobacter* (DHB). It is well documented in the literature that DHC and DHB have demonstrated ability to reduce chlorinated ethenes and ethanes, respectively. The role of the carbon substrate is to provide a food source for indigenous and bio-augmented microorganisms. As the carbon substrate is metabolized by the microorganisms, hydrogen gas is produced, which provides available protons required for reductive dechlorination. Competing processes include those that involve other electron acceptors, such as oxygen and sulfate. Reductive dechlorination may be delayed until competing electron acceptors have sufficiently decreased to below competing levels.

During biological reductive dechlorination, the chlorinated ethenes (such as PCE) serve as an electron acceptor and chlorine atoms are sequentially replaced with protons to yield TCE, cis-1,2-DCE, VC, and ethene as daughter products. A common observation is that PCE and TCE are reductively dechlorinated under relatively mild reducing conditions (e.g., sulfate-reducing conditions), whereas reductive dechlorination of cis-1,2-DCE and VC generally require increasingly stronger reducing conditions (e.g. methanogenic conditions).

1 Laboratory-scale Bioremediation Treatability Study

A laboratory-scale bioremediation Treatability Study (TS) was conducted between February 25, 2013, and June 2013. One lactate based carbon source (e.g. sodium lactate) and one vegetable oil-based carbon source (e.g. emulsified vegetable oil [EVO]) were evaluated in the TS. The lactate-based carbon source was Wilclear Plus, manufactured by JRW Bioremediation, LLC, in

Lenexa, Kansas. The vegetable oil carbon source was SRS® - SD Small Droplet Emulsified Vegetable Oil (SRS), manufactured by Terra Systems, Inc., in Claymont, Delaware.

Results of the TS indicate that both treatment microcosms (Wilclear Plus Amended and SRS Amended) achieved complete dechlorination (reduction of PCE/TCE to ethene). The chlorinated VOCs in the control microcosms remained stable as expected. Similarly, reductions in sulfate concentrations were observed in both treatment microcosms. The Wilclear amendment, which is lactate-based, is a relatively fast substrate compared to the EVO-type substrates, as evidenced by the TS data. Complete details of the TS are provided in the 2013 RAWP for LHAAP-35A (58).

2 EISB Performance in the Eastern Plume at LHAAP- A ( )

In September 2013, EISB implementation was conducted by injecting Wilclear Plus in the eastern plume in the vicinity of monitoring wells 03WW01 and 35AWW08, followed by bioaugmentation using KB-1® Plus in November 2013. Groundwater monitoring was performed in August 2013 prior to EISB implementation (baseline event), October 2013 (performed after the carbon substrate injections), and in January 2014, May 2014, October 2014, January 2015, April 2015, July 2015, and October 2015, after bioaugmentation culture injections. Following EISB implementation, major reductions were observed in PCE in both wells. TCE, a degradation product of PCE, initially decreased between August 2013 and October 2013, but subsequently increased (due to reduction of PCE into TCE), demonstrating that the early stages of dechlorination were occurring. After the initial increase, TCE concentrations subsequently decreased, due to degradation of TCE to daughter products, and plateaued near the August 2013 concentrations. The concentrations of cis-1,2-DCE, a degradation product of TCE, increased in both wells during the October 2015 monitoring period, suggesting that dechlorination of TCE was occurring. To date, VC has not been detected in either well, potentially indicating the occurrence of a cis-1,2-DCE stall, a phenomenon known to occur in the absence of sufficient active culture of *dehalococcoides* bacteria. After two years of monitoring, no rebound has been observed, which indicates reductive dechlorination of chlorinated VOCs is effective in the EISB treatment area within the eastern groundwater plume.

EISB Design Parameters

This section presents the general EISB design parameters for the western plume. The EISB design is based on an evaluation of current site conditions, an understanding of the COCs, and their physical and geochemical properties in groundwater.

1 Substrate Selection

As indicated by the TS data, the EVO-type substrate can achieve complete dechlorination of the COCs in site groundwater and is proposed for the contingency remedy.

There are various formulations of EVO-type substrates commercially available for groundwater remediation. The specific formulation of EVO-type substrate for this project is the SRS® - SD Small Droplet Emulsified Vegetable Oil (SRS) or equivalent.

2 Substrate Loading

The EVO-type substrate will be delivered to the site in bulk as a concentrated medium. An approximate working solution strength of 10 to 20 % EVO-type substrate volume per volume of water will be generated in the field using a centrifugal pump, recirculation, and in-line mixer for micro emulsion. Water will be used with the EVO-type substrate to create the appropriate solution strength. The water will be sourced from the pump house serving the Groundwater Treatment Plant.

The mass of EVO-type substrate required for the target treatment area was calculated based on site characteristics (e.g., target area, depth of the Shallow Zone etc.) and stoichiometric demand exerted by the native (e.g., dissolved oxygen, sulfate etc.) and anthropogenic electron acceptors (COCs). These calculations were performed using the spreadsheet-based Substrate Estimating Tool for Enhanced Anaerobic Bioremediation of Chlorinated Solvents (Version 1.2, November 2010) developed by the Environmental Security Technology Certification Program (Parsons, 2010). The estimated quantities of EVO-type substrate are subject to modification, based on the field conditions encountered during the injection program.

The total estimated mass of concentrated EVO-type substrate (at 60% EVO) proposed for injection is approximately 14,625 pounds. The concentrated solution of EVO-type substrate will be diluted by mixing 1 part of EVO-type substrate with 5 to 10 parts of water (~10 to 20 % solution). The diluted EVO-type substrate will be injected into 36 injection points within the target treatment area.

The injection volume will be optimized to enhance and/or maintain biogeochemical conditions conducive to enhanced reductive dechlorination. The diluted EVO-type substrate will be applied to the subsurface at a target volume of 24 gallons per vertical foot.

Bioaugmentation Culture Loading

The TS indicated that augmenting the treatment microcosms with appropriate microbial culture enhanced the rate of biodegradation of the target VOCs in the microcosms. In the TS, KB-1 plus, a proprietary microbial culture comprised of a mix of DHC (bacteria well known for degradation of PCE/TCE, cis-1,2-DCE, and VC) and DHB (bacteria well known for degradation of 1,1,2-trichloroethane [TCA] and 1,1-dichloroethane [DCA]) was added into the treatment microcosms. Bioaugmentation using KB-1 plus microbial culture was also added to the EISB area in the eastern plume and is intended to be performed during implementation of the EISB.

Typically, DHC concentrations above 1 x 10^7 cells per liter are required for sufficiently high rates of EISB and ethene production (Lu et. al., 2006). Based on experience with field bioaugmentation of EISB in the eastern plume, and using technical recommendation provided by the microbial culture manufacturer (Sirem), a quantity of approximately two to three liters of KB-1 plus culture per injection point is proposed to be injected after the EISB implementation. The KB-1 plus culture comes in the form of a liquid solution pressurized under a compressed gas (argon or nitrogen). Bioaugmentation will be performed approximately two to four weeks after the EISB implementation until appropriate redox conditions are established.

4 Direct Push Technology In ections

EISB will be implemented in the area of elevated COC concentrations in the western plume (**Figure 1-6**). Based on the October 2016 isoconcentration map, the target treatment area is estimated to be approximately 325,000 square feet and will require approximately 36 injection points at a spacing of approximately 15 to 20 ft (anticipated radius of influence of 7.5 to 10 ft). Four injection points will be placed in a row approximately 15 to 20 ft upgradient of each of the following monitoring wells: 35AWW20, 35AWW14, LHSMW-07, 35AWW11, 35AWW19, one proposed new monitoring well (35AWW23), and downgradient from well 35AWW06. Since concentrations of COCs are relatively high at monitoring wells 35AWW20 and LHSMW07, two rows of four injection points each will be placed between monitoring wells 35AWW20 and LHSMW07, and monitoring wells LHSMW07 and 35AWW06. The target depth for each injection point will be within the Shallow Zone (approximately 20 to 30 feet bgs).

The EVO-type substrate will be injected into the subsurface through direct push technology (DPT) injection points either utilizing a single point injection system or using a mobile manifold injection system. The mobile manifold injection system will be capable of injecting the solution into multiple locations simultaneously. The injection system will consist of a bulk storage tank, mixing equipment, an injection pump, and volume metering and control equipment. EVO-type substrate, diluted as discussed above, will be pressure-fed into each injection point utilizing a transfer pump and a portable polyethylene mixing tank. Injection flow rates are expected to range from 2 to 10 gallons per minute (gpm) at injection pressures from 20 to 100 pounds per square inch (PSI). Injections will be conducted at the lowest pressure practical which yields an acceptable flow rate.

The substrate solution will be injected using a “bottom-up” approach at each proposed injection point at 2- to 5-foot intervals to cover the entire Shallow Zone groundwater treatment interval. Under this approach, the drill rods will be advanced to the bottom portion of the injection interval. The DPT drill rods will be pulled up exposing a stainless steel screen, between 2 and 5 ft in length, which will act as the temporary well screen. Injectate will be pumped down through the DPT drilling rods (acting as a temporary well casing) to the injection interval and injectate will be forced through the stainless steel screen into the surrounding formation. The tools are then withdrawn to the next injection depth and the material is again pumped through the rods. This cycle is repeated to provide coverage across the entire vertical treatment interval.

If the substrate solution delivery is not successful at a selected depth interval, the remaining volume may be injected into an adjacent depth interval within the same injection point or into the same depth interval at an adjacent injection point.

Real-time field conditions and the location of any subsurface structures will be used to adjust injection locations, depths and/or volumes to optimize substrate delivery into the subsurface as the remedial action (RA) progresses. Subsurface utilities and other structures may not only impede injection placement, but may also act as a preferential flow path for groundwater and injectate migration.

As discussed in Section 3.3.3, bioaugmentation will be performed approximately two to four weeks after the EISB implementation until appropriate redox conditions are established.

Bioaugmentation will involve injecting the microbial culture (KB-1 plus) via the direct push points located generally at the same locations where the EISB injections were performed. The injection tubing is advanced into the drive point at the desired injection depth and purged with argon or nitrogen gas to displace oxygen from the column. The culture is then injected into the drive point with the compressed gas.

The microbial culture will be injected under pressure in the same target depth intervals as the carbon substrate solution. Small quantities of the carbon substrate solution may be injected into the same points during bioaugmentation, so that a sufficient 'food source' is provided to the microbial culture as soon as it enters the subsurface environment.

4 1 Radius of Influence and In ection Point Spacing

The EISB injections will utilize 36 injection points with spacings of approximately 15 to 20 feet, to achieve an expected radius of influence of 7.5 to 10 ft. Data generated from the ESIB implemented at the eastern plume indicate that this radius of influence is conservative for the LHAAP-35A (58) site.

EISB Performance Monitoring

Performance monitoring will be used to evaluate the effectiveness of the EISB treatment and to determine if additional substrate injections are necessary. A single injection event is currently proposed. Following the first injection event, groundwater will be monitored quarterly for two years. The groundwater monitoring data will be used to evaluate the effectiveness of EISB in meeting the RAOs and to determine if a second round of injections is necessary. Experience from the eastern plume indicates that one event is sufficient to achieve significant reduction in chlorinated VOCs. After the end of performance monitoring for EISB, the monitoring schedule for the western plume target area will be aligned with the schedule for the rest of the western plume.

1 Baseline Groundwater Monitoring

A baseline groundwater monitoring event will be conducted prior to EISB implementation to establish baseline COC concentrations and geochemical conditions. The baseline groundwater sampling results will be compared with monitoring results following substrate emplacement to assess the performance of EISB. Groundwater samples during baseline event will be analyzed for VOCs and for the following biogeochemical parameters: alkalinity, common anions (chloride, sulfate, nitrate, nitrite), sulfide, total organic carbon (TOC), dissolved iron and manganese, total phosphorus, carbon dioxide, dissolved gases (methane, ethane, and ethene), total iron, DHC, DHB, and tracer (if used).

2 EISB Performance Monitoring

Groundwater monitoring will be performed for eight quarterly events following implementation of EISB to demonstrate effectiveness of the EISB remedy. A total of six monitoring wells (35AWW20, LHSMW07, 35AWW06, 35AWW11, 35AWW19, and proposed well, 35AWW23) will be included in the EISB monitoring program for collection and analysis of groundwater samples for VOCs and biogeochemical parameters. These wells were selected for their placement relative to the VOC plumes to monitor the effectiveness of EISB at LHAAP-35A (58). Other monitoring wells included in the semi-annual sampling program for this site will continue to be sampled.

4 FIELD PREPARATION AND METHODS

This section discusses the field preparation and field methods that will be utilized to complete the scope of work under the contingency RA.

4 1 Permitting

AECOM will prepare and obtain any necessary permits prior to initiation of EISB. This may include applicable requirements to satisfy Underground Injection Control guidelines.

4 2 Pre-mobili ation Activities

A pre-construction meeting will be held prior to initiation of field activities.

4 Preliminary Activities Mobili ation

A field schedule will be finalized with the selected drilling and/or injection subcontractor prior to mobilizing to the LHAAP-35A (58) site. An on-site project kickoff meeting will be held with the subcontractor to review the scope of work, including the drilling locations, utility clearances, and health and safety issues/requirements.

4 4 Site Utility Clearance

Existing utility maps will be utilized to locate subsurface utilities. All proposed locations of monitoring well borings and DPT injection points will be marked, Underground Service Alert (One Call) will be notified at least two working days prior to intrusive work, and the utility clearance standard operating procedure will be followed.

4 Monitoring Well Installation

Two new monitoring wells are proposed in the Shallow Zone. One well will be located in the center of the western plume and will be used to monitor EISB performance as discussed in **Section 1.2.1**. The second well will be installed to the south and downgradient from monitoring well 35AWW19 for 1,1-DCE plume extent delineation. The monitoring wells will be installed using hollow-stem auger or mud rotary drilling techniques. Well installation and development will follow the procedures specified in the Installation-Wide Work Plan (July 2014).

4 6 Site Survey

After completion of the sampling activities, the new monitoring wells will be surveyed by a licensed land surveyor. The survey activities (for location and elevation) will be performed in accordance with the Installation-Wide Work Plan (July 2014).

4 7 Investigation Derived Wastes

Investigation-derived waste (IDW) generated during the investigation and monitoring activities will include disposable sampling equipment, purge water, equipment decontamination fluids, drill cuttings, and used personal protective equipment (PPE). IDW (except PPE and disposable sampling equipment) will be containerized and stored on-site pending analytical results and waste profiling. The IDW management, storage, and disposal will be performed in accordance with the Installation-Wide Work Plan (July 2014).

4 Decontamination of E uipment and Personnel

Decontamination of equipment and personnel will be performed in accordance with the Installation-Wide Work Plan (July 2014).

4 Health and Safety Procedures

The health and safety procedures described in the LHAAP Installation-Wide Work Plan (July 2014) will be complied with during field activities. The field work is anticipated to be performed in Level D modified PPE that will include a hard hat, safety glasses, steel-toed boots, and nitrile gloves. Additional PPE may include bug spray, Tyvek® suits, poison oak block, and reflective safety vests, depending on the location and type of field activities.

The medical center associated with this project is the Workcare (Occupational Clinic) located at Marshall, Texas. An emergency contact list and emergency route map are included in the Installation-Wide Work Plan.

4 10 Quality Assurance Quality Control

All work will be performed in accordance with the Installation-Wide Work Plan (July 2014). The Installation-Wide Work Plan provides information on Quality Assurance/Quality Control procedures for this project, identifies personnel, procedures, controls, instructions, tests, verifications, documents, and forms to be used and the types of records to be maintained. The Installation-Wide Work Plan also addresses quality control requirements specific to each major feature of work.

REMEDY PERFORMANCE E ALUATION AND REPORTING

Reporting will consist of formal annual reports, supplemented by distribution of validated data to the Army as they become available, to shorten the lag time between sampling and providing analytical results to the regulators.

EISB evaluation reports will be completed at the end of the first year of quarterly monitoring and at the end of the second year of quarterly monitoring. Following completion of the contingency remedy, a Remedial Action Completion Report (RACR) Addendum will be prepared. The RACR Addendum will include an Operation and Maintenance (O&M) Plan detailing O&M of the well system and other features of the remedy. The information required for LTM and Five Year Review Reports for the LHAAP-35A (58) site is provided in 2013 RAWP.

1 EISB Evaluation

Technical evaluations of EISB effectiveness will be performed at the end of the first year and the end of the second year. The objective of the evaluations is to determine whether the injections in the western plume target area have been effective, or whether a second round of injections is needed to achieve RAOs. If there is a second round of injections, the design for the supplemental injections will be determined by the results of the groundwater sampling during performance monitoring. The report will include:

- Figures of the site, and groundwater elevation contours;
- Groundwater analytical results;
- Plume extent and COC concentrations over time;
- An evaluation of the effectiveness of EISB in creating conditions favorable for MNA, based on the first and second lines of evidence (see 2013 RAWP for description of these lines of evidence),
- A recommendation on whether a second round of injections is appropriate. If a second injection round is recommended, the injection design will optimized using the EISB performance monitoring results.

6 SCHEDULE

Table 6-1 shows the estimated duration for each major site activity and timeline. This schedule is reasonable and achievable. Adverse weather and unknown site conditions could affect this schedule.

Table 6-1: Schedule and Duration of Major Site Activities

Activit	Duration	Elapsed Time
Groundwater monitoring: EISB	1 week	2 months
Mobilization / site setup	1 day	-
Groundwater sampling	4 days	-
Demobilization	1 day	-
Well Installation	1 month	1 month
In situ bioremediation injections	2 week	3 months
Mobilization / site setup	2 day	-
Direct push injections	5 days	-
Demobilization	1 day	-
Groundwater monitoring: EISB: 8	24 Months	27 Month
Mobilization / site setup	1 day	-
Groundwater sampling	4 days	-
Demobilization	1 day	-
Estimated duration	6 days per event	-
In situ bioremediation evaluation	12 months	24 months
Achieve cleanup levels	TBD	TBD
Western Plume	TBD	TBD

TBD – to be determined

7 REFERENCES

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Subject: **Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **LHAAP; Call-In 515-603-3155 with Code 1063533#**
Date of Meeting: **January 18, 2018 – 10:30 AM CST**

Attendees:

Army BRAC:	Rose Zeiler (RMZ)- on the phone
AEC:	Nick Smith (NS)
EPA:	Rich Mayer (RM), Dorelle Harrison (DH), Kent Becher (KB)-United States Geological Survey (USGS) Liaison; and Barry Forsythe– on the phone
TCEQ:	April Palmie (AP) – on the phone
USACE:	Aaron Williams (AW)
Bhate:	Kim Nemmers (KN)
APTIM:	Susan Watson (SW) – on the phone and Bill Foss (BF)
USFWS:	Paul Bruckwicki (PB) – on the phone

Action Items
Open action items were discussed as follows.

Army

- Army provided a draft schedule for the primary documents prior to the meeting. RMZ noted that the document and issues (DI) tracker reflects a more aggressive schedule which does not allow for unforeseen issues and schedule delays. **CLOSED**
- EPA was asked to provide comments on Standard Operating Procedures (SOPs) previously presented prior to Bhate coming on-board. KN noted that the Installation-Wide Work Plan (IWWP) was issued draft to the regulators on January 17, 2018. **Therefore, this action item is overcome by events (OBE).** KB requested a hard copy of the IWWP. KN thought that more than one copy had been provided to RM and indicated that he would confirm before providing additional copies. KB and RM noted that they are having issues obtaining documents from the APTIM portal. BF and SW said that they would follow up.

Bhate/APTIM

- BF discussed the schedule for LHAAP-17 Pre-Design Investigation (PDI) activities as it has changed due to the weather. BF stated that the pumping test would commence late on Monday with the equipment planned for delivery on Friday. The PDI sampling is complete with the exception of the proposed soil sample locations that are currently under water. If the water recedes next week, then these soil sample locations will be sampled. Mostly sunny weather is expected based upon the weather forecasts. The step-test will be completed on Monday followed by the complete pumping test Tuesday through Friday with Recovery on Friday and Demobilization on Saturday.

EPA

- Surface water samplers were deployed in December and size samples were collected with all three ports filling up following the deployment of the passive samplers. A spring sampling event is currently planned.

TCEQ

- AP was not able to attend the meeting in person and requested a PDF of the Restoration Advisory Board (RAB) handouts be provided via electronic mail (e-mail).
- AP mentioned that the administrative record (AR) submittals are not presented in the DI trackers. AP asked if the AR submittals are still planned to be submitted quarterly. RMZ concurred. SW stated that a list has previously been provided with AR documents that need to be added. AP reminded the team that the final MMM and RAB information needs to be posted also. Bhate to provide AR submittals on the next DI tracker (**ongoing**).

AEC

- NS stated that the Army Engineer Research and Development Center (ERDC) sampling was completed. ERDC is ready to conduct training for the onsite perchlorate analysis method. RMZ stated that training should be planned for April.

USFWS

- Discussed moving Starr Ranch visit to April 2018, when AP and RMZ are able to be present.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN asked everyone to refer to the DI Tracking Table dated January 18, 2017.

- **Task 1** (Project Management)
  - KN stated that the December 2018 MMM minutes were finalized on January 12, 2018.
  - KN stated that the previous RAB meeting minutes were issued to the RAB members on November
  - IWWP - KN indicated that draft IWWP was provided to the Regulators on January 17, 2018. AP stated that she received her copy and asked her reviewers for comments within the 30-day window; however, AP expects that a schedule extension will be requested due to the inclusion of the Quality Assurance Project Plan (QAPP) within the IWWP.
- **Task 2** (LHAAP-02 Semi-Annual Groundwater Monitoring Report) – KN stated that the validated groundwater data was provided during the December 2017 MMM.
- **Task 3** (LHAAP-03 Record of Decision [ROD] and Explanation of Significant Difference [ESD]) – KN stated the ROD and ESD are currently under Army review. RMZ clarified that these two documents plus the LHAAP-58 Response to Regulator Comments on the ESD are with Army legal. RMZ will ask Army legal to review the response to regulator comments ahead of the other two documents. TCEQ requests all three of the documents, Revised DF ROD, the RTCs and the LHAAP-58 ESD for LHAAP-03, be released to the regulators for review at the same time. RMZ asked NS if he knew whether the Revised DF ROD for LHAAP-03 would need to go through the Board since it had already undergone review up-the-chain. NS indicated that he is leaving that up to RMZ's chain of command as signatory official on the document. RM stated that the EPA is committed to finalizing the ROD by the end of September 2018.
- **Task 4** (LHAAP-04 Remedial Design [RD]/Remedial Action Work Plan [RAWP]) – Monitoring wells were installed in December 2017. Groundwater was collected last week, and results are expected within 10 business days. This data will be presented in the RD/RAWP. BF stated that the new wells were producing and not running dry.

- **Task 5** (LHAAP-12 Annual Remedial Action – Operation [RA-O] Report) – The validated data packages were presented during the January 2018 MMM.
- **Task 6** (LHAAP-16 RAWP) – The RAWP for in situ enhanced bioremediation is currently being reviewed by the Army.
- **Task 7** (LHAAP-17 PDI Report) –
    - BF discussed the technical memorandum that presented the incorrect well labeling observed. BF stated that monitoring well 17WW12 was dry and labeled as an intermediate monitoring well. The question about why the well would be dry was raised and whether it was plugged. APTIM reviewed previous well logs and then pulled the tubing. APTIM determined based upon this review that the well had been incorrectly labeled in the field after installation. Since historical boring logs and survey data have the intermediate well labeled as 17WW11, the name plates will be switched in the field. Current logs and laboratory analytical information will be adjusted accordingly.
    - This incorrect labeling of the wells means that the previous detection in the intermediate zone is an error. The 990 microgram per liter detection of perchlorate from 2009 that was previously believed to be in the intermediate zone was actually from the shallow zone, and no intermediate zone exceedances have been detected. However, the shallow zone well (now 17WW12) was dry when sampling was attempted in November 2017. SW stated that the well will be checked regularly to try to sample them if they are no longer dry.
    - KB mentioned that an anomaly with the well depths was previously noted in a report that KB was prepared. KB stated that he would provide a copy to APTIM.
    - KN asked BF to review the schedule again in case anyone had previously missed the discussion early in the call.
    - SW stated that the shallow well at LHAAP-17 (17WW19) to the west was sampled Monday. SW also stated that corrections regarding the well naming were made to the RAB slides.
    - AP asked if it was typical to not note in the table that a monitoring well could not be sampled, as the validated data package omitted this information and did not present the monitoring well. SW stated that the data validation table is generated by an automatic system. RMZ indicated that this information would be included in the PDI Report, and SW concurred.
- **Task 9** (LHAAP-37) – Validated groundwater data was provided during the January 2018 MMM.
- **Task 10** (LHAAP-46) – Groundwater sampling is scheduled for February 2018.
- **Task 11** (LHAAP-50 RA-O Reports) – The Year 3 RA-O Report is currently under Army review. The validated groundwater data from the Year 4 RA-O was provided during the January 2018 MMM.
- **Task 12** (LHAAP-58 ESD and RA-O Report) – The Year 3 RA-O Report was posted onto the project portal on January 17, 2018. A hard copy and compact discs (CDs) should be delivered on Friday. As previously discussed, the response to regulator comments on the ESD is under Army legal review. The Revised Final RAWP has been issued.
- **Tasks 14 and 15** (MMRP Sites' RD) – The Land Use Control (LUC) Remedial Designs for LHAAP-001-R-01 and LHAAP-003-R-01 were provided for regulator review in December 2017. The validated data for site LHAAP-001-R001 was provided during the December 2017 MMM.
- **Task 16 (Groundwater Treatment Plant [GWTP])**

- KN discussed that the only issue that the GWTP is facing is freezing weather, but the plant has been operating each week.
- KN discussed that two compressors are being delivered to replace the existing compressors during the first full week in February 2018.
- KN explained that Bhate had just identified that the air sampling was not completed in the 4th Quarter. As a correction, Bhate will collect air samples in the next week or the following week to account for the 4th Quarter sampling. Then a second air sampling event will be completed in February or March 2018 for the 1st Quarter 2018. Based upon prior air sampling results not indicating any issues, AP and RM concurred with this correction.

- **Task 18** (Surface Water) –Surface water was sampled at the end of December 2017 but the analytical data had not been received in sufficient time to validate and provide to the Regulators or Public.

Schedule Next Managers' Meeting

- February 2018 MMM will be held Feburary 15, 2018 via conference call at 10:00 AM CST.
- Next RAB will be held on April 19, 2018. RMZ wanted to offer a tour of the LHAAP during the next RAB meeting. The tour will likely be Thursday afternoon. The MMM for April 2018 will be moved to 9:30am CST. Then the new contractor for LHAAP-18/24 will meet with the Regulators and Army either Friday morning or Wednesday afternoon.

Adjourned at 11:32 AM CST.

ACRONYM LIST

AEC	United States Army Environmental Command
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BF	Bill Foss
BRAC	Base Realignment and Closure
CD	Compact disc
CST	Central Standard Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
DI	Document and issues
E-mail	Electronic mail
EPA	United States Environmental Protection Agency
ERDC	Engineer Research and Development Center
ESD	Explanation of Significant Differences
GWTP	Ground Water Treatment Plant
IWWP	Installation Wide Work Plan
KB	Kent Becher
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MMM	Monthly Managers' Meeting

MMRP	Military Munitions Response Program
NS	Nick Smith
OBE	Overcome by events
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
SOP	Standard Operating Procedure
SW	Susan Watson
TCEQ	Texas Commission on Environmental Quality
UFP-QAPP	Uniform Federal Policy-Quality Assurance Policy Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

Document and Issue Tracking
January 18, 2018

Task	Description	Next Action	Tentative Delivery Date to Regulators	Current Status	Remarks
Task 1- General Project Management	Monthly Managers Meeting (MMM)	Next MMM at LHAAP on 1/18/2018 at 10:30 CST	N/A	• Meeting Minutes issued final for the December 13 , 2017 Meeting to Regulators and Army on 12/20/17 • TCEQ comments issued on 1/4/18 and revisions made • TCEQ and EPA concurred with changes on 1/10/18	
	Restoration Advisory Board (RAB) Meeting	Next RAB at LHAAP	N/A	• Meeting minutes provided to Regulators for RAB on 11/13/17 • Final minutes sent to RAB Members on 11/16/17 • Next RAB planned for January 18th	
	IWWP	Receive comments on Draft	February 12, 2018	• Issued to Regulators via portal on January 12, 2018 and delivered on January 16, 2018	
Task 2: LHAAP-02	LHAAP-02 Technical Memorandum for Semi-Annual	Submit Draft	September 11, 2018		Technical Memorandum will capture three years of semi-annual groundwater monitoring results
	Groundwater Monitoring	Validated Data Package	N/A	• Provided during December 2017 MMM	
Task 3: LHAAP-03	DF ROD	Issue as Revised Draft Final	April 20, 2018	• Under Army review	
	ESD (LHAAP-58)	Submit Draft	May 7, 2018	• Under Army review	
Task 4: LHAAP-04	Remedial Design/Remedial Action Work Plan	Submit Draft	March 22, 2018	• Install monitoring wells in December 2017 and sample ground water in January 2018	
Task 5: LHAAP-12	2017 Annual RA-O Report	Submit Draft	April 16, 2018	• Sampling completed in December 2017 • Validated data package to be presented at January 2018 MMM	
Task 6: LHAAP-16	Remedial Action Work Plan	Submit Draft	January 31, 2018	• Under Army review	

Document and Issue Tracking
January 18, 2018

Task	Description	Next Action	Tentative Delivery Date to Regulators	Current Status	Remarks
Task 7: LHAAP-17	PDI Report	Submit Draft	May 10, 2018	• PDI field work began November 2017 • Validated data package for samples collected in November 2017 to be presented at January 2018 MMM	
Task 9: LHAAP-37	Year 1 Quarter 1 RA-O Sampling	Validated Data Deliverable	January 2018	• Groundwater sampling completed in November 2017 • Validated data package to be presented at January 2018 MMM	
Task 10: LHAAP-46	Year 4 1st Semiannual RA-O Sampling	Validated Data Deliverable	March 2018	• Sampling scheduled for February 2018	
Task 11: LHAAP-50	Year 3 Annual RA-O Report	Submit Draft	February 20, 2018	• Under Army review	
	Year 4 1st Semiannual RA-O Sampling	Validated Data Package	January 2018	• Groundwater sampling completed in November 2017 • Validated data package to be presented at January 2018 MMM	
Task 12: LHAAP-58	LHAAP-58 Explanation of Significant Difference	Issue as Draft Final	To be determined	• Provided Draft ESD to Regulators on 11/13/2017 • TCEQ Comments Receive 12/5/2017 • EPA Comments Received on 11/30/2017 • Response to Regulator comments on the ESD is under Army review	
	LHAAP-58 Revised Final Remedial Action Work Plan (RAWP)			• Final RAWP was revised to change the substrate and add additional injection points • Received TCEQ and EPA comments on 1/9/18; Resolved comments on 1/9/18 • Issued with revisions as Final Revised via portal on 1/12/2018 and via hard copy on 1/16/18	
	LHAAP-58 Semi-Annual RA-O Report Year 3	Submit Draft	January 19, 2018	• Annual RA-O Report Year 3 is being prepared for Draft Submittal to Regulators on or before 1/19/2018. Groundwater sampling completed in November 2017 for Year 4 RA-O • Validated data package from Year 4 RAO to be presented at January 2018 MMM	
Task 13: LHAAP-67	Year 4 1st Semiannual RA-O Sampling	Validated Data Package	January 2018	• Groundwater sampling completed in November 2017 • Validated data package to be presented at January 2018 MMM	

Document and Issue Tracking
January 18, 2018

Task	Description	Next Action	Tentative Delivery Date to Regulators	Current Status	Remarks
Task 14: LHAAP-001-R-01	LHAAP-001-R-01 LUC Remedial Design	Receive Comments on Draft	January 29, 2018	• Issued to Regulators in December 20, 2017	
	LHAAP-001-R-01 2nd Annual Groundwater Monitoring Report	Submit Draft	March 28, 2018	• Sampling completed in November 2017; validated data provided in December 2017 MMM	
Task 15: LHAAP-001-R-03	LHAAP-001-R-03 LUC Remedial Design	Received Comments on Draft	January 29, 2018	• Issued to Regulators in December 20, 2017.	
Task 16 Groundwater Treatment Plant (GWTP)	4th Qtr 2017 GWTP Quarterly OM&M Report	Submit Draft	April 27, 2018	• Will begin preparation of report upon validation of December 2017 data	
Task 17: LHAAP-18/24	LHAAP-18/24 Annual Compliance Report	Submit Draft	April 27, 2018	• Groundwater sampling completed in December 2017	
Task 18: Surface Water	Annual Surface Water Sampling Report- Year 1			• Surface water sampling completed in December 2017	
Task 19: LUC Management	2017 Comprehensive LUC Management Plan			• Issued Final on 11/30/2017	

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LHAAP Data alidated
November - December 2017

LHAAP-12 *Annual Groundwater Sampling - December 2017*

VOLATILES (SW8260)

LHAAP-17 *Pre Design Investigation Groundwater Sampling - November 2017*

VOLATILES (SW8260)

LHAAP- 7 *Year 1 Quarter 1 RA-O Groundwater Sampling - November 2017*

VOLATILES (SW8260)

LHAAP- 0 *Semiannual MNA Groundwater Sampling - November 2017*

VOLATILES (SW8260)

LHAAP- *RA-O Year 4 Sampling – November 2017*

ALKALINITY (310.2)	METABOLIC ACIDS (HPLC-METACIDS)
PHOSPHORUS (365.4)	DECHLORINATING BACTERIA
ANIONS (9056)	DISSOLVED GASES (RSK-175)
METALS (6020A)	FERROUS IRON (SM3500FE)
VOLATILES (SW8260)	SULFIDE (376.1)
TOTAL ORGANIC CARBON (415.1)	1,4-DIOXANE (8270D SIM)

LHAAP-67 *Semiannual MNA Groundwater*

VOLATILES (SW8260)

LHAAP-12 Annual Groundwater Sampling - December 2017

	Sample ID		12WW20-120417		12WW21-120417		12WW21-120417-FD		12WW24-120417	
	Sample Date		12/4/2017		12/4/2017		12/4/2017		12/4/2017	
	Location Description:		Site 12 – NW, central region		Site 12 – N, middle region		Site 12 – N, middle region, Duplicate		Site 12 - East of landfill	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	26	
Trichloroethene	µg/L	5	< 1	U	< 1	U	< 1	U	83	
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - Undetected: The analyte was analyzed, and is an estimated Non-Detect.

MCL - Maximum Contaminant Limit

MSC - Medium-Specific Concentrations

U - Undetected: The analyte was analyzed for, but not detected.

mg/L - milligrams per liter

ug/L - micrograms per liter

Val Qual - Qualifiers applied by APTIM chemist during data validation

LHAAP-17 Pre Design Investigation Groundwater Sampling- November 2017

		Sample ID	130-111417		17WW01-111517		17WW02-111517		17WW02-111517-FD		17WW03-111417		17WW04-111617		17WW05-111617		17WW06-111617	
		Sample Date	11/14/2017		11/14/2017		11/15/2017		11/15/2017		11/14/2017		11/16/2017		11/16/2017		11/16/2017	
		Location Description:	Shallow Zone, impacted, outside site boundary		Shallow Zone impacted, within site boundary		Shallow Zone, impacted, within site boundary		Shallow Zone, impacted, within site boundary, Duplicate		Shallow Zone, impacted, within site boundary		Shallow Zone, unimpacted, outside site boundary		Deep Zone, unimpacted, outside site boundary		Shallow Zone, impacted, outside site boundary	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	2.5	J	< 4	U	2500	J	3400	J	< 4	U	< 4	U	< 4	U	110,000	
1,1-Dichloroethene	µg/L	7	< 1	U	240		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	7.6	
1,2-Dichloroethane	µg/L	5	< 1	U	87		3.3		3.8		< 1	U	< 1	U	< 1	U	8.4	
cis-1,2-Dichloroethene	µg/L	70	< 1	U	3700		2.5		2.7		0.7	J	< 1	U	< 1	U	9.4	
Trichloroethene	µg/L	5	2.1		6100	J	6.2		7.4		5.3		< 1	U	< 1	U	260	
Vinyl chloride	µg/L	2	< 1	U	4		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-17 Pre Design Investigation Groundwater Sampling- November 2017

		Sample ID	17WW07-111417		17WW08-111417		17WW09-111517		17WW10-111517		17WW11-111617		17WW13-111417		17WW14-111517		17WW15-111517	
		Sample Date	11/14/2017		11/14/2017		11/15/2017		11/15/2017		11/16/2017		11/14/2017		11/15/2017		11/15/2017	
		Location Description:	Intermediate Zone, unimpacted, within site boundary		Shallow Zone, unimpacted, within site boundary		Intermediate Zone, unimpacted, outside site boundary		Shallow Zone, unimpacted, outside site boundary		**Intermediate** Zone, unimpacted,within site boundary		Shallow Zone, unimpacted, within site boundary		Shallow Zone, unimpacted, outside site boundary		Intermediate Zone, unimpacted, outside site boundary	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	< 4	U	< 4	U	< 4	U	1.6	J	< 4	U	< 4	U	2.5	J	< 4	U
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	1.5		< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-17 Pre Design Investigation Groundwater Sampling- November 2017

		Sample ID	17WW16-111517		17WW17-111517		17WW17-111517-FD		17WW18-111517		18WW10-111517		18WW14-111617		18WW15-111617	
		Sample Date	11/15/2017		11/15/2017		11/15/2017		11/15/2017		11/15/2017		11/16/2017		11/16/2017	
		Location Description:	Deep Zone, unimpacted, outside site boundary		Intermediate Zone, unimpacted, within site boundary		Intermediate Zone, unimpacted, within site boundary, Duplicate		Intermediate Zone, unimpacted, outside site boundary		Shallow Zone, impacted, outside site boundary		Shallow Zone, unimpacted, outside site boundary		Intermediate Zone, unimpacted, outside site boundary	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	< 4	U	< 4	U	< 4	U	< 4	U	52		< 4	U	< 4	U
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	1.9		1.9		< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more ana J - Estimated: The analyte was positively identified, the quantitation is an estimation

UJ - Undetected: The analyte was analyzed, and is an estimated Non-Detect.

MCL - Maximum Contaminant Limit

MSC - Medium-Specific Concentrations

*PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protection

U - Undetected: The analyte was analyzed for, but not detected.

mg/L - milligrams per liter

ug/L - micrograms per liter

Val Qual - Qualifiers applied by APTIM chemist during data validation

LHAAP-37 Year 1 Quarter 1 RA-O Groundwater Sampling - November 2017

		Sample ID	35BWW01-110817		35BWW04-110917		35BWW04-110917-FD		35BWW05-110817		35BWW06-110817		35BWW07-110917	
		Sample Date	11/8/2017		11/9/2017		11/9/2017		11/8/2017		11/8/2017		11/9/2017	
		Location Description:	Shallow zone, unimpacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary Duplicate		Shallow zone, impacted, within site boundary		Lower shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted downgradient	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 1	U	7.3		8.2		1.5		< 1	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 1	U	1.1		7		< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-37 Year 1 Quarter 1 RA-O Groundwater Sampling - November 2017

		Sample ID	35BWW08-110717		35BWW09-110717		35BWW10-110717		35BWW11-110817		35BWW12-110917		35BWW13-110717	
		Sample Date	11/7/2017		11/7/2017		11/7/2017		11/8/2017		11/9/2017		11/7/2017	
		Location Description:	Shallow zone, unimpacted, within site boundary		Shallow zone, impacted outside site boundary		Shallow, impacted, within site boundary		Shallow zone, v. low impact, within site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, v. low impact, crossgradient	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 1	U	0.84	J	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	1.7		< 1	U	< 1	U	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 1	U	< 1	U	31		< 1	U	4.8		0.99	J
Trichloroethene	µg/L	5	0.89	J	180		33		< 1	U	0.62	J	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-37 Year 1 Quarter 1 RA-O Groundwater Sampling - November 2017

		Sample ID	35BWW13-110717-FD		35BWW14-110717		35BWW15-110717		35BWW16-110717		35BWW17-110717		35BWW18-110717	
		Sample Date	11/7/2017		11/7/2017		11/7/2017		11/7/2017		11/7/2017		11/7/2017	
		Location Description:	Shallow zone, v. low impact, outside site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, within site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, unimpacted, within site boundary		Shallow zone, unimpacted, outside site boundary	
Parameter	Units	M**CL**/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 1	U	8.4		4.2		1.1		< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	2.4		1.1		< 1	U	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	0.84	J	53		12		9.2		2.6		< 1	U
Trichloroethene	µg/L	5	< 1	U	24		15		4.2		1.1		< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	UJ	< 1	U

LHAAP-37 Year 1 Quarter 1 RA-O Groundwater Sampling - November 2017

		Sample ID	35BWW19-110717		35BWW20-110817		35BWW23-110917		35BWW24-110817		35BWW25-110817		35BWW25-110817-FD	
		Sample Date	11/7/2017		11/8/2017		11/9/2017		11/8/2017		11/8/2017		11/8/2017	
		Location Description:	Shallow zone, unimpacted, outside site boundary		Shallow sone, impacted, within site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, unimpacted, outside site boundary		Shallow zone, impacted, outside site boundary		Shallow zone, impacted, outside site boundary DUPLICATE	
Parameter	Units	M**CL/MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 1	U	25		< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	4.7		< 1	U	< 1	U	7.6		7.5	
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-37 Year 1 Quarter 1 RA-O Groundwater Sampling - November 2017

		Sample ID	35BWW26-110917		LHSMW58-110817	
		Sample Date	11/9/2017		11/8/2017	
		Location Description:	Shallow zone, unimpacted, within site boundary		Shallow zone, impacted, within site boundary	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 1	U	20	
Trichloroethene	µg/L	5	< 1	U	1.6	
Vinyl chloride	µg/L	2	< 1	U	< 1	U

Note:

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte specific quality control criteria

UJ - Undetected: The analyte was analyzed, and is an estimated Non-Detect.

MCL - Maximum Contaminant Limit

MSC - Medium-Specific Concentrations

U - Undetected: The analyte was analyzed for, but not detected.

mg/L - milligrams per liter

ug/L - micrograms per liter

Val Qual - Qualifiers applied by APTIM chemist during data validation

LHAAP-50 Semiannual MNA Sampling, November 2017

		Sample ID	50WW05-111017		50WW05-111017-FD		50WW06-111317		50WW08-111317		50WW08-111317-FD		50WW09-111017	
		Sample Date	11/10/2017		11/10/2017		11/13/2017		11/13/2017		11/13/2017		11/10/2017	
		Location Description:	Site 50-NE, lower shallow, outside site boundary		Site 50-NE, lower shallow, outside site boundary. Duplicate		Site 50 - ENE, outside site boundary		Site 50 - E, upper shallow, inside site boundary. Sampled quarterly		Site 50 - E, upper shallow, inside site boundary. Sampled quarterly Duplicate		Site 50-E, lower shallow, inside site boundary	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	< 4	U	< 4	U	950		27		25		< 4	U
1,1-Dichloroethene	µg/L	7	1.5		1.4		< 1	U	< 1	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	1.3		1.3		< 1	U	0.98	J	1.2	J	< 1	U
cis-1,2-Dichloroethene	µg/L	70	16	J	13	J	1.9		19		23		< 1	U
Tetrachloroethene	µg/L	5	0.91	J	0.83	J	< 1	U	< 1		1.1		< 1	U
Trichloroethene	µg/L	5	180		160		13		180	J	240	J	4.9	
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-50 Semiannual MNA Sampling, November 2017

		Sample ID	50WW10-111017		50WW11-111317		50WW12-111417		50WW13-111317		50WW14-111317		50WW15-111017	
		Sample Date	11/10/2017		11/13/2017		11/14/2017		11/13/2017		11/13/2017		11/10/2017	
		Location Description:	Site 50 - E, intermediate, inside site boundary.		Site 50 - ENE, upper shallow, outside site boundary		Site 50 - ENE, upper shallow, outside site boundary		Site 50 - E, upper shallow, outside site boundary		Site 50 - E, lower shallow, outside site boundary, along S. Crockett Ave.,		Site 50 - NNE, upper shallow, outside site boundary, along Goose Prairie Creek	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	< 4	U	20000		21000		13000		< 4	U	< 4	U
1,1-Dichloroethene	µg/L	7	< 1	U	33		0.81	J	< 50	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 1	U	30		0.55	J	83		< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	78		< 1	U	410		2.7		4.2	
Tetrachloroethene	µg/L	5	< 1	U	< 10	U	< 1	U	< 50	U	< 1	U	1.3	
Trichloroethene	µg/L	5	< 1	U	4700		41		13000		8.2		3.6	
Vinyl chloride	µg/L	2	< 1	U	< 10	U	< 1	U	< 50	U	< 1	U	0.85	J

LHAAP-50 Semiannual MNA Sampling, November 2017

		Sample ID	50WW16-111417		50WW17-111017		50WW18-111017		50WW21-111017		50WW22-111317		50WW23-111417	
		Sample Date	11/14/2017		11/10/2017		11/10/2017		11/10/2017		11/13/2017		11/14/2017	
		Location Description:	Site 50 - NE, upper shallow, outisde site boundary, along Goose Prairie Creek		Site 50 - NE, fully penetrating shallow, outside site boundary, near Goose Prairie Creek		Site 50 - NE, upper shallow, outside site boundary, along Goose Prairie Creek. Sampled		Site 50 - E, upper shallow, outside site boundary, East Side of S.Crockett Ave.		Site 50 - SE, upper shallow, outside site boundary		Site 50 - E, upper shallow, outside site boundary.	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	< 4	U	< 4	U	< 4	U	< 4	U	< 4	U	< 4	U
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 1	U	< 1	U	< 1	UJ	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	1.7	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-50 Semiannual MNA Sampling, November 2017

	Sample ID		50WW24-111017		50WW27-111017	
	Sample Date		11/10/2017		11/10/2017	
	Location Description:		Site 50 -ENE, upper shallow, outside site boundary		Site 50-N, upper shallow, outside site boundary, east of S. Crockett Ave.	
Parameter	Units	MCL/**MSC**	Result	Val Qual	Result	Val Qual
Perchlorate	µg/L	17*	< 4	U	< 4	U
1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U
1,2-Dichloroethane	µg/L	5	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U
Tetrachloroethene	µg/L	5	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - Undetected: The analyte was analyzed, and is an estimated Non-Detect.

MCL - Maximum Contaminant Limit

*PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration

MSC - Medium-Specific Concentrations

U - Undetected: The analyte was analyzed for, but not detected. mg/L - milligrams per liter

ug/L - micrograms per liter

Val Qual - Qualifiers applied by APTIM chemist during data validation

LHAAP-58 Remedial Action Operation Validated Data - November 2017

Location ID: Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.
Alkalinity (310.2)												
Alkalinity, Total	mg/L	NV	**3310**	NA	NA	**666**	NA	**4360**	**286**	**62.1**	**452**	NA
Phosphorus (365.4)												
Phosphorus	mg/L	NV	**2.70**	NA	NA	**0.0220 J**	NA	**3.55**	**0.0660**	**0.322**	**0.0500**	NA
Total Organic Carbon (415.1)												
Total Organic Carbon	mg/L	NV	**191**	NA	NA	**2.29**	NA	**581**	**6.79**	**3.89**	**5.05**	NA
Metals (6020A)												
Total Arsenic	mg/L	0.01	**0.0350**	< 0.00200 U	NA	**0.000590 J**	**0.000814 J**	**0.148**	**0.000468 J**	NA	NA	NA
Total Iron	mg/L	NV	**45.8**	NA	NA	**0.175 J**	NA	**31.6**	**0.315**	**0.593**	**0.632**	NA
Total Manganese	mg/L	14	**7.11**	NA	NA	**0.422**	NA	**3.58**	**0.442**	**0.0641**	**0.487**	NA
Dissolved Iron	mg/L	NV	**42.5**	NA	NA	**0.0617 J**	NA	**31.6**	**0.0307 J**	< 0.200 U	< 0.200 U	NA
Dissolved Manganese	mg/L	14	**8.54**	NA	NA	**0.403**	NA	**5.70**	**0.128**	**0.0662**	**0.468**	NA
Volatile Organic Compounds (8260C)												
1,1,1,2-Tetrachloroethane	µg/L	110	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1,1-Trichloroethane	µg/L	200	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1,2,2-Tetrachloroethane	µg/L	14	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1-Dichloroethane	µg/L	10000	< 5.0 U	< 1.0 U	< 1.0 U	**0.78 J**	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1-Dichloroethene	µg/L	7	< 5.0 U	< 1.0 U	< 1.0 U	**3.9**	NA	< 10 U	< 1.0 U	< 1.0 U	**12**	< 1.0 UJ
1,1-Dichloropropene	µg/L	2.9	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,3-Trichlorobenzene	µg/L	310	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,3-Trichloropropane	µg/L	0.0041	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-58 Remedial Action Operation Validated Data - November 2017

Location ID: Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.
1,2,4-Trichlorobenzene	µg/L	70	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,4-Trimethylbenzene	µg/L	5100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dichlorobenzene	µg/L	600	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dichloroethane	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dichloropropane	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,3,5-Trimethylbenzene	µg/L	5100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,3-Dichlorobenzene	µg/L	3100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,3-Dichloropropane	µg/L	29	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,4-Dichlorobenzene	µg/L	75	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
2,2-Dichloropropane	µg/L	42	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	61000	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	2000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
2-Hexanone	µg/L	6100	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	2000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
4-Isopropyltoluene	µg/L	10000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
4-Methyl-2-pentanone	µg/L	8200	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	NA	**12 J**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	92000	**71**	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromobenzene	µg/L	2000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromochloromethane	µg/L	4100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ

LHAAP-58 Remedial Action Operation Validated Data - November 2017

Location ID: Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.
Bromodichloromethane	µg/L	4.6	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromoform	µg/L	36	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	140	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	10000	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chlorobenzene	µg/L	100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chloroethane	µg/L	41000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chloroform	µg/L	1000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chloromethane	µg/L	220	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	**38**	**0.78 J**	< 1.0 U	< 1.0 U	< 1.0 UJ
cis-1,3-Dichloropropene	µg/L	5.3	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Dibromochloromethane	µg/L	34	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Dibromomethane	µg/L	380	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Dichlorodifluoromethane	µg/L	20000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Hexachlorobutadiene	µg/L	20	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Isopropylbenzene	µg/L	1000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
m,p-Xylene	µg/L	10000	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 UJ
Methylene chloride	µg/L	5	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 20 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 UJ
Naphthalene	µg/L	2000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	4100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
n-Propylbenzene	µg/L	4100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ

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Location ID: Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.
o-Xylene	µg/L	10000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
sec-Butylbenzene	µg/L	4100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Styrene	µg/L	100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
tert-Butylbenzene	µg/L	4100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Tetrachloroethene	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	**12**	**350**	< 1.0 U	< 1.0 U	< 1.0 UJ
Toluene	µg/L	1000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
trans-1,2-Dichloroethene	µg/L	100	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
trans-1,3-Dichloropropene	µg/L	29	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Trichloroethene	µg/L	5	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	**33**	**97**	< 1.0 U	< 1.0 U	< 1.0 UJ
Trichlorofluoromethane	µg/L	31000	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride		2	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 10 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Metabolic Acids (HPLC-METACIDS)												
Acetic Acid	mg/L	NV	**8.8**	NA	NA	NA	NA	**43**	< 4.0 U	< 4.0 U	NA	NA
Butyric Acid	mg/L	NV	< 2.0 U	NA	NA	NA	NA	< 2.0 U	< 2.0 U	< 2.0 U	NA	NA
Lactic Acid	mg/L	NV	**3.4**	NA	NA	NA	NA	**26**	< 2.0 U	< 2.0 U	NA	NA
Propionic Acid	mg/L	51	**8.2**	NA	NA	NA	NA	**24**	< 2.0 U	< 2.0 U	NA	NA
Pyruvic Acid	mg/L	NV	< 0.20 U	NA	NA	NA	NA	**3.7**	< 0.20 U	< 0.20 U	NA	NA

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Location ID: Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.
Anions (9056)												
Chloride	mg/L	NV	**1020**	NA	NA	**1040**	NA	**2060**	**1520**	**6.86**	**2650**	NA
Nitrate	mg/L	10	< 0.100 U	NA	NA	**2.12**	NA	**0.249**	< 0.100 U	< 0.100 U	< 0.100 U	NA
Nitrite	mg/L	1	< 0.100 U	NA	NA	< 0.100 U	NA	< 0.100 U	< 0.100 U	< 0.100 U	< 0.100 U	NA
Sulfate	mg/L	NV	**40.8**	NA	NA	**1560**	NA	**2.03**	**1010**	**59.4**	**1290**	NA
Semi-Volatile Organic Compounds (8270D SIM)												
1,4-Dioxane	µg/L	26	**1.4**	**0.99**	**1.9**	< 0.20 U	NA	**1.2**	**1.6**	**0.13**	**1.6 J**	**0.20 J**
Dissolved Gases (RSK-175)												
Carbon Dioxide	µg/L	NV	**310,000**	NA	NA	**200000**	NA	**190,000**	**290,000**	**340,000**	**230000**	NA
Ethane	µg/L	NV	< 0.60 U	NA	NA	< 0.60 U	NA	< 0.60 U	< 0.60 U	< 0.60 U	< 0.60 U	NA
Ethene	µg/L	NV	**1.2**	NA	NA	< 1.0 U	NA	**0.56 J**	< 1.0 U	< 1.0 U	< 1.0 U	NA
Methane	µg/L	NV	**620**	NA	NA	**0.32 J**	NA	**670**	**1.5**	< 1.3 U	< 1.3 U	NA
Ferrous Iron (SM3500Fe)												
Ferrous Iron	mg/L	NV	**18.9 J**	NA	NA	**0.09 J**	NA	**17.4 J**	**0.06 J**	**0.07 J**	**0.08 J**	NA
Sulfide (376.1)												
Sulfide	mg/L	NV	**10.4**	NA	NA	< 1.0 U	NA	**30.4**	< 1.0 U	**1.24**	< 1.0 U	NA

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Location ID: Sample Date:	Units	MCL/MSC	03WW01-111517 11/15/17	35AWW01_111617 11/16/17	35AWW05-111317 11/13/17	35AWW06-111417 11/14/17	35AWW07_111717 11/17/17	35AWW08-111517 11/15/17	35AWW09-111517 11/15/17	35AWW10-111517 11/15/17	35AWW11-111417 11/14/17	35AWW12_111617 11/16/17
Location Description			Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - SW, outside the site boundary.	Site 58 - E, outside site boundary.	Site 58 - E, inside site boundary.	Site 58 - E, inside site boundary.	Site 58 - ESE, inside site boundary.	Site 58 - SE, inside site boundary.	Site 58 - E, outside site boundary.
Dechlorinating Bacteria												
BAV1 Vinyl Chloride Reductase		NV	< 2.10 U	NA	NA	NA	NA	< 3.80 U	< 0.50 U	< 0.90 U	NA	NA
Dehalobacter spp.	cells/mL	NV	< 20.8 U	NA	NA	NA	NA	< 38.5 U	**1.40 J**	< 9.10 U	NA	NA
Dehalococoides	cells/mL	NV	**35300**	NA	NA	NA	NA	**3060000**	**1.5**	< 0.90 U	NA	NA
tceA Reductase	cells/mL	NV	< 2.10 U	NA	NA	NA	NA	< 3.80 U	< 0.50 U	< 0.90 U	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	**53200**	NA	NA	NA	NA	**4720000**	**2.2**	< 0.90 U	NA	NA

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

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Location ID: Sample Date:	Units	MCL/MSC	35AWW13_ 111617 11/16/17	35AWW14_ 111717 11/17/17	35AWW15_ 111617 11/16/17	35AWW16- 111317 11/13/17	35AWW16- 111317-a 11/13/17	35AWW17- 111317 11/13/17	35AWW18- 111317 11/13/17	35AWW19_ 111717 11/17/17	35AWW20- 111417 11/14/17	35AWW20- 111417-a 11/14/17
Location Description			Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary, near Building 744-A. Field duplicate.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.
Alkalinity (310.2)												
Alkalinity, Total	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**831**	**834**
Phosphorus (365.4)												
Phosphorus	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**0.0580**	**0.0750**
Total Organic Carbon (415.1)												
Total Organic Carbon	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**13.7**	**13.8**
Metals (6020A)												
Total Arsenic	mg/L	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Iron	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**0.531**	**0.650**
Total Manganese	mg/L	14	NA	NA	NA	NA	NA	NA	NA	NA	**1.47**	**1.43**
Dissolved Iron	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**0.309**	**0.311**
Dissolved Manganese	mg/L	14	NA	NA	NA	NA	NA	NA	NA	NA	**1.53**	**1.54**
Volatile Organic Compounds (8260C)												
1,1,1,2-Tetrachloroethane	µg/L	110	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	14	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**48**	**45**
1,1-Dichloroethane	µg/L	10000	< 1.0 U	**7.3**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**1.4**	**320**	**320**
1,1-Dichloroethene	µg/L	7	< 1.0 U	**8.7**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**7.7**	**1900**	**2000**
1,1-Dichloropropene	µg/L	2.9	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	310	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.0041	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

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Location ID: Sample Date:	Units	MCL/MSC	35AWW13_ 111617 11/16/17	35AWW14_ 111717 11/17/17	35AWW15_ 111617 11/16/17	35AWW16- 111317 11/13/17	35AWW16- 111317-a 11/13/17	35AWW17- 111317 11/13/17	35AWW18- 111317 11/13/17	35AWW19_ 111717 11/17/17	35AWW20- 111417 11/14/17	35AWW20- 111417-a 11/14/17
Location Description			Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary, near Building 744-A. Field duplicate.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	5100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**8.0**	**7.7**
1,2-Dichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**1.9**	**9.1**	**8.7**
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	5100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	3100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	29	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	42	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	61000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	2000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	6100	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	2000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Isopropyltoluene	µg/L	10000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	8200	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	92000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**3.1**	**2.9**
Bromobenzene	µg/L	2000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	4100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

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Location ID: Sample Date:	Units	MCL/MSC	35AWW13_ 111617 11/16/17	35AWW14_ 111717 11/17/17	35AWW15_ 111617 11/16/17	35AWW16- 111317 11/13/17	35AWW16- 111317-a 11/13/17	35AWW17- 111317 11/13/17	35AWW18- 111317 11/13/17	35AWW19_ 111717 11/17/17	35AWW20- 111417 11/14/17	35AWW20- 111417-a 11/14/17
Location Description			Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary, near Building 744-A. Field duplicate.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.
Bromodichloromethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	36	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	140	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	10000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	41000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	1000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloromethane	µg/L	220	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	< 1.0 U	**3.5**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**53**	**50**
cis-1,3-Dichloropropene	µg/L	5.3	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	34	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	380	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	20000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	20	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/L	1000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Naphthalene	µg/L	2000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Propylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

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Location ID: Sample Date:	Units	MCL/MSC	35AWW13_111617 11/16/17	35AWW14_111717 11/17/17	35AWW15_111617 11/16/17	35AWW16-111317 11/13/17	35AWW16-111317-a 11/13/17	35AWW17-111317 11/13/17	35AWW18-111317 11/13/17	35AWW19_111717 11/17/17	35AWW20-111417 11/14/17	35AWW20-111417-a 11/14/17
Location Description			Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary, near Building 744-A. Field duplicate.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.
o-Xylene	µg/L	10000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**0.80 J**	**0.77 J**
Toluene	µg/L	1000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**6.7**	**5.6**
trans-1,3-Dichloropropene	µg/L	29	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	5	< 1.0 U	**7.4**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**320**	**320**
Trichlorofluoromethane	µg/L	31000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride		2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**78**	**75**
Metabolic Acids (HPLC-METACIDS)												
Acetic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butyric Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lactic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	51	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyruvic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Location ID: Sample Date:	Units	MCL/MSC	35AWW13_ 111617 11/16/17	35AWW14_ 111717 11/17/17	35AWW15_ 111617 11/16/17	35AWW16- 111317 11/13/17	35AWW16- 111317-a 11/13/17	35AWW17- 111317 11/13/17	35AWW18- 111317 11/13/17	35AWW19_ 111717 11/17/17	35AWW20- 111417 11/14/17	35AWW20- 111417-a 11/14/17
Location Description			Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary, near Building 744-A. Field duplicate.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.
Anions (9056)												
Chloride	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**1730**	**1630**
Nitrate	mg/L	10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.100 U	< 0.100 U
Nitrite	mg/L	1	NA	NA	NA	NA	NA	NA	NA	NA	< 0.100 U	< 0.100 U
Sulfate	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**2150**	**1850**
Semi-Volatile Organic Compounds (8270D SIM)												
1,4-Dioxane	µg/L	26	**1.2**	**4.1**	**0.86**	**1.2 J**	**1.5**	**0.70**	**1.3**	< 0.10 U	**28**	**110**
Dissolved Gases (RSK-175)												
Carbon Dioxide	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**230000**	**230000**
Ethane	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	< 0.60 U	< 0.60 U
Ethene	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**0.38 J**	**0.41 J**
Methane	µg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**17**	**18**
Ferrous Iron (SM3500Fe)												
Ferrous Iron	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	**0.45 J**	**0.43 J**
Sulfide (376.1)												
Sulfide	mg/L	NV	NA	NA	NA	NA	NA	NA	NA	NA	< 1.0 U	< 1.0 U

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Location ID: Sample Date:	Units	MCL/MSC	35AWW13_ 111617 11/16/17	35AWW14_ 111717 11/17/17	35AWW15_ 111617 11/16/17	35AWW16- 111317 11/13/17	35AWW16- 111317-a 11/13/17	35AWW17- 111317 11/13/17	35AWW18- 111317 11/13/17	35AWW19_ 111717 11/17/17	35AWW20- 111417 11/14/17	35AWW20- 111417-a 11/14/17
Location Description			Site 58 - NE, inside site boundary.	Site 58 - SE, outside site boundary.	Site 58 - W, inside site boundary.	Site 58 - SW, outside site boundary, near Building 744-A.	Site 58 - SW, outside site boundary, near Building 744-A. Field duplicate.	Site 58 - SW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SSW, outside site boundary.	Site 58 - SW, inside site boundary, between Building 716 and 113.	Site 58 - SW, inside site boundary, between Building 716 and 113. Field Duplicate.
Dechlorinating Bacteria												
BAV1 Vinyl Chloride Reductase		NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dehalobacter spp.	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dehalococoides	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
tceA Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

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Location ID: Sample Date:	Units	MCL/MSC	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
Alkalinity (310.2)								
Alkalinity, Total	mg/L	NV	NA	NA	NA	NA	**750**	NA
Phosphorus (365.4)								
Phosphorus	mg/L	NV	NA	NA	NA	NA	**0.0250 J**	NA
Total Organic Carbon (415.1)								
Total Organic Carbon	mg/L	NV	NA	NA	NA	NA	**6.81**	NA
Metals (6020A)								
Total Arsenic	mg/L	0.01	NA	NA	**0.000499 J**	< 0.00200 U	**0.000724 J**	**0.000850 J**
Total Iron	mg/L	NV	NA	NA	NA	NA	**1.13**	NA
Total Manganese	mg/L	14	NA	NA	NA	NA	**0.131**	NA
Dissolved Iron	mg/L	NV	NA	NA	NA	NA	**0.310**	NA
Dissolved Manganese	mg/L	14	NA	NA	NA	NA	**0.134**	NA
Volatile Organic Compounds (8260C)								
1,1,1,2-Tetrachloroethane	μg/L	110	< 1.0 UJ	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,1,1-Trichloroethane	μg/L	200	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,1,2,2-Tetrachloroethane	μg/L	14	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,1,2-Trichloroethane	μg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	**3.6**	NA
1,1-Dichloroethane	μg/L	10000	< 1.0 U	< 1.0 U	NA	**4.2**	**50**	NA
1,1-Dichloroethene	μg/L	7	< 1.0 U	< 1.0 U	NA	**12**	**600**	NA
1,1-Dichloropropene	μg/L	2.9	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2,3-Trichlorobenzene	μg/L	310	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2,3-Trichloropropane	μg/L	0.0041	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA

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Location ID: Sample Date:	Units	MCL/MSC	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2,4-Trimethylbenzene	µg/L	5100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,2-Dichloroethane	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	**1.5**	NA
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,3,5-Trimethylbenzene	µg/L	5100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,3-Dichlorobenzene	µg/L	3100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,3-Dichloropropane	µg/L	29	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
2,2-Dichloropropane	µg/L	42	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
2-Butanone	µg/L	61000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
2-Chlorotoluene	µg/L	2000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
2-Hexanone	µg/L	6100	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
4-Chlorotoluene	µg/L	2000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
4-Isopropyltoluene	µg/L	10000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
4-Methyl-2-pentanone	µg/L	8200	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
Acetone	µg/L	92000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
Benzene	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Bromobenzene	µg/L	2000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Bromochloromethane	µg/L	4100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA

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Location ID: Sample Date:	Units	MCL/MSC	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
Bromodichloromethane	µg/L	4.6	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Bromoform	µg/L	36	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Bromomethane	µg/L	140	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Carbon disulfide	µg/L	10000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Chloroethane	µg/L	41000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Chloroform	µg/L	1000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Chloromethane	µg/L	220	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
cis-1,2-Dichloroethene	µg/L	70	< 1.0 U	< 1.0 U	NA	**14**	**11**	NA
cis-1,3-Dichloropropene	µg/L	5.3	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Dibromochloromethane	µg/L	34	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Dibromomethane	µg/L	380	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Dichlorodifluoromethane	µg/L	20000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Hexachlorobutadiene	µg/L	20	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Isopropylbenzene	µg/L	1000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
m,p-Xylene	µg/L	10000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	NA
Naphthalene	µg/L	2000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
n-Butylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
n-Propylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA

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Location ID: Sample Date:	Units	MCL/MSC	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
o-Xylene	µg/L	10000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
sec-Butylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Styrene	µg/L	100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
tert-Butylbenzene	µg/L	4100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Toluene	µg/L	1000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
trans-1,3-Dichloropropene	µg/L	29	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Trichloroethene	µg/L	5	< 1.0 U	< 1.0 U	NA	**5.8**	**39**	NA
Trichlorofluoromethane	µg/L	31000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	NA
Vinyl chloride		2	< 1.0 U	< 1.0 U	NA	**2.2**	**15**	NA
Metabolic Acids (HPLC-METACIDS)								
Acetic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA
Butyric Acid	mg/L	NV	NA	NA	NA	NA	NA	NA
Lactic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	51	NA	NA	NA	NA	NA	NA
Pyruvic Acid	mg/L	NV	NA	NA	NA	NA	NA	NA

LHAAP-58 Remedial Action Operation Validated Data - November 2017

Location ID: Sample Date:	Units	MCL/MSC	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
Anions (9056)								
Chloride	mg/L	NV	NA	NA	NA	NA	**2540**	NA
Nitrate	mg/L	10	NA	NA	NA	NA	< 0.100 U	NA
Nitrite	mg/L	1	NA	NA	NA	NA	< 0.100 U	NA
Sulfate	mg/L	NV	NA	NA	NA	NA	**2940**	NA
Semi-Volatile Organic Compounds (8270D SIM)								
1,4-Dioxane	µg/L	26	**1.8**	**0.63**	NA	**0.99**	**120**	NA
Dissolved Gases (RSK-175)								
Carbon Dioxide	µg/L	NV	NA	NA	NA	NA	**220000**	NA
Ethane	µg/L	NV	NA	NA	NA	NA	< 0.60 U	NA
Ethene	µg/L	NV	NA	NA	NA	NA	< 1.0 U	NA
Methane	µg/L	NV	NA	NA	NA	NA	**18**	NA
Ferrous Iron (SM3500Fe)								
Ferrous Iron	mg/L	NV	NA	NA	NA	NA	**0.4 J**	NA
Sulfide (376.1)								
Sulfide	mg/L	NV	NA	NA	NA	NA	< 1.0 U	NA

LHAAP-58 Remedial Action Operation Validated Data - November 2017

Location ID: Sample Date:	Units	MCL/MSC	35AWW21-111317 11/13/17	35AWW22_111717 11/17/17	LHSMW03_111717 11/17/17	LHSMW06_111717 11/17/17	LHSMW07-111417 11/14/17	1004TW001_111717 11/17/17
Location Description			Site 58 - ESE, outside site boundary, beside Building 725.	Site 58 - ENE, outside site boundary.	Site 58 - ESE, outside site boundary.	Site 58 - SW, inside site boundary, beside Building 715.	Site 58 - SW, outside site boundary.	Site 58 - SE, inside site boundary.
Dechlorinating Bacteria								
BAV1 Vinyl Chloride Reductase		NV	NA	NA	NA	NA	NA	NA
Dehalobacter spp.	cells/mL	NV	NA	NA	NA	NA	NA	NA
Dehalococoides	cells/mL	NV	NA	NA	NA	NA	NA	NA
tceA Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA
Vinyl Chloride Reductase	cells/mL	NV	NA	NA	NA	NA	NA	NA

Blue Highlighting Indicates concentrations above the MCL/MSC

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: Between the method detection limit and reporting limit and/or due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

LHAAP-67 Semiannual MNA Groundwater Sampling

	Sample ID		67WW01-112817		67WW02-112817		67WW05-112817		67WW06-112917		67WW07-112917		67WW08-112817	
	Sample Date		11/28/2017		11/28/2017		11/28/2017		11/29/2017		11/29/2017		11/28/2017	
	Location Description:		Site 67-Central, within Site boundary.		Site 67 - NW, within site boundary.		Site 67 - WNW, outside site boundary.		Site 67-SE, outside site boundary.		Site 67 - E, outside site boundary.		Site 67-S, within site boundary.	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1,1-Trichloroethane	µg/L	200	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1,2-Trichloroethane	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7	250		< 1	U	< 1	U	< 1	U	< 1	U	340	
1,2-Dichloroethane	µg/L	5	28		< 1	U	< 1	U	< 1	U	< 1		13	
cis-1,2-Dichloroethene	µg/L	70	1.3		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	2.1		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-67 Semiannual MNA Groundwater Sampling

		Sample ID	67WW08-112817-FD		67WW09-112717		67WW09A-112917		67WW10-112917		67WW11-112717		67WW12-112917	
		Sample Date	11/28/2017		11/27/2017		11/29/2017		11/29/2017		11/27/2017		11/29/2017	
	Location Description:		Site 67-S, within site boundary. Duplicate		Site 67-S outside site boundary		Site 67 - S outside site boundary.		Site 67 - SE, outside site boundary.		Site 67- SW, outside site boundary		Site 67 - NE, within site boundary. .	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1,1-Trichloroethane	µg/L	200	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1,2-Trichloroethane	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
1,1-Dichloroethene	µg/L	7	350		< 1	U	< 1	U	< 1	U	5.2		2.2	
1,2-Dichloroethane	µg/L	5	13		< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Trichloroethene	µg/L	5	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U

LHAAP-67 Semiannual MNA Groundwater Sampling

		Sample ID	67WW12-112917-FD		67WW13-112817		67WW14-112717		67WW15-112717	
		Sample Date	11/29/2017		11/28/2017		11/27/2017		11/27/2017	
	Location Description:		Site 67 - NE, within site boundary. Duplicate. .		Site 67 - WSW, within site boundary.		Site 67 - SW, outside the site boundary beside Ignatius Avenue.		67-W, outside site boundary.	
Parameter	Units	MCL/MSC	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
1,1,1-Trichloroethane	µg/L	200	< 1	U	< 1	< 1	< 1	U	< 1	U
1,1,2-Trichloroethane	µg/L	5	< 1	U	5.1		< 1	U	5.6	
1,1-Dichloroethene	µg/L	7	1.8		320		5.6		510	
1,2-Dichloroethane	µg/L	5	< 1	U	32		3.1		27	
cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	< 1	< 1	U	1.5	
Trichloroethene	µg/L	5	< 1	U	< 1	< 1	< 1	U	< 1	U
Vinyl chloride	µg/L	2	< 1	U	< 1	< 1	< 1	U	< 1	U

Notes:

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - Undetected: The analyte was analyzed, and is an estimated Non-Detect.

MCL - Maximum Contaminant Limit

MSC - Medium-Specific Concentrations

U - Undetected: The analyte was analyzed for, but not detected.

mg/L - milligrams per liter

ug/L - micrograms per liter

Val Qual - Qualifiers applied by APTIM chemist during data validation

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Groundwater Treatment Plant - Processed Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of processed water.

Processed Water Data

(in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199

Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716

Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547

Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456

Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012

Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057

Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376

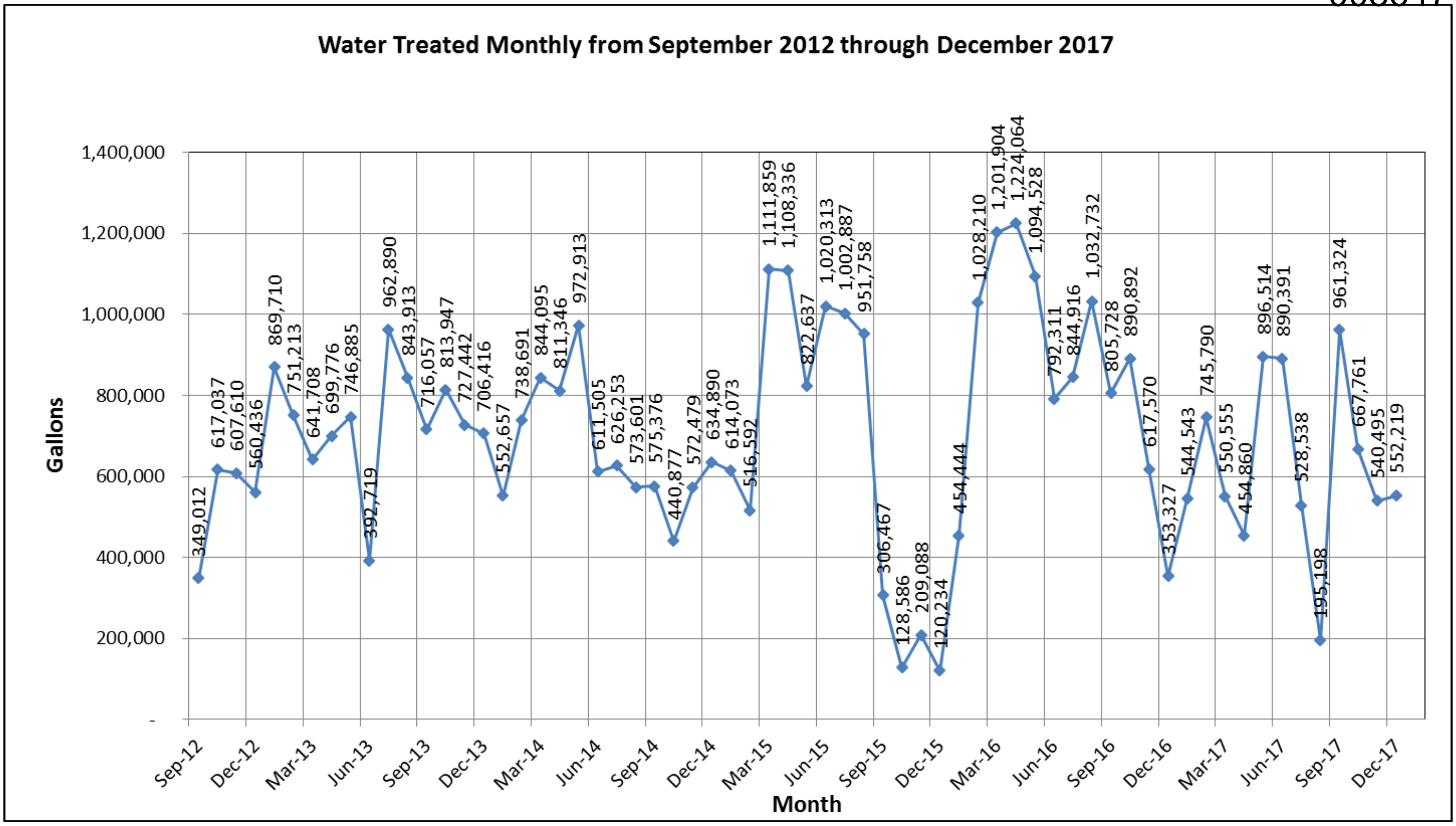
Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467

Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728

Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324

Oct-17	Nov-17	Dec-17									
667,761	540,594	552,219									

*Indicates Estimate



Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
Oct-16	0	642,876	0	0	0
Nov-16	0	576,898	0	0	0
Dec-16	0	236,688	0	0	0
Jan-17	0	0	0	0	0
Feb-17	0	0	0	0	14,355
Mar-17	127,242	0	0	0	14,400
Apr-17	113,038	0	236,821	0	0
May-17	205,665	0	534,155	0	0
Jun-17	467,830	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	0	0	309,980	651,434	0
Oct-17	0	0	667,761	0	0
Nov-17	0	0	540,495	0	0
Dec-17	0	0	552,219	560,350	0

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DRAFT
TECHNICAL MEMORANDUM

ERROR IN FIELD LABELING/SURVEY OF MONITORING WELLS 17WW11 AND 17WW12

FOR

LHAAP-17, BURNING GROUND NO. 2/FLASHING AREA, GROUP 2

LONGHORN ARMY AMMUNITION PLANT

KARNACK, TEXAS

Prepared For:

U.S. Army Corps of Engineers

Prepared By:

1608 13th Avenue South, Suite 300Birmingham, Alabama 35205

2500 CityWest Blvd, Suite 1700
Houston, Texas 77042

January 2018

DRAFT
TECHNICAL MEMORANDUM

ERROR IN FIELD LABELING/SURVEY OF MONITORING WELLS 17WW11 AND 17WW12

FOR

LHAAP-17, BURNING GROUND NO. 2/FLASHING AREA, GROUP 2

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KARNACK, TEXAS

Prepared For:

U.S. Army Corp of Engineers

Tulsa District

Prepared By:

Bhate Environment & Infrastructure
and
Aptim

Contract No. W9128F-13-D-0012

Task Order No. W912BV17F0150

January 2018

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Introduction

Monitoring wells 17WW11 and 17WW12 were installed in 1998 as part of the Phase III Remedial Investigation for LHAAP Group 2 Sites conducted by Jacobs, and the well construction forms were provided in the April 2001 Remedial Investigation Report. The well construction forms are attached and information from the forms is summarized in the table below. The original installation identifies 17WW11 as the intermediate well and 17WW12 as the shallow well as represented by their respective depths.

However, subsequent groundwater sampling forms and reports recorded the sampling depth of 17WW11 as approximately 18 feet (BTOC) and the total depth of 17WW12 was recorded as approximately 49 feet (see sample collection forms from February 2009). We have concluded, based on field evidence, that the well IDs painted on the well casings of these two wells were switched right after well installation. This has caused their coordinates and analytical sample results to be incorrectly reported because survey and field sampling staff used the well IDs painted on the well casings.

November 2017 Sampling Event

While sampling groundwater at LHAAP-17 in November 2017, APTIM field staff found that the well marked in the field as 17WW11 was dry and the well marked as 17WW12 had water. It was odd that the intermediate well would be dry while shallow well would have water. Upon further review of the 2009 sample collection logs, we determined that the total well depth recorded for 17WW11 matched the shallow well zone while the depth recorded for 17WW12 corresponded to the intermediate zone. APTIM confirmed in November 2017 that the 43 foot depth sample collection tubing was in the well marked as 17WW12 and the well marked as 17WW11 was dry.

Findings and Recommendations

APTIM's findings and recommendation are summarized in Table 1 below and relevant pages from historical documents are included as attachments.

Table 1 – Review of Historical Sample Collection Documentation

Well Information		
Aquifer Zone	**Intermediate**	**Shallow**
Well ID	17WW11	17WW12
Installed	5/13/1998	4/19/1998
Total Well Depth	46 feet	15 feet
Screened Interval	36-46 Feet bgs	5-15 feet bgs
2009 Sampling Event	17WW12	17WW11
Measured Depth	Bottom of screen 48.89 feet below top of casing (BTOC	17.96 feet BTOC
Perchlorate results	Not detected	990 micrograms per liter
2009 Results previously reported for the wrong depth and need to be switched		
Field Observations		
Observation: The wells markings observed in the field are reversed **Recommendations:** 1) Switch the Well ID labels in the field 2) Switch well coordinates in the database 3) Switch analytical data in the database This will result in wells showing in their correct position on maps and results will be associated with the correct well ID/sample zone.		

Attachments

From April 2001 Remedial Investigation Report

- Well Logs (17WW11 and 17WW12)
- Table 4-2 Monitoring Well Construction Summary
- AR page 025884 – Original Survey Coordinates from the 2001 RI

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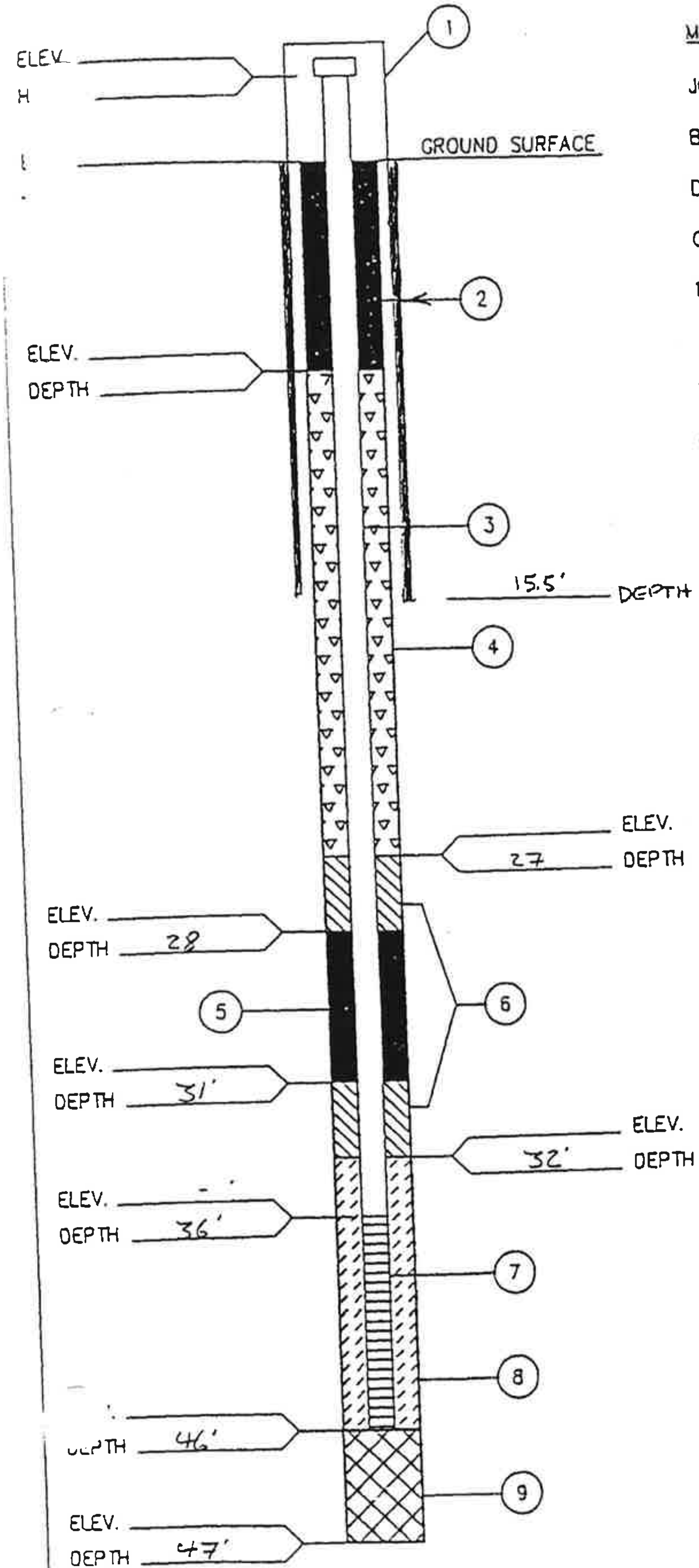

MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. ________

BORING/WELL NO. 17WW11 INT.

DATE 5-13-93

CHIEF UNIT Wilcox

1. PROTECTIVE CASING <u>YES</u> NO

   LOCKING <u>YES</u> NO

2. TYPE OF SURFACE SEAL (IF INSTALLED)
   8" Ø steel casing

3. SOLID PIPE TYPE Sch 40, 304 S.S., 4" I.D.
   SOLID PIPE LENGTH 36' ft.
   JOINT TYPE SLIP/GLUED/<u>THREADED</u>

4. TYPE OF BACKFILL cement/bentonite
   HOW INSTALLED – <u>TREMIE</u>
   FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Chip

6. TYPE OF SECONDARY FILTER PACK
   Silica Sand (30-70)

7. SCREEN TYPE Sch 40, 304 S.S.
   SCREEN LENGTH 10' ft.
   SLOT SIZE #10 wire wound in.
   SCREEN DIAMETER 4" in.

8. TYPE OF PRIMARY FILTER PACK
   Filter Sand (16-30)

9. TYPE OF BACKFILL Filter Sand

10. DRILLING METHOD Mud Rotary

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup
ENVIRONMENTAL

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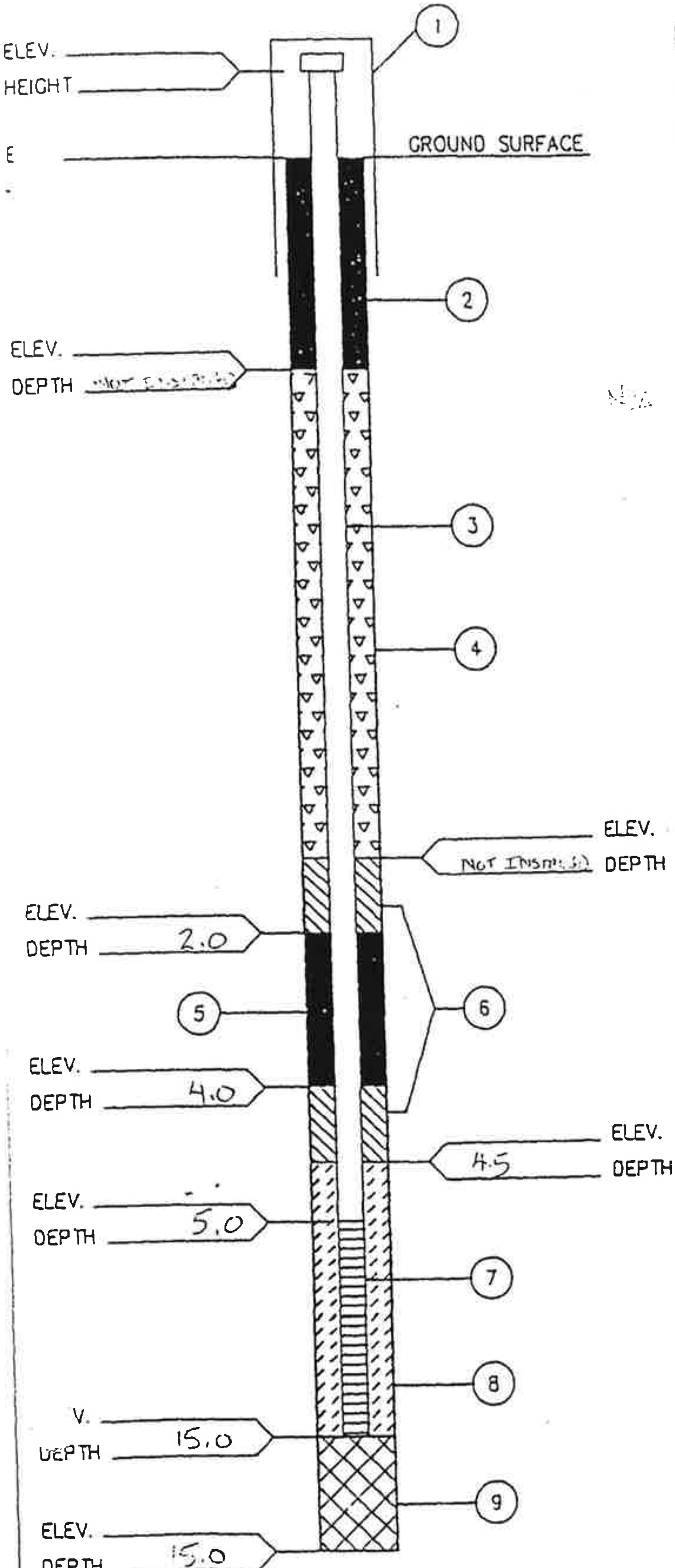

MONITORING WELL CONSTRUCTION INFORMATION

JOB. NO. 000187

BORING/WELL NO. 17WW12 SHALLOW

DATE 4-19-98

CHIEF UNIT WILCOX

1. PROTECTIVE CASING YES NO

LOCKING YES NO

2. TYPE OF SURFACE SEAL (IF INSTALLED) CEMENT

3. SOLID PIPE TYPE Sch 40 304 STAINLESS STEEL

SOLID PIPE LENGTH 5.0 FROM GROUND SURFACE ft.

JOINT TYPE SLIP/GLUED/THREADED

4. TYPE OF BACKFILL CEMENT/BENTONITE GROUT

HOW INSTALLED - TREMIE

FROM SURFACE

5. TYPE OF LOWER SEAL (IF INSTALLED) BENTONITE CHIPS

6. TYPE OF SECONDARY FILTER PACK SILICA SAND (20-70)

7. SCREEN TYPE Sch 40 304 STAINLESS STEEL

SCREEN LENGTH 10 ft.

SLOT SIZE 0.01 WIRE WRAP in.

SCREEN DIAMETER 4 in.

8. TYPE OF PRIMARY FILTER PACK SILICA SAND (16-30)

9. TYPE OF BACKFILL

10. DRILLING METHOD AUGER 11" O.D.

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE

Sverdrup

ENVIRONMENTAL

Table 4-2
Monitoring Well Construction Summary

Well Identification	Well Depth (feet)	Groundwater Zone	Surface Elevation	Measuring Point Elevation	Casing Diameter (inches)	Screen Interval (feet)	Hydraulic Conductivity (cm/sec)
C-7	35.00	Shallow	195.18	197.69	4.00	20-30	3.03E-04
130	23.00	Shallow	174.44	177.23	2.00	8-23	2.05E-05
17WW01	30.80	Shallow	176.62	179.01	4.00	11-31	3.03E-04
17WW02	24.00	Shallow	174.27	177.14	4.00	12-22	3.53E-03
17WW03	32.00	Shallow	176.24	179.05	4.00	19-29	2.09E-03
17WW04	37.00	Shallow	177.22	180.14	4.00	25-35	2.04E-03
17WW05	152.00	Deep	178.69	182.62	4.00	142-152	2.20E-06
17WW06	22.00	Shallow	176.76	179.30	4.00	11-21	4.57E-03
17WW07	52.00	Intermediate	176.92	179.82	4.00	42-52	1.75E-03
17WW08	34.00	Shallow	176.54	179.72	4.00	21-31	1.16E-03
17WW09	62.00	Intermediate	178.17	181.20	4.00	41-51	5.92E-04
17WW10	31.00	Shallow	178.17	181.34	4.00	21-31	1.36E-04
17WW11	46.00	Intermediate	177.22	180.66	4.00	36-46	2.45E-03
17WW12	15.00	Shallow	176.75	180.03	4.00	5-15	—
17WW13	32.00	Shallow	175.95	179.19	4.00	22-32	3.97E-05
17WW14	24.00	Shallow	178.72	181.79	4.00	13-23	1.19E-03

For the intermediate saturated zone, hydraulic conductivity values ranged from a minimum value of 5.92E-04 cm/sec at well 17WW09, located on the western side of the site, to a maximum value 1.77E-03 cm/sec at well 17WW07, located in the southeast corner of the site. Only one monitoring well (17WW05) was completed in the deep saturated zone at Site 17 and this well had a calculated hydraulic conductivity value of 2.2E-06 cm/sec. These hydraulic conductivity values are consistent with the expected range of values for sands and silty sands (Freeze and Cherry, 1979).

During the Phase III RI, groundwater level measurements were collected from each monitoring well in August 1998. This data were used to create potentiometric elevation contours for the shallow and intermediate saturated zones and are depicted on Figure 4-7 (Appendix I) and Figure 4-8 (Appendix I), respectively.

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025884

Location Information of Group 2					Sample Sites				
SITE	X	Y	Z	BORE DEPTH TOTAL	SITE	X	Y	Z	BORE DEPTH TOTAL
17SS10	3315780.5	6952594.3	0	0	17WW08	3315989.6	6952493.5	176.54	34
17SS11	3315970.7	6952579.2	0	0	17WW09	3315375.8	6952841.9	178.17	62
17SS12	3316046.0	6952637.9	0	0	17WW10	3315391.2	6952840.8	178.17	0
17SS13	3315692.1	6952568.4	0	0	17WW11	3315573.8	6952972.1	177.22	0
17SS14	3316019.9	6952590.7	0	0	17WW12	3315588.4	6952973.2	176.75	49
17SS15	3315743.2	6952535.0	0	0	17WW13	3315985.4	6952677.9	175.95	32
17SS16	3315629.0	6952538.1	0	0	17WW14	3315325.0	6952611.1	178.72	24
17SS17	3315972.7	6952541.3	0	0	18SB01	3316996.7	6951303.3	0	127
17SS18	3315862.8	6952934.0	0	0	18SB02	3315764.6	6953861.5	176	222
17SS19	3315832.1	6953082.6	0	0	18SB03	3317804.9	6953798.4	173	107
17SS20	3315751.2	6953291.9	0	0	18SB04	3317279.0	6955651.3	180.17	85.75
17SS21	3315664.5	6952765.1	0	0	18SB05	3317834.9	6957023.8	186.8	116.1
17SS22	3315735.4	6952761.5	0	0	18SD01	3316388.5	6954289.2	0	0
17SS23	3315808.0	6952760.0	0	0	18SD02	3316149.7	6954062.9	0	0
17SS24	3315705.7	6952729.5	0	0	18SD03	3317519.0	6953720.9	0	0
17SS25	3315771.4	6952727.2	0	0	18SD04	3316965.4	6953354.7	0	0
17SS26	3315947.0	6952796.4	0	0	18SD05	3316428.0	6953187.5	0	0
17SS27	3315663.5	6952672.0	0	0	18SD06	3316645.0	6953087.6	0	0
17SS28	3315727.7	6952685.2	0	0	18SD07	3316473.7	6953013.0	0	0
17SS29	3315805.9	6952678.4	0	0	18SD08	3316994.0	6953193.9	0	0
17SS30	3315932.4	6948494.5	0	0	18SD09	3317742.2	6952884.0	0	0
17SS31	3316017.8	6952523.3	0	0	18SD10	3316186.2	6953052.6	0	0
17SW01	3315759.6	6952932.1	0	0	18SD11	3315861.4	6953437.7	0	0
17SW02	3315608.9	6952879.1	0	0	18SD12	3315805.9	6954073.3	0	0
17SW03	3315865.4	6952522.9	0	0	18SD13	3316260.4	6954453.2	0	0
17SW04	3316026.0	6952841.1	0	0	18SD14	3317005.3	6955478.5	0	0
17SW05	3315793.0	6952885.0	0	0	18SD15	3317354.6	6955518.0	0	0
17SW06	3315688.1	6952995.7	0	0	18SD16	3318120.6	6954608.1	0	0
17SW07	3315605.1	6952803.0	0	0	18SD17	3320397.4	6951976.9	0	0
17SW08	3315624.1	6952951.8	0	0	18SD18	3321027.4	6954673.3	0	0
17SW09	3315632.8	6953103.2	0	0	18SD19	3320451.5	6957042.0	0	0
17SW10	3316031.3	6952755.9	0	0	18SD20	3314184.4	6952869.9	0	0
17SW11	3315859.1	6952815.8	0	0	18SD21	3315470.8	6954103.1	0	0
17SW12	3315528.5	6952700.6	0	0	18SD22	3315733.0	6954568.7	0	0
17SW13	3315570.0	6953078.8	0	0	18SD23	3316073.4	6954956.4	0	0
17SW14	3315496.9	6952861.3	0	0	18SD24	3316395.5	6955799.3	0	0
C-7	3315826.6	6952103.2	195.18	36	18SD25	3317320.3	6958190.0	0	0
130	3315816.3	6952831.7	174.44	23	18SD26	3319088.0	6958778.3	0	0
MW-18	3315774.2	6953264.3	177.09	0	18SD27	3309139.5	6949153.5	0	0
MW-19	3316076.0	6952976.2	176.83	0	18SD28	3309139.5	6949103.5	0	0
17WW01	3315692.2	6952639.5	176.62	31	18SD29	3309139.5	6949053.5	0	0
17WW02	3315651.4	6952784.8	174.27	24	18SS01	3316219.4	6954050.7	0	0
17WW03	3315789.3	6952652.1	176.24	32	18SS02	3316360.0	6954196.2	0	0
17WW04	3315473.6	6952536.5	177.22	37	18SS03	3316460.4	6954176.7	0	0
17WW05	3315437.1	6952644.3	178.69	152	18SS04	3316547.4	6954242.8	0	0
17WW06	3315475.2	6952718.2	176.76	22	18SS05	3316870.8	6954369.9	0	0
17WW07	3315980.3	6952512.6	176.92	52	18SS06	3316634.4	6953989.8	0	0

2009 Sample Collection Logs and Laboratory Reports

- February 2009 Sample Collection Logs (17WW11 and 17WW12)
- March 2009 Sample Collection Log (17WW11)
- Laboratory Reports for Perchlorate Analysis of February and March 2009 Samples (17WW11 and 17WW12)

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: LHAAP-17
Project Name/#: 117591 / LHAAP
Weather: cloudy; 60s
Sampling location ID: 17WW11
Sample ID: 17WW11-022609
Collection Time/Date:

Pump Installation

Pump installation crew: A. Willmon
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 17.96
Initial (pre-installation) DTW/time: 12.56
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): ~18'
Installation date/beginning time: 2/26/09 15:01
Installation date/completion time: 2/26/09 15:05
Screen Interval (ft. BTOC): 8 ~~7.50~~ to ~~10.5~~ 18
Pump intake depth (ft BTOC): 15.5
Post-installation DTW/time: 12.14
Max. sustainable pump rate (mL/min): 100
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmon
Purge date/beginning time: 2/26/09 15:15
Initial (pre-purging) DTW (ft. BTOC): 12.14
Calculated tubing + pump volume: NA
PID/FID reading (well head/background): 0.0
Purge date/completion time:
Final (post-purging) DTW (ft. BTOC): 13.26
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting									
Discharge Setting				NA					
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
15:20	13.03	100	0.5	19.36	3.132	5.94	112.0	2.74	499.7
15:25	13.26	100	1.0	18.79	3.160	5.91	152.6	2.12	146.7
15:30	13.26	100	1.5	18.71	3.165	5.94	187.4	2.40	54.9
15:35	13.26	100	2.0	18.59	3.168	5.95	200.2	2.40	52.1
15:40	13.26	100	2.5	18.65	3.170	5.95	217.0	2.52	45.5
1545	13.26	100	3.0	18.68	3.195	5.95	210.3	2.48	50.6
1550	13.26	100	3.5	18.70	3.207	5.96	203.1	2.46	58.3
1555	13.26	100	4.0	18.58	3.186	5.92	162.7	2.27	40.8

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GROUNDWATER SAMPLING FORM

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10% 10/20
1600	13.26	100	4.5	18.63	3.207	5.90	148.2	1.96	77.6
1605	13.26	100	5.0	18.69	3.205	5.89	145	1.94	73.8
1610	13.26	100	5.5	18.71	3.206	5.89	143.2	1.91	73.0
1611	Sample								

8/26/09

Sampling

Sampling beginning time: 1611

Sampling completion time: 16:21

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
16:26	13.26	100	7.9	18.71	3.206	5.89	142.9	1.90	72.4

Sample Information

Sample ID: MWW11-022609

Duplicate sample collected (Y/N): N

Split sample collected (Y/N): N

COC No(s):

Sample collection date/time:

Duplicate sample ID: NA

Split sample ID: NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Nickel	6020B	1-500 mL HDPE			
VOCs	8260	3-40 mL VOAs			
Perchlorate	300.1	1-250 mL HDPE			

Comments: Purged ; Sampled w/ peristaltic pump.
Filtered Nickel Sample

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

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GROUNDWATER SAMPLING FORM

Sheet 1 of 2

Operable Unit/Site ID: Site 17
Project Name/#: USACE - LHAAP
Weather:
Sampling location ID: 17WW12
Sample ID: 17WW12 022609
Collection Time/Date: 02-26-09

Pump Installation

Pump installation crew: M. Martinez
PID/FID reading (well head/background): NA
Casing diameter (inches): 4"
Total well Depth (ft. BTOC):
Initial (pre-installation) DTW/time: 10.98
Final (after pump priming) DTW/time: 11.08
Free product (circle): ~~LNAPL / DNAPL~~
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): NA
Installation date/beginning time: 02-26-09/
Installation date/completion time: 02-26-09/
Screen Interval (ft. BTOC): 38.89 to 48.89
Pump intake depth (ft BTOC): ~~70.~~ 43'
Post-installation DTW/time: 10.92
Max. sustainable pump rate (mL/min): NA
Appearance of product: NA
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): NO

Pneumatic Controller Tuning:

Initial air pressure = H (ft.) X 0.43 = ________ psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting					NA				
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: M. Martinez
Purge date/beginning time: 02-26-09/ 1518
Initial (pre-purging) DTW (ft. BTOC): 11.08
Calculated tubing + pump volume: NA
PID/FID reading (well head/background): NA
Purge date/completion time: 02-26-09
Final (post-purging) DTW (ft. BTOC):
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:

Initial air pressure = H (ft.) X 0.43 = NR psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)	30								
Refill Setting	10								
Discharge Setting	5								
Flow rate (mL/min)	210								

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1522	11.15	210	2.0	19.83	1.060	5.93	17.3	2.74	324.0
1532	11.25	210	4.1	19.09	1.117	5.73	-12.8	0.44	378.2
1537	11.26	210	5.06	19.11	1.120	5.73	-14.6	0.36	242.1
1542	11.26	210	6.11	19.13	1.123	5.73	-17.2	0.24	205.6
1547	11.26	210	7.16	18.98	1.124	5.73	-18.3	0.18	272.1
1552	11.26	210	8.21	18.80	1.127	5.73	-19.3	0.17	249.4
1557	11.26	210	9.26	18.81	1.129	5.73	-19.7	0.17	200.0
1558	Sample								

GROUNDWATER SAMPLING FORM

Sheet 2 of 2

17WW12

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10% 10/20

MB

Sampling

Sampling beginning time: 1558

Sampling completion time: 1605

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
1600	11.26	210		18.88	1.129	5.74	-20.9	0.15	210.6

MB

Sample Information

Sample ID: 17WW12 022609

Sample collection date/time: 02-26-09

Duplicate sample collected (Y/N): NO

Duplicate sample ID: NA

Split sample collected (Y/N): NO

Split sample ID: NA

COC No(s):

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
VOC		3 x 40 mL VOA			
Perchlorate		1 x 250 mL HDPE			
Thallium		1 x 250 mL HDPE			

MB

MB

Comments:

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

GROUNDWATER SAMPLING FORM

Sheet 1 of 2

17WW11

Operable Unit/Site ID: LHAAP-17
Project Name/#: Longhorn MARC / 117591
Weather: ptly cloudy ; cool 70s
Sampling location ID: 17WW11
Sample ID: 17WW11-033009
Collection Time/Date: 12:20 ~~03-30-09~~ 3-30-09 3-30-09

Pump Installation

Pump installation crew: A. Willmore
PID/FID reading (well head/background): 0.0
Casing diameter (inches): 4"
Total well Depth (ft. BTOC): 17.96
Initial (pre-installation) DTW/time: 12.69
Final (after pump priming) DTW/time: NA
Free product (circle): LNAPL / DNAPL
Volume of water removed during priming (mL): NA
Discharge tube length (ft.): 19
Installation date/beginning time: 3/30/09 ~~09:45~~ 11:13
Installation date/completion time: 3/30/09 ~~09:47~~ 11:20
Screen Interval (ft. BTOC): 8 to 18
Pump intake depth (ft BTOC): 15.5
Post-installation DTW/time: 12.67
Max. sustainable pump rate (mL/min): 160
Appearance of product: None
Discharge tube diameter (3/8" or 1/4"): 1/4"
Inlet reducer used (Y/N): N

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting					NA				
Discharge Setting									
Flow rate (mL/min)									

Purging

Purging/sampling crew: A. Willmore
Purge date/beginning time: 3/31/09 11:26
Initial (pre-purging) DTW (ft. BTOC): 12.67
Calculated tubing + pump volume: NA
PID/FID reading (well head/background): 0.0
Purge date/completion time: 3/31/09 12:31
Final (post-purging) DTW (ft. BTOC): 13.14
No. of tubing + pump volumes purged: NA

Pneumatic Controller Tuning:
Initial air pressure = H (ft.) X 0.43 = NA psi

	Initial	2	3	4	5	6	7	8	Final
Pressure (psi)									
Refill Setting				NA					
Discharge Setting									
Flow rate (mL/min)									

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
11:31	12.71	100	0.5	17.21	4.001	5.01	244.1	2.41	432.1
11:51	~~12.94~~ 13.14	100	1.0	17.01	3.519	5.26	272.1	2.32	80.1
11:56	13.14	100	1.5	17.38	3.406	5.31	202.3	2.01	74.3
12:01	13.14	100	2.0	17.38	3.182	5.32	130.4	1.81	72.1
12:06	13.14	100	2.5	17.39	3.185	5.32	131.1	1.79	74.3
12:11	13.14	100	3.0	17.42	3.187	5.32	135.3	1.79	74.1
12:16	13.14	100	3.5	17.91	3.187	5.32	136.7	1.78	70.5

Purged for 20 mins

00864728

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GROUNDWATER SAMPLING FORM

Sheet 2 of 2

17WW11

Water Quality Parameter Measurements (continued)

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C) ± 10%	±3% Electrical Conductivity (uMhos/cm)	pH ± 0.1	Eh (mv) ± 10	DO (mg/L) ± 10%	Turbidity (NTU) ± 10%

10/20

3/30/09

Sampling

Sampling beginning time: 12:20

Sampling completion time: 12:35

Water Quality Parameter Measurements

Time	DTW (ft. BTOC)	Purge Rate (mL/min)	Cumulative Volume Purged (L)	Temp. (degree C)	Electrical Conductivity (uMhos/cm)	pH	Eh (mv)	DO (mg/L)	Turbidity (NTU)
12:31	13.14	100	5.0	18.63	3.199	5.31	139.1	1.78	69.4

Sample Information

Sample ID: 17WW11-033109

Sample collection date/time: 3.30.09 12:20

Duplicate sample collected (Y/N): N

Duplicate sample ID: NA

Split sample collected (Y/N): N

Split sample ID: NA

COC No(s): NA

Requested Analysis	Method	Containers	Requested Analysis	Method	Containers
Perchlorate	300	1-250 mL HDPE			

Comments: Purged & Sampled w/ peristaltic pum

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter

Analytical Data

Microbac Laboratories, Inc.
ATTN: Ms. Stephanie Mossburg

Job Number: 680-45252-1
Project: Shaw Longhorn
SDG Number: Shaw Longhorn

Client Sample ID: 17WW11-022609

Lab Sample ID: 680-45252-8
Client Matrix: Water

Date Sampled: 02/26/2009 16:11
Date Received: 03/05/2009 10:15

Test Method	CAS Number	Result	Q	Flag	MDL	MQL	SDL	Unit	Batch	Analysis Date/Time	D.F.	Analyst
Method: EPA 314.0,Water												
Perchlorate	14797-73-0	290			0.11	1.0	1.1	ug/L	132604	03/12/2009 21:42	10	CB

Analytical Data

Microbac Laboratories, Inc.
ATTN: Ms. Stephanie Mossburg

Job Number: 680-45252-1
Project: Shaw Longhorn
SDG Number: Shaw Longhorn

Client Sample ID: 17WW12-022609

Lab Sample ID: 680-45252-9
Client Matrix: Water

Date Sampled: 02/26/2009 15:58
Date Received: 03/05/2009 10:15

Test Method	CAS Number	Result	Q	Flag	MDL	MQL	SDL	Unit	Batch	Analysis Date/Time	D.F.	Analyst
Method: EPA 314.0,Water												
Perchlorate	14797-73-0	0.22	U		0.11	1.0	0.22	ug/L	132604	03/12/2009 21:57	2	CB

dr 03 2209

Analytical Data

Microbac Laboratories, Inc.
ATTN: Ms. Stephanie Mossburg

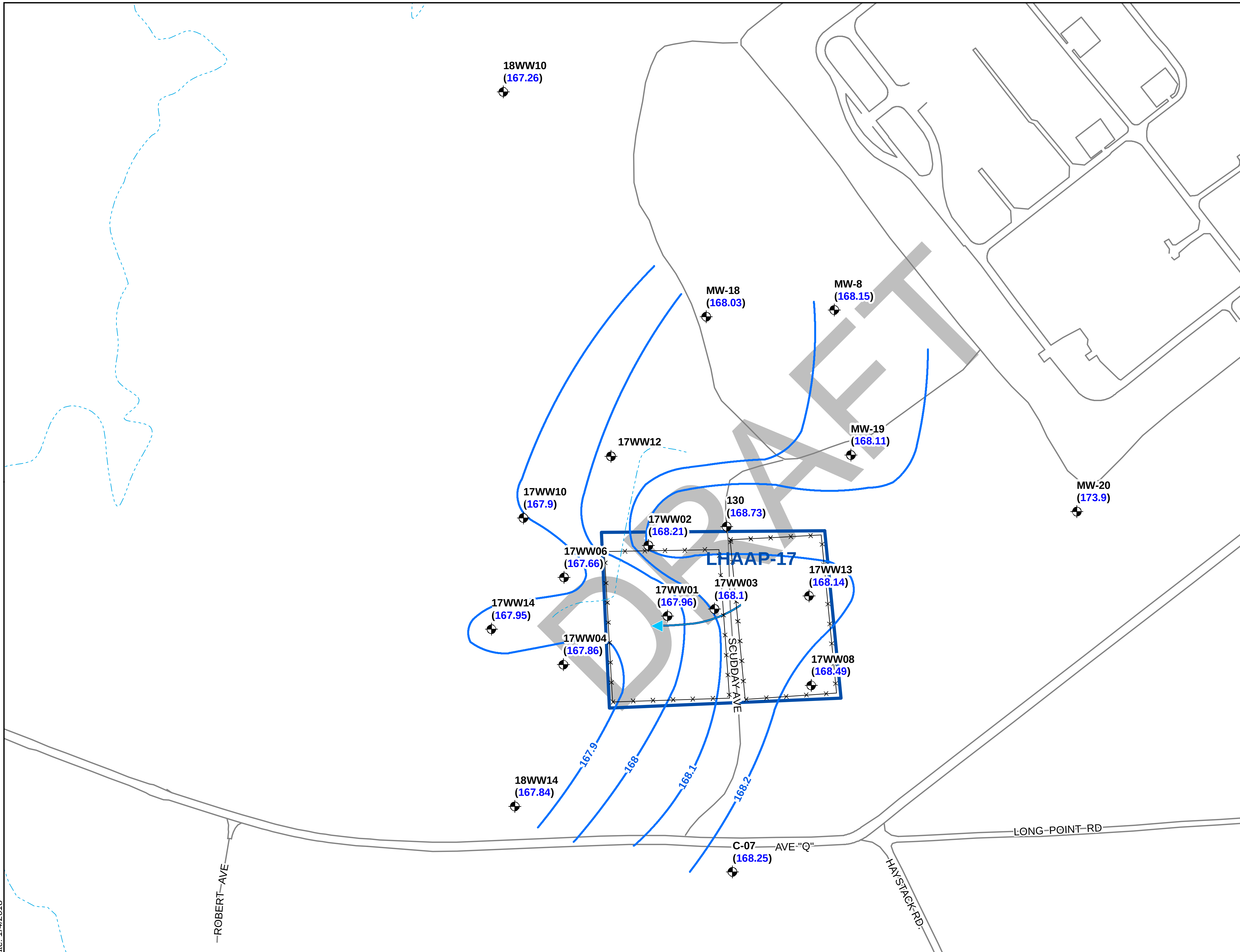
Job Number: 680-45945-1
Project: Shaw Longhorn
SDG Number: Shaw Longhorn

Client Sample ID: 17WW11-033009

Lab Sample ID: 680-45945-1
Client Matrix: Water

Date Sampled: 03/30/2009 12:20
Date Received: 03/31/2009 10:15

Test Method	CAS Number	Result	Q	Flag	MDL	MQL	SDL	Unit	Batch	Analysis Date/Time	D.F.	Analyst
Method: EPA 314.0,Water												
Perchlorate	14797-73-0	990			0.11	1.0	1.1	ug/L	134126	03/31/2009 20:31	10	CB



Shallow Monitor Well
Road
Groundwater Flow Direction
Groundwater Contour
Stream
Site Boundary

N

0 100 200
Feet

APTIM

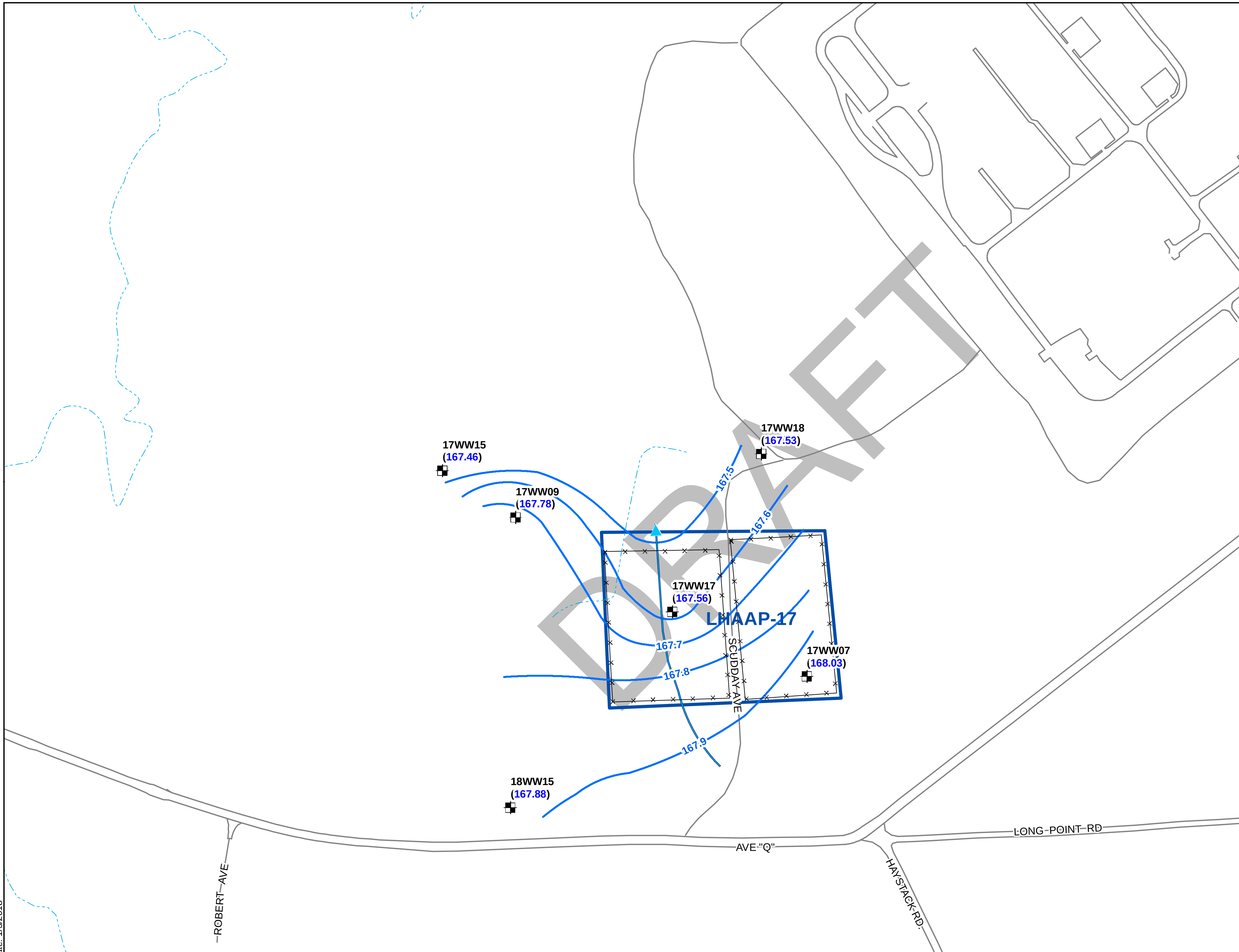
U.S. ARMY CORP OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

Figure 1

Shallow Zone Potentiometric Surface
(November 2017)
LHAAP-17 Monitoring Well Network

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

00864733



Intermediate Monitor Well
Stream
Groundwater Flow Direction
Groundwater Contour
Road
Site Boundary

N

0 100 200 Feet

APTIM

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

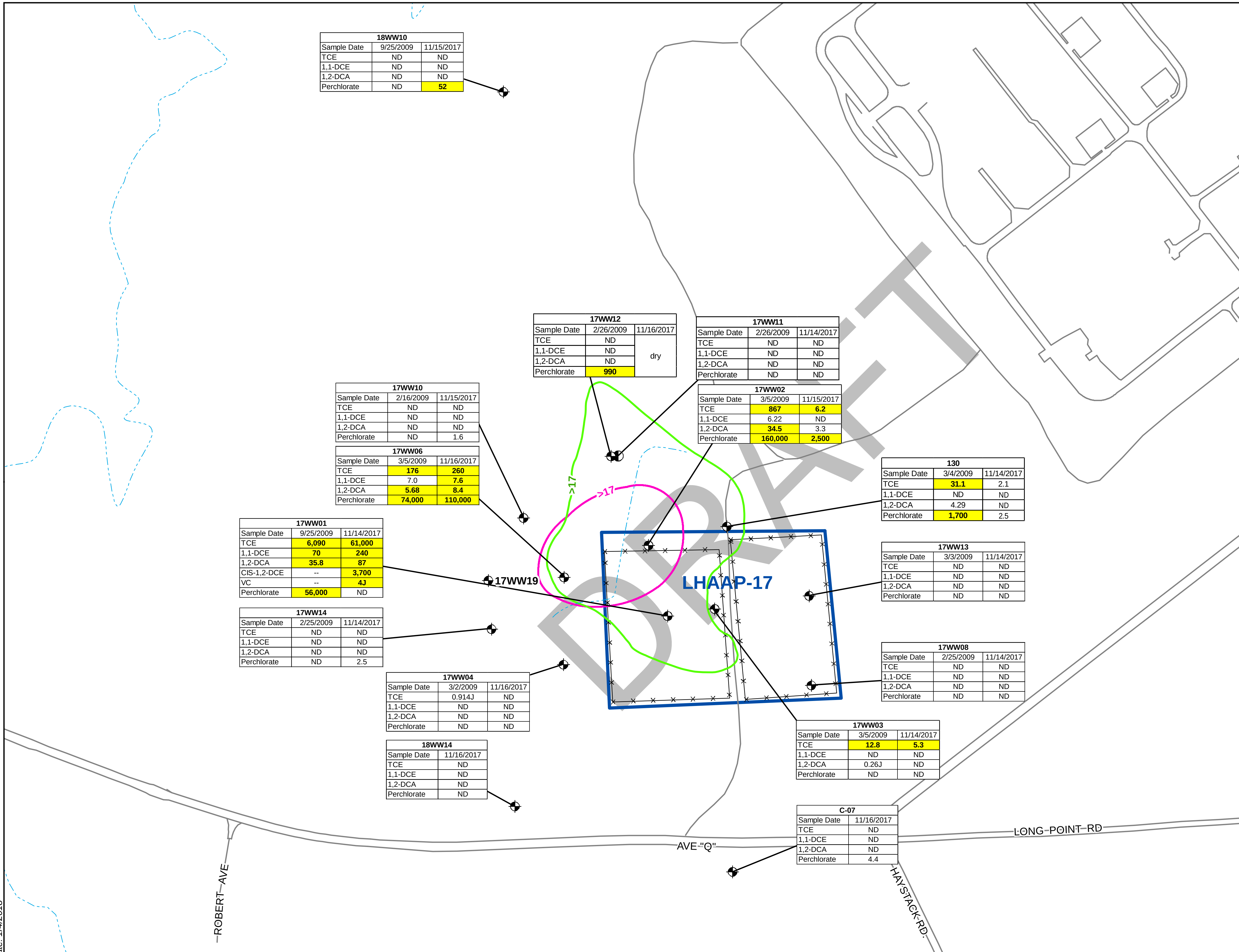
Figure 2

Intermediate Zone Potentiometric Surface
(November 2017)
LHAAP-17 Monitoring Well Network

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/3/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP17\Groundwater\Nov2017\LHAAP17_IntermediateZoneNov2017.mxd



18WW10		
Sample Date	9/25/2009	11/15/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	**52**

17WW12		
Sample Date	2/26/2009	11/16/2017
TCE	ND	dry
1,1-DCE	ND	
1,2-DCA	ND	
Perchlorate	**990**	

17WW11		
Sample Date	2/26/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW02		
Sample Date	3/5/2009	11/15/2017
TCE	**867**	**6.2**
1,1-DCE	6.22	ND
1,2-DCA	**34.5**	3.3
Perchlorate	**160,000**	**2,500**

17WW10		
Sample Date	2/16/2009	11/15/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	1.6

17WW06		
Sample Date	3/5/2009	11/16/2017
TCE	**176**	**260**
1,1-DCE	7.0	**7.6**
1,2-DCA	**5.68**	**8.4**
Perchlorate	**74,000**	**110,000**

130		
Sample Date	3/4/2009	11/14/2017
TCE	**31.1**	2.1
1,1-DCE	ND	ND
1,2-DCA	4.29	ND
Perchlorate	**1,700**	2.5

17WW01		
Sample Date	9/25/2009	11/14/2017
TCE	**6,090**	**61,000**
1,1-DCE	**70**	**240**
1,2-DCA	**35.8**	**87**
CIS-1,2-DCE	--	**3,700**
VC	--	**4J**
Perchlorate	**56,000**	ND

17WW13		
Sample Date	3/3/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW14		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	2.5

17WW08		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW04		
Sample Date	3/2/2009	11/16/2017
TCE	0.914J	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW03		
Sample Date	3/5/2009	11/14/2017
TCE	**12.8**	**5.3**
1,1-DCE	ND	ND
1,2-DCA	0.26J	ND
Perchlorate	ND	ND

18WW14	
Sample Date	11/16/2017
TCE	ND
1,1-DCE	ND
1,2-DCA	ND
Perchlorate	ND

C-07	
Sample Date	11/16/2017
TCE	ND
1,1-DCE	ND
1,2-DCA	ND
Perchlorate	4.4

Shallow Monitor Well
Shallow/Intermediate Monitor Well
2009 Perchlorate Contour (PCL = 17 µg/L)
2017 Perchlorate Contour (PCL = 17 µg/L)
Road
Stream
Site Boundary

Notes:
1. All concentrations are reported in microgram per liter (µg/L).
2. ND - non detect
3. Highlighted concentrations indicate levels above cleanup
4. TCE - trichloroethene
5. 1,1-DCE - 1,1-dichloroethene (MCL = 7 µg/L)
6. 1,2-DCA - 1,2-dichloroethane (MCL = 5 µg/L)
7. cis-1,2-DCE - cis-1,2-dichloroethene (MCL = 70 µg/L)
8. VC - Vinyl Chloride (MCL = 2 µg/L)
9. PCL - Texas Risk Reduction Program Protective Concentration Level
10. MCL - Safe Drinking Water Act Maximum Contaminated Level

Preliminary

N
0 100 200
Feet

APTIM

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

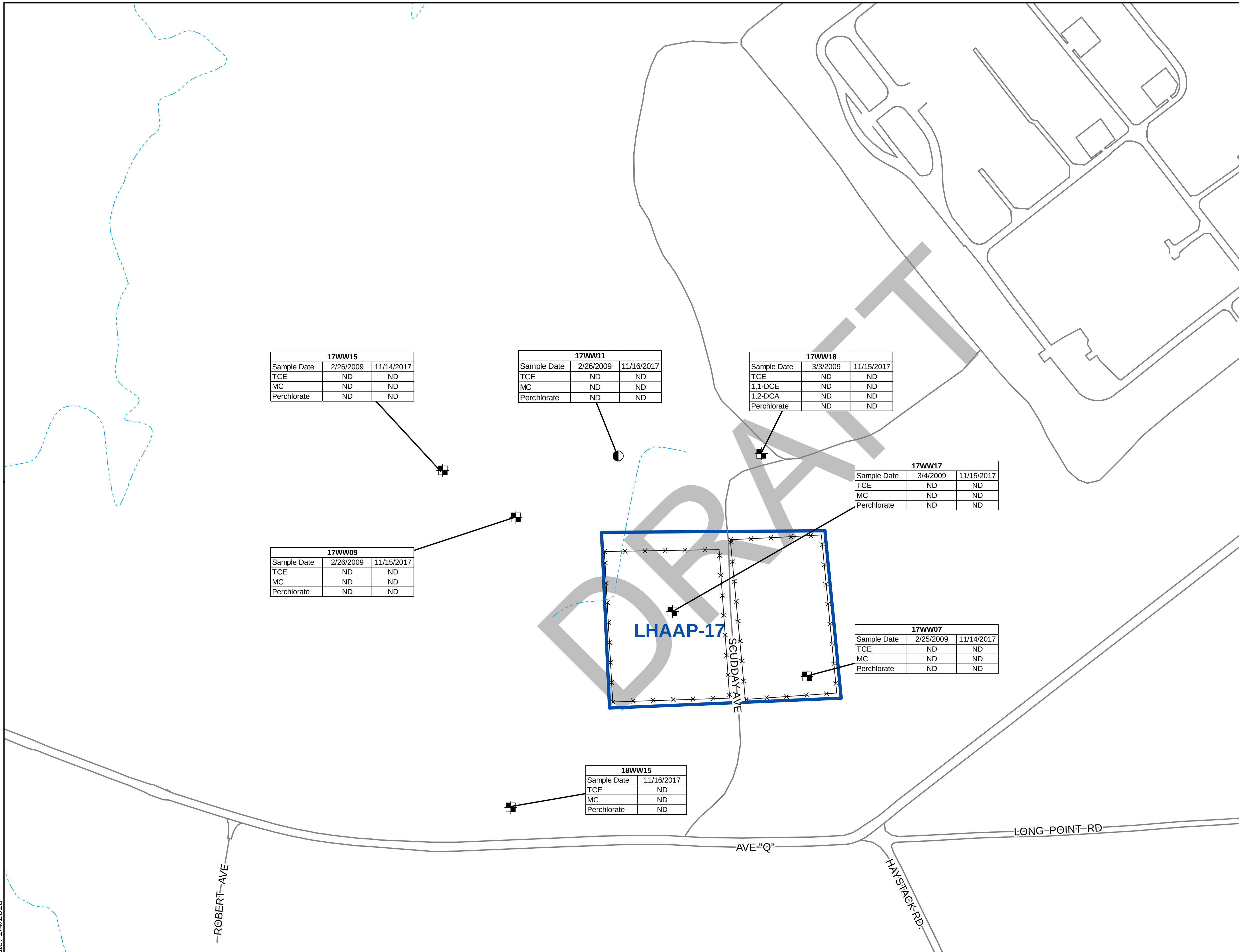
Figure 3

Shallow Zone Results
(November 2017)
LHAAP-17 Monitoring Well Network

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/4/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP17\Groundwater\Nov2017\LHAAP17_ShallowZoneAnaltyicalNov2017.mxd



17WW15		
Sample Date	2/26/2009	11/14/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW11		
Sample Date	2/26/2009	11/16/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW18		
Sample Date	3/3/2009	11/15/2017
TCE	ND	ND
1,1-DCE	ND	ND
1,2-DCA	ND	ND
Perchlorate	ND	ND

17WW17		
Sample Date	3/4/2009	11/15/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW09		
Sample Date	2/26/2009	11/15/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW07		
Sample Date	2/25/2009	11/14/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

18WW15	
Sample Date	11/16/2017
TCE	ND
MC	ND
Perchlorate	ND

Intermediate Monitor Well
Shallow/Intermediate Monitor Well
Road
Stream
Site Boundary

Notes:
1. All concentrations are reported in microgram per liter (µg/L).
2. ND - non detect
3. Highlighted concentrations indicate levels above cleanup
4. TCE - trichloroethene
5. MC - Methylene Chloride
6. 1,1-DCE - 1,1-dichloroethene
7. 1,2-DCA - 1,2-dichloroethane

Preliminary

N

0 100 200
Feet

APTIM

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

Figure 4

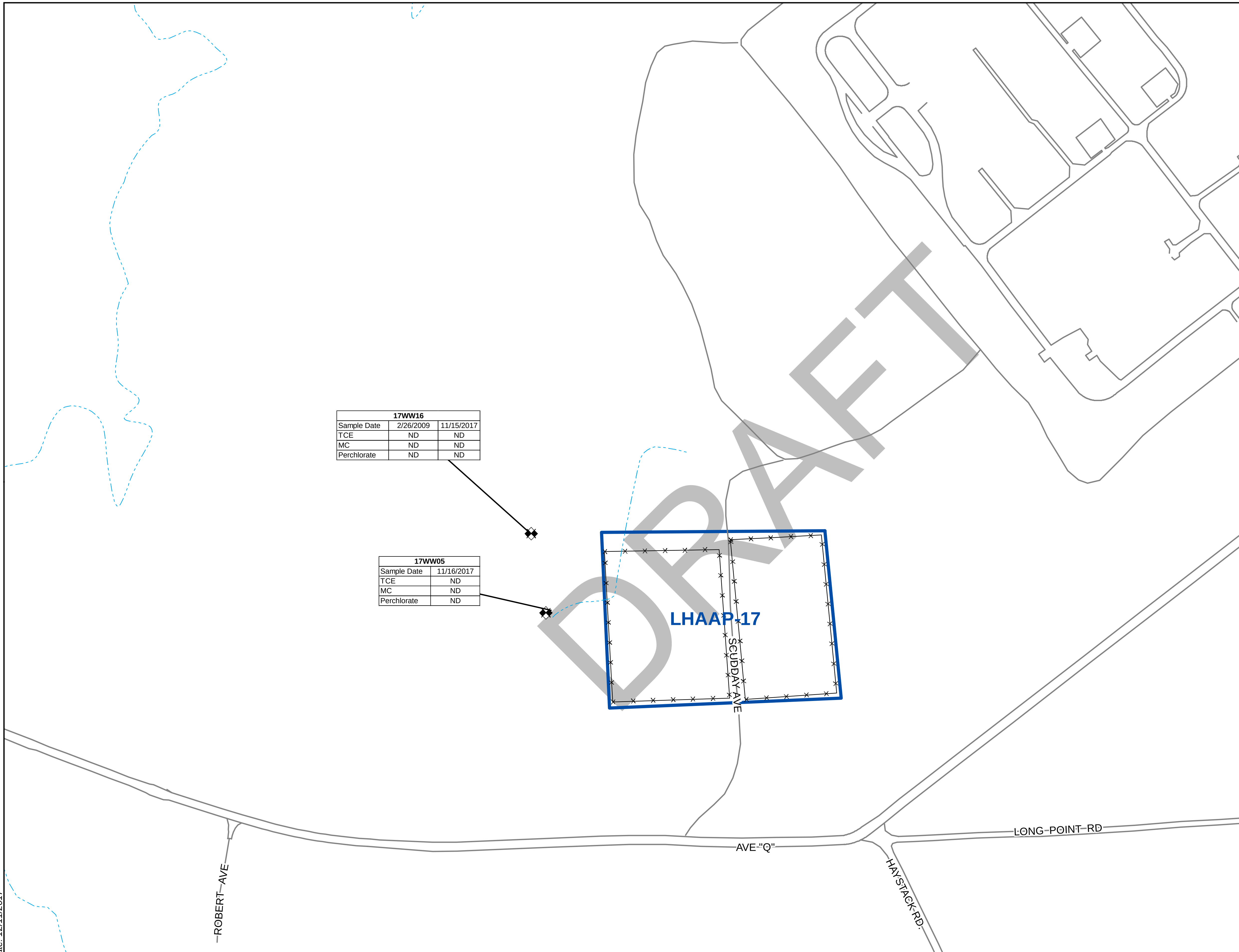
Intermediate Zone Results
(November 2017)
LHAAP-17 Monitoring Well Network

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 1/4/2018

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP17\Groundwater\Nov2017\LHAAP17_IntermediateZoneAnaltyicalNov2017.mxd

00864736



17WW16		
Sample Date	2/26/2009	11/15/2017
TCE	ND	ND
MC	ND	ND
Perchlorate	ND	ND

17WW05	
Sample Date	11/16/2017
TCE	ND
MC	ND
Perchlorate	ND

Deep Monitor Well
Road
Stream
Site Boundary

Notes:
1. All concentrations are reported in microgram per liter (µg/L).
2. ND - non detect
3. Highlighted concentrations indicate levels above cleanup
4. TCE - trichloroethene
5. MC - Methylene Chloride

Preliminary

N

0 100 200
Feet

APTIM

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

Figure 5

Deep Zone Results
(November 2017)
LHAAP-17 Monitoring Well Network

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Date: 12/11/2017

Document Path: G:\Longhorn\LHAAP\Documents\Mxd\LHAAP17\Groundwater\Nov2017\LHAAP17_DeepZoneAnaltyicalNov2017.mxd

Subject: **Final Minutes, Monthly Managers' Meeting (MMM), Longhorn Army Ammunition Plant (LHAAP)**

Location of Meeting: **Conference Call-In 515-603-3155 with Code 1063533#**
Date of Meeting: **February 15, 2018 – 10:00 AM CST**

Attendees:

Army BRAC: Rose Zeiler (RMZ)
EPA: Rich Mayer (RM) and Dorelle Harrison (DH)
TCEQ: April Palmie (AP)
USACE: Aaron Williams (AW)
Bhate: Kim Nemmers (KN)
APTIM: Susan Watson (SW) and Praveen Srivastav (PS)
USFWS: Paul Bruckwicki (PB)

Action Items
No open action items following the January 19, 2018 MMM. KN indicated that the agenda for the call along with the Document and Issues (DI) Tracker and validated data packages had been sent to everyone. It was later noted that RM had been left off of the meeting invitation and had not received emails containing this information but AW provided the information to RM. KN also noted that the sampling schedule had been revised with the primary change being moving the Military Munitions Response Program (MMRP) Site LHAAP-01-R sampling from March to November 2018.

Schedule Review
RMZ noted RM's concern regarding the finalization of the Site LHAAP-03 Record of Decision (ROD) in this fiscal year. RMZ stated that the goal is to have the draft ROD to the EPA and TCEQ in March 2018.

RMZ stated that the Army has a partial schedule available from the new contractor for the Sites LHAAP-18/24, LHAAP-29 and LHAAP-47. RMZ stated that the new contractor has three technical project planning (TPP) meetings scheduled with the first planned for March 22, 2018. The purpose of the initial TPP is to discuss the LHAAP-18/24 Proposed Plan (PP) prior to preparation of the PP. RM stated that he may be sent to Puerto Rico and is tentative for that date. RMZ stated that she will confirm the March 22nd meeting date the week of February 19, 2018. RMZ indicated that everyone should plan to travel on March 21, 2018 for a full day of meeting on March 22, 2018. All three of the sites will be discussed with the focus on the LHAAP-18/24 PP.

RMZ indicated that the new contractor is preparing for field work at LHAAP-47, which will start in April 2018. The remedy for LHAAP-47 has been selected and the ROD is being finalized. AP stated that she did not find much information for LHAAP-47. RMZ stated that the Post-Screening Investigation Work Plan was approved in 2016 and is being implemented. For LHAAP-29, the last document submitted to the TCEQ and EPA is the Addendum to the Remedial Investigation (RI)/Feasibility Study (FS). RMZ clarified that the post-ROD work will be completed under a separate contract.

Defense Environmental Restoration Program (DERP) Performance Based Remediation (PBR) Update

KN asked everyone to refer to the DI Tracking Table dated February 15, 2018.

- **Task 1** (Project Management)
  - KN stated that the TCEQ approval of the RAB meeting minutes was received and that comments or approval from the EPA was pending.
  - Installation Wide Work Plan (IWWP) - KN indicated that the regulator-requested extension was noted in the tracker. AP stated that her chemist needed additional time for review. RM indicated that Kent Becher's (KB) personal absence was a concern regarding EPA review time. AP stated that she felt her comments had pulled in many of KB's prior comments. KN stated that she understood that the Standard Operating Procedures (SOPs) that were in a different format were acceptable for Regulatory review. AP and RM concurred.
- **Task 2** (LHAAP-02 Semi-Annual Groundwater Monitoring Report) – KN stated that there was not much to update on LHAAP-02 other than that sampling would be completed in the spring per the sampling schedule.
- **Task 3** (LHAAP-03 ROD and Explanation of Significant Difference [ESD]) – PS indicated that the DI Tracker has a June 2018 date for delivery to the Regulators but this date might be in March 2018 if Army reviews are done quicker. RMZ indicated that Army BRAC legal has reviewed the documents, which are now with the assessment panel following the Army process.
- **Task 4** (LHAAP-04 Remedial Design [RD]/Remedial Action Work Plan [RAWP]) – Groundwater analytical data is within the data validation package provided with the MMM agenda. SW noted that there was a surprising decrease in perchlorate detections. SW stated that monitoring well 04WW04 was the hottest location at the site previously but has reduced greatly. RM asked if well 04WW05 is west of well 04WW04 to which SW confirmed stating that the well is west of the drive. PS noted that the field work is almost complete. AP asked if there was a work plan to which RMZ stated that the well installation and sampling was completed per the ROD. SW added that the well installations and sampling were completed following existing IWWP SOPs. AP stated that the map would help in reviewing the data. PS suggested that he could send a map with the actual wells locations with Army approval. One monitoring well was dry and being evaluated this week for sampling. RM asked if all the remedial actions planned were to be completed. AW stated that reaching the cleanup goals may be achieved sooner after RMZ stated that the same actions are likely to be implemented and regulators will receive an RD for review. SW indicated that the design will be based on the new plume configuration.
- **Task 5** (LHAAP-12 Annual Remedial Action – Operation [RA-O] Report) – PS stated that the Annual RA-O Report is being prepared.
- **Task 6** (LHAAP-16 RAWP) – The RAWP is planned for submittal as draft to the Regulators by the end of the month after final Army comments are addressed.
- **Task 7** (LHAAP-17 PDI Report) – PS stated that the soil sampling was completed in January 2018 with the exception of one sample location area that is still under water. The soil data is being compiled and will be presented in the March 2017 MMM validated data package. The new monitoring well that was installed to the west was sampled, and the validated data is included with the February 2018 MMM information. This western well was "clean," resulting in plume definition to the west. A shallow monitoring well to the north (17WW12) will be sampled to fully define the plume if and when there is water in the well.

- **Task 9** (LHAAP-37) – Groundwater sampling at LHAAP-37 is occurring this week.
- **Task 10** (LHAAP-46) – Groundwater sampling is scheduled to start next week February 20, 2018).
- **Task 11** (LHAAP-50 RA-O Reports) – The Year 3 RA-O Report is currently under Army review.
- **Task 12** (LHAAP-58 ESD and RA-O Report) – RMZ indicated that if Region 6 EPA concurs, then the ESD will be sent for signature which may take a few days depending upon schedules and availability. KN stated that the comments had been received but asked what RM was requesting as far as the Conceptual Site Model cartoon or visual depictions. RM indicated that he would provide an example and stated that the request was made to help visual the overall site conditions. RMZ asked RM if this was typically more of a Feasibility Study exhibit. RM stated that it was but that this information is helpful.
  KN requested approval for deviation from the SOP for grouting cure of 24 hours before the pad is installed. RM stated the he would check internally. AW indicated that Army was unaware of this request. AP stated that the request needs to receive Army approval first. KN stated that the wells were planned for installation starting on Tuesday. RM asked if both wells were planned for install on Tuesday, February 20 to which KN confirmed. DH and RM may want to visit the site. KN stated that she would send RM James Cook's, the Bhate geologist, cell phone information.
- **Task 13** (LHAAP-67) – PS stated that RA-O Report is the next deliverable.
- **Tasks 14 and 15** (MMRP Sites' RD) – KN stated that there was not much to update on the MMRP sites other than what is documented in the DI Tracker.
- **Task 16 (Groundwater Treatment Plant [GWTP])**
    - KN stated that the two new compressors were online and operational as of the night before.
    - PLC replacement is still being designed with the Federal Communications Commission (FCC) license for the radios being worked through with the subcontractor and the Army.
    - KN stated that the 4th Quarter 2017 Operation Maintenance and Monitoring (OM&M) Report was under preparation awaiting air analytical results from the January 2018 sampling. Air results are expected from the laboratory on February 16, 2018. Another air sampling event will be completed in the first quarter 2018 for the quarterly report that covers that time period.

Schedule Next Managers' Meeting

- March 2018 MMM will be held March 15, 2018 via conference call at 10:00 AM CST.

Adjourned at 10:58 AM CST.

ACRONYM LIST

AEC	United States Army Environmental Command
AP	April Palmie
AR	Administrative Record
AW	Aaron Williams
BF	Bill Foss
BRAC	Base Realignment and Closure

CD	Compact disc
CST	Central Standard Time
DERP	Defense Environmental Restoration Program
DH	Dorelle Harrison
DI	Document and issues
E-mail	Electronic mail
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FCC	Federal Communications Commission
GWTP	Ground Water Treatment Plant
IWWP	Installation Wide Work Plan
KB	Kent Becher
KN	Kim Nemmers
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Control
MMM	Monthly Managers' Meeting
MMRP	Military Munitions Response Program
NS	Nick Smith
OBE	Overcome by events
PB	Paul Bruckwicki
PBR	Performance-Based Remediation
PDI	Pre-Design Investigation
RA-O	remedial action – operation
RAWP	Remedial Action Work Plan
RD	Remedial Design
ROD	Record of Decision
RM	Rich Mayer
RMZ	Rose M. Zeiler
SOP	Standard Operating Procedure
SW	Susan Watson
TCEQ	Texas Commission on Environmental Quality
UFP-QAPP	Uniform Federal Policy-Quality Assurance Policy Plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

LHAAP Data alidated

January 201

LHAAP Area	Analytic Method
LHAAP-04	***Groundwater Sampling - January 2018***
	PERCHLORATE (6850)
LHAAP-17	***Groundwater Sampling of New Well - January 2018***
	PERCHLORATE (6850)
	VOLATILES (SW8260)
LHAAP-1 24	***Groundwater Sampling – December 2017***
	Perchlorate (6850)
	Metals (6020A)
	VOCs (8260C)
LHAAP Surface Water	***Quarterly Perchlorate Sampling – December 2017***
	Perchlorate (6850)
GWTP Effluent	***Weekly Perchlorate Sampling – December 2017***
	Perchlorate (6850)
GWTP Effluent	***Weekly, Bi-Weekly, and Monthly Sampling – December 2017***
	Ammonia (350.3)
	Hexavalent Chromium (7196A)
	1,4-Dioxane (8270D-SIM)
	VOC (8260C)
	Anions (9056)
	Metals (6020A)
	Ortho-Phosphate (365.3)
	Organic Carbon (415.1)
GWTP Influent	***Monthly Sampling – December 2017***
	Metals (6020A)
	Perchlorate (6850)
	Hexavalent Chromium (7196A)
GWTP Quarterly	***Influent and Effluent – December 2017***
	Oil and Grease (1664A)
	Perchlorate (6850)
	Anions (9056)
	1,4-Dioxane (8270D-SIM)
	Metals (6020A)
	Chemical Oxygen Demand (410.4)
	VOC (8260C)

LHAAP-04 Groundwater Sampling
January 2018

		Location Code		04WW01		04WW02		04WW03		04WW04			
		Sample ID		04WW01-011018		04WW02-010918		04WW03-010918		04WW04-010918		04WW04-010918-	
		Sample Date		1/10/2018		1/9/2018		1/9/2018		1/9/2018		1/9/2018	
		Location Description:		Shallow Zone, Downgradient of Plume		Shallow Zone, Upgradient of Plume		Shallow Zone, Far Upgradient of Plume		Shallow Zone, Within Plume Area		Shallow Zone, Within Plume Area	
LHAAP Area	Parameter	Units	MCL/ PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
LHAAP-04													
	Perchlorate	µg/L	17	< 4	U	< 4	U	< 4	U	31	J	20	J

LHAAP-04 Groundwater Sampling
January 2018

		Location Code		04WW05		04WW06		04WW07		04WW08		LHSMW01	
		Sample ID		04WW05-010918		04WW06-010918		04WW07-010918		04WW08-010918		LHSMW01-010918	
		Sample Date		1/9/2018		1/9/2018		1/9/2018		1/9/2018		1/9/2018	
		Location Description:		Shallow Zone, Within Plume Area		Shallow Zone, Cross-Gradient to Plume Area		Shallow Zone, Downgradient of Plume Area		Intermediate Zone, Slightly Upgradient of Plume Area		Shallow Zone, Cross-Gradient to Plume Area	
LHAAP Area	Parameter	Units	MCL/ PCL	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual	Result	Val Qual
LHAAP-04													
	Perchlorate	µg/L	17	78		3.1	J	13		1.5	J	< 4	U

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

ug/L - micrograms per liter

LHAAP-17 Groundwater Sampling of New Well - January 2018

			Location Code		17WW19			
			Sample ID		17WW19-011518		17WW19-011518-FD	
			Sample Date		1/15/2018		1/15/2018	
			Location Description:		Shallow Zone, unimpacted, outside site boundary		Shallow Zone, unimpacted, outside site boundary	
LHAAP Area	Parameter		Units	MCL/PCL	Result	Val Qual	Result	Val Qual
LHAAP-17	PERCHLORATE							
		Perchlorate	µg/L	17	< 4	U	< 4	U
	VOLATILES							
		1,1-Dichloroethene	µg/L	7	< 1	U	< 1	U
		1,2-Dichloroethane	µg/L	5	< 1	U	< 1	U
		cis-1,2-Dichloroethene	µg/L	70	< 1	U	< 1	U
		Trichloroethene	µg/L	5	< 1	U	< 1	U
		Vinyl chloride	µg/L	2	< 1	U	< 1	U

Blue Highlighting Indicates concentrations above the MCL/PCL

Some samples may have been diluted due to the concentration(s) of one or more analytes exceeding the upper limit of the calibration curve.

U - Undetected: The analyte was analyzed for, but not detected.

MCL - Maximum Contaminant Limit

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

ug/L - micrograms per liter

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	AWD3_121817 12/18/17	18CPTMW01SW _122017 12/20/17	18CPTMW03SW _121517 12/15/17	18CPTMW04_12 2017 12/20/17	18CPTMW04SW _122017 12/20/17	18CPTMW06_12 1817 12/18/17	18CPTMW06_12 1817_a 12/18/17
Location Description:			Site 18/24- NNW, outside the fence line, along the perimeter road	Site 18/24-NE, inside the fence line, middle region shallow Wilcox	Site 18/24-S, inside the fence line	Site 18/24-NW, inside the fence line, middle region	Site 18/24- NW, inside the fence line, middle region Shallow Wilcox	Site 18/24-SSE, inside the fence line, middle region	Site 18/24-SSE, inside the fence line, middle region, Duplicate.
Aquifer Zone:			**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**
Perchlorate (6850)									
Perchlorate	µg/L	17*	**8800 J**	< 4.0 U	**120**	**620**	< 4.0 U	**1.8 J**	< 4.0 U
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	7	< 1.0 U	< 1.0 U	< 1.0 U	**3.6**	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	**12**	< 1.0 U	**4.5**	**5.4**	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	AWD3_121817 12/18/17	18CPTMW01SW _122017 12/20/17	18CPTMW03SW _121517 12/15/17	18CPTMW04_12 2017 12/20/17	18CPTMW04SW _122017 12/20/17	18CPTMW06_12 1817 12/18/17	18CPTMW06_12 1817_a 12/18/17
Location Description:			Site 18/24- NNW, outside the fence line, along the perimeter road	Site 18/24-NE, inside the fence line, middle region shallow Wilcox	Site 18/24-S, inside the fence line	Site 18/24-NW, inside the fence line, middle region	Site 18/24- NW, inside the fence line, middle region Shallow Wilcox	Site 18/24-SSE, inside the fence line, middle region	Site 18/24-SSE, inside the fence line, middle region, Duplicate.
Aquifer Zone:			**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	**14**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 1.0 U	**5.8**	**2.1**	**0.44 J**	< 1.0 U	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U	**3.7**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	**6.1**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	240	**1.5**	< 1.0 U	< 1.0 U	**2.3**	< 1.0 U	< 1.0 U	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	**68**	**13**	**7.2**	**66**	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U	**1.7 J**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U	**1500**	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	**2.5**
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	AWD3_121817 12/18/17	18CPTMW01SW _122017 12/20/17	18CPTMW03SW _121517 12/15/17	18CPTMW04_12 2017 12/20/17	18CPTMW04SW _122017 12/20/17	18CPTMW06_12 1817 12/18/17	18CPTMW06_12 1817_a 12/18/17
Location Description:			Site 18/24- NNW, outside the fence line, along the perimeter road	Site 18/24-NE, inside the fence line, middle region shallow Wilcox	Site 18/24-S, inside the fence line	Site 18/24-NW, inside the fence line, middle region	Site 18/24- NW, inside the fence line, middle region Shallow Wilcox	Site 18/24-SSE, inside the fence line, middle region	Site 18/24-SSE, inside the fence line, middle region, Duplicate.
Aquifer Zone:			**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**
o-Xylene	µg/L	10,000	< 1.0 U	**1.1**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U	**4.0**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	**2.3**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	5	**470**	**90**	**43**	**1600**	< 1.0 U	**2.2**	**1.7**
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	**0.0335**	0.00872 UB	**0.0241**	NA	**0.0283**	NA	NA
Antimony	mg/L	0.006	< 0.00200 U	0.000593 UB	< 0.00200 U	NA	0.00146 UB	NA	NA
Arsenic	mg/L	0.01	< 0.00200 U	**0.0150**	**0.000771 J**	NA	**0.00216**	NA	NA
Barium	mg/L	2	**0.216**	**0.913**	**0.157**	NA	**0.822**	NA	NA
Beryllium	mg/L	0.004	**0.000315 J**	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	NA	NA
Cadmium	mg/L	0.005	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	NA	NA
Calcium	mg/L	NV	**4.90**	**30.2**	**6.53**	NA	**30.4**	NA	NA
Chromium	mg/L	0.1	**0.279**	< 0.00400	**0.00872**	NA	**0.00521**	NA	NA
Cobalt	mg/L	6.1	**0.0309**	**0.00101 J**	**0.00113 J**	NA	**0.0148**	NA	NA
Copper	mg/L	1.3	**0.0298**	< 0.00200 U	**0.00159 J**	NA	< 0.00200 U	NA	NA
Iron	mg/L	NV	**1.95**	**55.5**	**0.446**	NA	**25.6**	NA	NA
Lead	mg/L	0.015	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	NA	NA
Magnesium	mg/L	NV	**3.39**	**19.5**	**3.73**	NA	**16.2**	NA	NA
Manganese	mg/L	1.1*	**0.255**	**0.602**	**0.0159**	NA	**0.748**	NA	NA
Nickel	mg/L	0.49*	**1.98**	**0.00225**	**0.00724**	NA	**0.00980**	NA	NA
Potassium	mg/L	NV	**0.924**	**5.96**	**205**	NA	**23.5**	NA	NA

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	AWD3_121817 12/18/17	18CPTMW01SW _122017 12/20/17	18CPTMW03SW _121517 12/15/17	18CPTMW04_12 2017 12/20/17	18CPTMW04SW _122017 12/20/17	18CPTMW06_12 1817 12/18/17	18CPTMW06_12 1817_a 12/18/17
Location Description:			Site 18/24- NNW, outside the fence line, along the perimeter road	Site 18/24-NE, inside the fence line, middle region shallow Wilcox	Site 18/24-S, inside the fence line	Site 18/24-NW, inside the fence line, middle region	Site 18/24- NW, inside the fence line, middle region Shallow Wilcox	Site 18/24-SSE, inside the fence line, middle region	Site 18/24-SSE, inside the fence line, middle region, Duplicate.
Aquifer Zone:			**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**
Selenium	mg/L	0.05	**0.00152 J**	< 0.00200 U	**0.00290**	NA	< 0.00200 U	NA	NA
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	NA	NA
Sodium	mg/L	NV	**48.0**	**101**	**231**	NA	**99.3**	NA	NA
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	NA	NA
Vanadium	mg/L	0.72	< 0.00500 U	< 0.00500 U	0.000943 UB	NA	< 0.00500 U	NA	NA
Zinc	mg/L	31	**0.00506**	0.00377 UB	**0.00398 J**	NA	**0.0341**	NA	NA
Mercury	mg/L	0.002	**0.000113 J**	< 0.000200 U	< 0.000200 U	NA	< 0.000200 U	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW07_120617 12/6/17	18CPTMW08SW_122117 12/21/17	18CPTMW08DW_122117 12/21/17	18CPTMW10SW-121217 12/12/17	18CPTMW10DW-121217 12/12/17	18CPTMW12SW-121217 12/12/17	18CPTMW12DW-121217 12/12/17
Location Description:			Site 18/24-NNE, inside the fence line, outer region	Site 18/24-N, inside the fence line, outer region Shallow Wilcox	Site 18/24-N, inside the fence line, outer region Deep Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Shallow Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Deep Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Shallow Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Deep Wilcox
Aquifer Zone:			Wilcox	Shallow	Wilcox	Wilcox	Wilcox	Wilcox	Wilcox
Perchlorate (6850)									
Perchlorate	µg/L	17*	< 4.0 U	**31000**	**220**	< 4.0 U	**12**	< 4.0 U	< 4.0 U
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 1.0 U	**3.8**	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	7	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW07_120617 12/6/17	18CPTMW08SW_122117 12/21/17	18CPTMW08DW_122117 12/21/17	18CPTMW10SW-121217 12/12/17	18CPTMW10DW-121217 12/12/17	18CPTMW12SW-121217 12/12/17	18CPTMW12DW-121217 12/12/17
Location Description:			Site 18/24-NNE, inside the fence line, outer region	Site 18/24-N, inside the fence line, outer region Shallow Wilcox	Site 18/24-N, inside the fence line, outer region Deep Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Shallow Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Deep Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Shallow Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Deep Wilcox
Aquifer Zone:			Wilcox	Shallow	Wilcox	Wilcox	Wilcox	Wilcox	Wilcox
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	240	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	< 1.0 U	**15**	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 UJ	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	18CPTMW07_120617 12/6/17	18CPTMW08SW_122117 12/21/17	18CPTMW08DW_122117 12/21/17	18CPTMW10SW-121217 12/12/17	18CPTMW10DW-121217 12/12/17	18CPTMW12SW-121217 12/12/17	18CPTMW12DW-121217 12/12/17
Location Description:			Site 18/24-NNE, inside the fence line, outer region	Site 18/24-N, inside the fence line, outer region Shallow Wilcox	Site 18/24-N, inside the fence line, outer region Deep Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Shallow Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Deep Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Shallow Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Deep Wilcox
Aquifer Zone:			**Wilcox**	**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**
o-Xylene	µg/L	10,000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	5	< 1.0 U	**58**	NA	**2.6**	**2.1**	< 1.0 U	< 1.0 U
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	2	< 1.0 U	**7.9**	NA	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	NA	NA	NA	NA	0.0111 UB	0.00841 UB	0.00889 UB
Antimony	mg/L	0.006	NA	NA	NA	NA	0.000501 UB	0.00117 UB	0.000508 UB
Arsenic	mg/L	0.01	NA	NA	NA	NA	**0.00139 J**	**0.00205**	**0.00332**
Barium	mg/L	2	NA	NA	NA	NA	**0.0743**	**0.775**	**0.119**
Beryllium	mg/L	0.004	NA	NA	NA	NA	< 0.00200 U	< 0.00200 U	< 0.00200 U
Cadmium	mg/L	0.005	NA	NA	NA	NA	< 0.00200 U	< 0.00200 U	< 0.00200 U
Calcium	mg/L	NV	NA	NA	NA	NA	**3.70 J**	**50.6**	**6.62**
Chromium	mg/L	0.1	NA	NA	NA	NA	< 0.00400	**0.00260 J**	**0.0108**
Cobalt	mg/L	6.1	NA	NA	NA	NA	< 0.00500 U	**0.0133**	< 0.00500 U
Copper	mg/L	1.3	NA	NA	NA	NA	**0.00100 J**	**0.00106 J**	**0.00103 J**
Iron	mg/L	NV	NA	NA	NA	NA	**0.211**	**3.38**	**1.42**
Lead	mg/L	0.015	NA	NA	NA	NA	< 0.00200 U	< 0.00200 U	< 0.00200 U
Magnesium	mg/L	NV	NA	NA	NA	NA	**3.37**	**33.1**	**3.74**
Manganese	mg/L	1.1*	NA	NA	NA	NA	**0.00517**	**1.11**	**0.0497**
Nickel	mg/L	0.49*	NA	NA	NA	NA	0.00124 UB	**0.00958**	0.00111 UB
Potassium	mg/L	NV	NA	NA	NA	NA	**76.2**	**33.8**	**80.1**

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	18CPTMW07_120617 12/6/17	18CPTMW08SW_122117 12/21/17	18CPTMW08DW_122117 12/21/17	18CPTMW10SW-121217 12/12/17	18CPTMW10DW-121217 12/12/17	18CPTMW12SW-121217 12/12/17	18CPTMW12DW-121217 12/12/17
Location Description:			Site 18/24-NNE, inside the fence line, outer region	Site 18/24-N, inside the fence line, outer region Shallow Wilcox	Site 18/24-N, inside the fence line, outer region Deep Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Shallow Wilcox	Site 18/24-WSW, outside the fence line, along the outer loop road. Deep Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Shallow Wilcox	Site 18/24-SW, outside the fence line, along the road surrounding the fence line. Deep Wilcox
Aquifer Zone:			**Wilcox**	**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**	**Wilcox**
Selenium	mg/L	0.05	NA	NA	NA	NA	< 0.00200 U	**0.00140 J**	< 0.00200 U
Silver	mg/L	0.51	NA	NA	NA	NA	< 0.00200 U	< 0.00200 U	< 0.00200 U
Sodium	mg/L	NV	NA	NA	NA	NA	**155**	**216**	**152**
Thallium	mg/L	0.002	NA	NA	NA	NA	< 0.00200 U	< 0.00200 U	< 0.00200 U
Vanadium	mg/L	0.72	NA	NA	NA	NA	0.000734 UB	0.000804 UB	0.000864 UB
Zinc	mg/L	31	NA	NA	NA	NA	**0.00305 J**	**0.0171**	**0.00254 J**
Mercury	mg/L	0.002	NA	NA	NA	NA	< 0.000200 U	< 0.000200 U	< 0.000200 U

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

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LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	18CPTMW14_120717 12/7/17	18CPTMW14_120717_a 12/7/17	18CPTMW15_120617 12/6/17	18CPTMW16_121817 12/18/17	18CPTMW18_120517 12/5/17	18CPTMW19_120617 12/6/17	18CPTMW19_120617_a 12/6/17
Location Description:			Site 18/24-SE, outside the fence line, along the road surrounding the fence line.	Site 18/24-SE, outside the fence line, along the road surrounding the fence line. Duplicate.	Site 18/24- NW, outside the fence line	Site 18/24 - NW, outside the fence line, near Harrison Bayou	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-N outside of the fence line	Site 18/24-N outside of the fence line. Duplicate.
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
Perchlorate (6850)									
Perchlorate	µg/L	17*	**2700**	**2600**	**1.9 J**	< 4.0 U	**2**	**35**	**36**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	7	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	**2.8**	**2.6**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW14_120717 12/7/17	18CPTMW14_120717_a 12/7/17	18CPTMW15_120617 12/6/17	18CPTMW16_121817 12/18/17	18CPTMW18_120517 12/5/17	18CPTMW19_120617 12/6/17	18CPTMW19_120617_a 12/6/17
Location Description:			Site 18/24-SE, outside the fence line, along the road surrounding the fence line.	Site 18/24-SE, outside the fence line, along the road surrounding the fence line. Duplicate.	Site 18/24- NW, outside the fence line	Site 18/24 - NW, outside the fence line, near Harrison Bayou	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-N outside of the fence line	Site 18/24-N outside of the fence line. Duplicate.
Aquifer Zone:			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	240	**5.5**	**5.0**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	**4.9**	**4.5**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	NA	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 UJ	< 1.0 UJ	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	18CPTMW14_120717 12/7/17	18CPTMW14_120717_a 12/7/17	18CPTMW15_120617 12/6/17	18CPTMW16_121817 12/18/17	18CPTMW18_120517 12/5/17	18CPTMW19_120617 12/6/17	18CPTMW19_120617_a 12/6/17
Location Description:			Site 18/24-SE, outside the fence line, along the road surrounding the fence line.	Site 18/24-SE, outside the fence line, along the road surrounding the fence line. Duplicate.	Site 18/24- NW, outside the fence line	Site 18/24 - NW, outside the fence line, near Harrison Bayou	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-N outside of the fence line	Site 18/24-N outside of the fence line. Duplicate.
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
o-Xylene	µg/L	10,000	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	5	**0.74 J**	**0.70 J**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	5	**600**	**520**	**0.96 J**	NA	< 1.0 U	< 1.0 U	< 1.0 U
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	2	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	**0.0845**	**0.0859**	NA	NA	0.0142 UB	NA	NA
Antimony	mg/L	0.006	**0.000408 J**	< 0.00200 U	NA	NA	< 0.00200 U	NA	NA
Arsenic	mg/L	0.01	0.00215 UB	0.00216 UB	NA	NA	**0.00169 J**	NA	NA
Barium	mg/L	2	**3.79**	**3.81**	NA	NA	**0.533**	NA	NA
Beryllium	mg/L	0.004	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA	NA
Cadmium	mg/L	0.005	< 0.00200 U	< 0.00200 U	NA	NA	**0.000215 J**	NA	NA
Calcium	mg/L	NV	**478**	**447**	NA	NA	**273**	NA	NA
Chromium	mg/L	0.1	**0.0217**	**0.0206**	NA	NA	**0.000581 J**	NA	NA
Cobalt	mg/L	6.1	**0.00265 J**	**0.00250 J**	NA	NA	**0.0145**	NA	NA
Copper	mg/L	1.3	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA	NA
Iron	mg/L	NV	**0.285**	**0.305**	NA	NA	**0.751**	NA	NA
Lead	mg/L	0.015	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA	NA
Magnesium	mg/L	NV	**76.7**	**71.8**	NA	NA	**189**	NA	NA
Manganese	mg/L	1.1*	**0.141**	**0.132**	NA	NA	**1.93**	NA	NA
Nickel	mg/L	0.49*	**0.00190 J**	**0.00173 J**	NA	NA	**0.0138**	NA	NA
Potassium	mg/L	NV	**22.3**	**22.0**	NA	NA	**2.90**	NA	NA

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	18CPTMW14_120717 12/7/17	18CPTMW14_120717_a 12/7/17	18CPTMW15_120617 12/6/17	18CPTMW16_121817 12/18/17	18CPTMW18_120517 12/5/17	18CPTMW19_120617 12/6/17	18CPTMW19_120617_a 12/6/17
Location Description:			Site 18/24-SE, outside the fence line, along the road surrounding the fence line.	Site 18/24-SE, outside the fence line, along the road surrounding the fence line. Duplicate.	Site 18/24- NW, outside the fence line	Site 18/24 - NW, outside the fence line, near Harrison Bayou	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-N outside of the fence line	Site 18/24-N outside of the fence line. Duplicate.
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
Selenium	mg/L	0.05	**0.00707**	**0.00583**	NA	NA	**0.00129 J**	NA	NA
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA	NA
Sodium	mg/L	NV	**587**	**575**	NA	NA	**724**	NA	NA
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA	NA
Vanadium	mg/L	0.72	**0.00128 J**	**0.00116 J**	NA	NA	< 0.00500 U	NA	NA
Zinc	mg/L	31	**0.00437**	**0.00344 J**	NA	NA	**0.0145**	NA	NA
Mercury	mg/L	0.002	< 0.000200 U	< 0.000200 U	NA	NA	< 0.000200 U	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	18CPTMW22R_121417 12/14/17	18CPTMW22SW_121417 12/14/17	18CPTMW23_120717 12/7/17	18CPTMW24_120717 12/7/17	18WW02_120817 12/8/17	18WW06_120817 12/8/17	18WW08_120617 12/6/17
Location Description:			Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24 -WNW, outside the fence line, near the road surrounding the fence line	Site 18/24 - E, outside the fence line, on the road surrounding the fence line	Site 18/24-NW, outside the fence line Wilcox Well	Site 18/24- W. just outside the fence line	Site 18/24-NNW, outside the fence line
Aquifer Zone:			Shallow	Wilcox	Shallow	Shallow	Wilcox	Wilcox	Wilcox
Perchlorate (6850)									
Perchlorate	µg/L	17*	**8.3**	**6900**	**140**	**65**	< 4.0 U	< 4.0 U	**2,400**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 1.0 U	< 1.0 U	**0.44 J**	< 1.0 U	< 1.0 U	< 1.0 U	**0.54 J**
1,1-Dichloroethene	µg/L	7	< 1.0 U	< 1.0 U	**4.0**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	< 1.0 U	< 1.0 U	**110**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW22R_121417 12/14/17	18CPTMW22SW_121417 12/14/17	18CPTMW23_120717 12/7/17	18CPTMW24_120717 12/7/17	18WW02_120817 12/8/17	18WW06_120817 12/8/17	18WW08_120617 12/6/17
Location Description:			Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24 -WNW, outside the fence line, near the road surrounding the fence line	Site 18/24 - E, outside the fence line, on the road surrounding the fence line	Site 18/24-NW, outside the fence line Wilcox Well	Site 18/24- W. just outside the fence line	Site 18/24-NNW, outside the fence line
Aquifer Zone:			Shallow	Wilcox	Shallow	Shallow	Wilcox	Wilcox	Wilcox
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 1.0 U	< 1.0 U	**0.75 J**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	240	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	< 1.0 U	< 1.0 U	**190**	**10**	< 1.0 U	< 1.0 U	**2.0**
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	18CPTMW22R_ 121417 12/14/17	18CPTMW22SW _121417 12/14/17	18CPTMW23_12 0717 12/7/17	18CPTMW24_12 0717 12/7/17	18WW02_12081 7 12/8/17	18WW06_12081 7 12/8/17	18WW08_12061 7 12/6/17
Location Description:			Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24 -WNW, outside the fence line, near the road surrounding the fence line	Site 18/24 - E, outside the fence line, on the road surrounding the fence line	Site 18/24-NW, outside the fence line Wilcox Well	Site 18/24- W. just outside the fence line	Site 18/24-NNW, outside the fence line
Aquifer Zone:			**Shallow**	**Wilcox**	**Shallow**	**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**
o-Xylene	µg/L	10,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	**1.4**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	5	< 1.0 U	< 1.0 U	**2000**	**3.3**	< 1.0 U	< 1.0 U	**4.7**
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	2	< 1.0 U	< 1.0 U	**1.3**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	**1.36**	**0.0857**	NA	**0.0204**	**0.129**	NA	NA
Antimony	mg/L	0.006	< 0.00200 U	< 0.00200 U	NA	**0.000457 J**	< 0.00200 U	NA	NA
Arsenic	mg/L	0.01	**0.00129 J**	**0.000798 J**	NA	**0.00811**	0.000627 UB	NA	NA
Barium	mg/L	2	**0.109**	**0.216**	NA	**9.80**	**0.0424**	NA	NA
Beryllium	mg/L	0.004	**0.000626 J**	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U	NA	NA
Cadmium	mg/L	0.005	< 0.00200 U	< 0.00200 U	NA	**0.000757 J**	< 0.00200 U	NA	NA
Calcium	mg/L	NV	**2.33**	**106**	NA	**383**	**6.47**	NA	NA
Chromium	mg/L	0.1	**0.00146 J**	**0.0118**	NA	**0.000926 J**	**0.00342 J**	NA	NA
Cobalt	mg/L	6.1	**0.00749**	< 0.00500 U	NA	**0.00398 J**	< 0.00500 U	NA	NA
Copper	mg/L	1.3	**0.00331**	**0.00121 J**	NA	< 0.00200 U	< 0.00200 U	NA	NA
Iron	mg/L	NV	**1.22**	**0.0437 J**	NA	**8.22**	**1.66**	NA	NA
Lead	mg/L	0.015	**0.00115 J**	< 0.00200 U	NA	< 0.00200 U	**0.000609 J**	NA	NA
Magnesium	mg/L	NV	**1.80**	**5.01**	NA	**235**	**1.10**	NA	NA
Manganese	mg/L	1.1*	**0.0771**	**0.0249**	NA	**0.448**	**0.0767**	NA	NA
Nickel	mg/L	0.49*	**0.00518**	0.00110 UB	NA	**0.00562**	**0.00180 J**	NA	NA
Potassium	mg/L	NV	**0.342**	**155**	NA	**3.31**	**1.64**	NA	NA

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18CPTMW22R_121417 12/14/17	18CPTMW22SW_121417 12/14/17	18CPTMW23_120717 12/7/17	18CPTMW24_120717 12/7/17	18WW02_120817 12/8/17	18WW06_120817 12/8/17	18WW08_120617 12/6/17
Location Description:			Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24-S. outside the fence line, along the outer loop road	Site 18/24 -WNW, outside the fence line, near the road surrounding the fence line	Site 18/24 - E, outside the fence line, on the road surrounding the fence line	Site 18/24-NW, outside the fence line Wilcox Well	Site 18/24- W. just outside the fence line	Site 18/24-NNW, outside the fence line
Aquifer Zone:			**Shallow**	**Wilcox**	**Shallow**	**Shallow**	**Wilcox**	**Wilcox**	**Wilcox**
Selenium	mg/L	0.05	**0.00182 J**	**0.00213**	NA	**0.00935**	< 0.00200 U	NA	NA
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U	NA	NA
Sodium	mg/L	NV	**43.6**	**239**	NA	**951**	**15.9**	NA	NA
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U	NA	NA
Vanadium	mg/L	0.72	**0.00528**	0.00188 UB	NA	< 0.00500 U	**0.00200 J**	NA	NA
Zinc	mg/L	31	**0.00891**	**0.00427**	NA	**0.0126**	**0.00462**	NA	NA
Mercury	mg/L	0.002	< 0.000200 U	< 0.000200 U	NA	< 0.000200 U	< 0.000200 U	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	18WW17_120517 12/5/17	18WW22_120517 12/5/17	18WW24_120717 12/7/17	18WW25_120717 12/7/17	C03_120517 12/5/17	C08_120517 12/5/17	C09_120517 12/5/17
Location Description:			Site 18/24-NE, outside the fence line. Outer region.	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-WNW, outside the fence line, in the woods	Site 18/24-NW, outside the fence line, in the woods	Site 18/24 - NE, outside the fence line, along the outer loop road	Site 18/24 - E, outside the fence line, along the road heading east-northeast.	Site 18/24 - E, outside the fence line to the south, along Long Point Road
Aquifer Zone:			**Wilcox**	**Shallow**	**Shallow**	**Shallow**	**Wilcox**	**Shallow**	**Shallow**
Perchlorate (6850)									
Perchlorate	µg/L	17*	**94,000**	< 4.0 U	< 4.0 U	< 4.0 U	**170**	< 4.0 U	< 4.0 U
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1,2-Trichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1-Dichloroethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1-Dichloroethene	µg/L	7	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dichloroethane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 UJ
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U UJ
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	18WW17_120517 12/5/17	18WW22_120517 12/5/17	18WW24_120717 12/7/17	18WW25_120717 12/7/17	C03_120517 12/5/17	C08_120517 12/5/17	C09_120517 12/5/17
Location Description:			Site 18/24-NE, outside the fence line. Outer region.	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-WNW, outside the fence line, in the woods	Site 18/24-NW, outside the fence line, in the woods	Site 18/24 - NE, outside the fence line, along the outer loop road	Site 18/24 - E, outside the fence line, along the road heading east-northeast.	Site 18/24 - E, outside the fence line to the south, along Long Point Road
Aquifer Zone:			Wilcox	Shallow	Shallow	Shallow	Wilcox	Shallow	Shallow
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 UJ
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 UJ
Benzene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromochloromethane	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 UJ
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chloroform	µg/L	240	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
cis-1,2-Dichloroethene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Hexachlorobutadiene	µg/L	12	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ	< 1.0 UJ
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
m,p-Xylene	µg/L	10,000	< 2.0 U	< 2.0 U	< 2.0 U UJ	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U UJ
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U	< 2.0 U UJ
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
n-Butylbenzene	µg/L	1,200	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 UJ
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	18WW17_120517 12/5/17	18WW22_120517 12/5/17	18WW24_120717 12/7/17	18WW25_120717 12/7/17	C03_120517 12/5/17	C08_120517 12/5/17	C09_120517 12/5/17
Location Description:			Site 18/24-NE, outside the fence line. Outer region.	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-WNW, outside the fence line, in the woods	Site 18/24-NW, outside the fence line, in the woods	Site 18/24 - NE, outside the fence line, along the outer loop road	Site 18/24 - E, outside the fence line, along the road heading east-northeast.	Site 18/24 - E, outside the fence line to the south, along Long Point Road
Aquifer Zone:			**Wilcox**	**Shallow**	**Shallow**	**Shallow**	**Wilcox**	**Shallow**	**Shallow**
o-Xylene	µg/L	10,000	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Toluene	µg/L	1,000	< 1.0 U	< 1.0 U	< 1.0 UJ	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Trichloroethene	µg/L	5	**36**	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	**0.70 J**	< 1.0 UJ
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Vinyl chloride	µg/L	2	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 UJ
Metals (6020A)									
Aluminum	mg/L	100	0.00628 UB	**0.404**	**0.0368**	**0.00922 J**	NA	0.0147 UB	**0.0704**
Antimony	mg/L	0.006	< 0.00200 U	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U
Arsenic	mg/L	0.01	< 0.00200 U	**0.00523**	0.000915 UB	0.00177 UB	NA	< 0.00200 U	< 0.00200 U
Barium	mg/L	2	**3.27**	**0.0806**	**0.0621**	**0.236**	NA	**5.86**	**0.927**
Beryllium	mg/L	0.004	< 0.00200 U	< 0.00200 U	**0.000402 J**	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U
Cadmium	mg/L	0.005	**0.000356 J**	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	**0.000416 J**	**0.000395 J**
Calcium	mg/L	NV	**324**	**19.0**	**38.2**	**14.0**	NA	**268**	**267**
Chromium	mg/L	0.1	**0.00224 J**	**0.00290 J**	< 0.00400	< 0.00400	NA	< 0.00400	< 0.00400
Cobalt	mg/L	6.1	< 0.00500 U	**0.000280 J**	**0.0196**	**0.00113 J**	NA	**0.00476 J**	**0.000355 J**
Copper	mg/L	1.3	< 0.00200 U	**0.00140 J**	< 0.00200 U	**0.00232**	NA	**0.00185 J**	**0.00174 J**
Iron	mg/L	NV	**0.0425 J**	**0.0216 J**	**0.470**	**12.8**	NA	**0.358**	**0.0773 J**
Lead	mg/L	0.015	< 0.00200 U	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	**0.000619 J**
Magnesium	mg/L	NV	**203**	**0.953**	**32.2**	**8.53**	NA	**159**	**147**
Manganese	mg/L	1.1*	**0.0222**	**0.00360 J**	**3.44**	**1.69**	NA	**0.885**	**0.0385**
Nickel	mg/L	0.49*	**0.0103**	0.00112 UB	**0.0796**	< 0.00200 U	NA	**0.00559**	**0.00769**
Potassium	mg/L	NV	**1.61**	**6.60**	**0.648**	**1.18**	NA	**1.93**	**1.10**

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/PCL	18WW17_120517 12/5/17	18WW22_120517 12/5/17	18WW24_120717 12/7/17	18WW25_120717 12/7/17	C03_120517 12/5/17	C08_120517 12/5/17	C09_120517 12/5/17
Location Description:			Site 18/24-NE, outside the fence line. Outer region.	Site 18/24-NE, outside the fence line, in the woods	Site 18/24-WNW, outside the fence line, in the woods	Site 18/24-NW, outside the fence line, in the woods	Site 18/24 - NE, outside the fence line, along the outer loop road	Site 18/24 - E, outside the fence line, along the road heading east-northeast.	Site 18/24 - E, outside the fence line to the south, along Long Point Road
Aquifer Zone:			**Wilcox**	**Shallow**	**Shallow**	**Shallow**	**Wilcox**	**Shallow**	**Shallow**
Selenium	mg/L	0.05	**0.00311**	< 0.00200 U	**0.00350**	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U
Sodium	mg/L	NV	**999**	**67.3**	**661**	**33.2**	NA	**793**	**473**
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	< 0.00200 U	< 0.00200 U
Vanadium	mg/L	0.72	0.00139 UB	**0.0215**	< 0.00500 U	< 0.00500 U	NA	0.000603 UB	0.00128 UB
Zinc	mg/L	31	**0.0104**	**< 0.00400**	**0.0333**	**0.00405**	NA	**0.00766**	**0.00894**
Mercury	mg/L	0.002	< 0.000200 U	< 0.000200 U	< 0.000200 U	< 0.000200 U	NA	< 0.000200 U	< 0.000200 U

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW2_122017 12/20/17	MW3_122117 12/21/17	MW5_122017 12/20/17	MW7_121317 12/13/17	MW8_121217 12/12/17	MW9_121317 12/13/17	MW10-121117 12/11/17
Location Description:			Site 18/24 - NE, inside the fence line	Site 18/24 - N, inside the fence line	Site 18/24 - NNW, inside the fence line	Site 18/24 - SW, outside the fence line, along the road surrounding the fence line	Site 18/24 - SW, outside the fence line	Site 18/24 - WSW, outside the fence line, along the road surrounding the fence line	Site 18/24 -W, outside the fence line, along the outer loop road
Aquifer Zone:			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Perchlorate (6850)									
Perchlorate	µg/L	17*	**160**	**15,000**	**31,000**	**15,000**	**5,500**	**44**	< 4.0 U
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 100 U	< 5.0 U	**3.3**	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	7	270	**42**	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	< 100 U	< 5.0 U	< 1.0 U	**17**	**4.0**	**0.82 J**	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	15,000	< 200 U	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	120	< 200 U	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW2_122017 12/20/17	MW3_122117 12/21/17	MW5_122017 12/20/17	MW7_121317 12/13/17	MW8_121217 12/12/17	MW9_121317 12/13/17	MW10-121117 12/11/17
Location Description:			Site 18/24 - NE, inside the fence line	Site 18/24 - N, inside the fence line	Site 18/24 - NNW, inside the fence line	Site 18/24 - SW, outside the fence line, along the road surrounding the fence line	Site 18/24 - SW, outside the fence line	Site 18/24 - WSW, outside the fence line, along the road surrounding the fence line	Site 18/24 -W, outside the fence line, along the outer loop road
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
4-Isopropyltoluene	µg/L	2,400	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 200 U	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	22,000	< 200 U	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	< 100 U	< 5.0 U	< 1.0 U	**1.5 J**	**0.38 J**	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	200	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	980	**250**	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	120	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	34	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 200 U	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	98,000	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	240	< 100 U	< 5.0 U	< 1.0 U	**11**	< 1.0 U	**1.7**	< 1.0 U
Chloromethane	µg/L	70	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	**34000**	**84**	**12**	**11**	**5.4**	**70**	< 1.0 U
cis-1,3-Dichloropropene	µg/L	1.7	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	120	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/L	2,400	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 200 U	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	**140,000.00**	< 10 U	< 2.0 U	< 10 U	< 2.0 U	< 2.0 U	< 2.0 U
Naphthalene	µg/L	490	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
n-Propylbenzene	µg/L	980	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW2_122017 12/20/17	MW3_122117 12/21/17	MW5_122017 12/20/17	MW7_121317 12/13/17	MW8_121217 12/12/17	MW9_121317 12/13/17	MW10-121117 12/11/17
Location Description:			Site 18/24 - NE, inside the fence line	Site 18/24 - N, inside the fence line	Site 18/24 - NNW, inside the fence line	Site 18/24 - SW, outside the fence line, along the road surrounding the fence line	Site 18/24 - SW, outside the fence line	Site 18/24 - WSW, outside the fence line, along the road surrounding the fence line	Site 18/24 -W, outside the fence line, along the outer loop road
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
o-Xylene	μg/L	10,000	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	μg/L	980	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	μg/L	100	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	μg/L	980	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	μg/L	5	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Toluene	μg/L	1,000	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	μg/L	100	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	μg/L	9.1	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	μg/L	5	**2600**	**470**	**46**	**1600**	**270**	**930**	< 1.0 U
Trichlorofluoromethane	μg/L	7,300	< 100 U	< 5.0 U	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride	μg/L	2	< 100 U	**29**	< 1.0 U	< 5.0 U	< 1.0 U	< 1.0 U	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	**0.0381**	0.00504 UB	0.00867 UB	NA	NA	0.0106 UB	NA
Antimony	mg/L	0.006	0.000858 UB	0.000414 UB	0.000519 UB	NA	NA	< 0.00200 U	NA
Arsenic	mg/L	0.01	**0.00986**	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA
Barium	mg/L	2	**2.60**	**0.479**	**0.872**	NA	NA	**0.126**	NA
Beryllium	mg/L	0.004	**0.000620 J**	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA
Cadmium	mg/L	0.005	**0.000320 J**	**0.000290 J**	**0.000798 J**	NA	NA	< 0.00200 U	NA
Calcium	mg/L	NV	**79.7**	**28.1**	**21.7**	NA	NA	**10.2**	NA
Chromium	mg/L	0.1	**0.0158**	**0.000552 J**	**0.581**	NA	NA	**0.0325**	NA
Cobalt	mg/L	6.1	**0.0660**	**0.0104**	**0.00537**	NA	NA	**0.00199 J**	NA
Copper	mg/L	1.3	< 0.00200 U	< 0.00200 U	**0.00622**	NA	NA	**0.00216**	NA
Iron	mg/L	NV	**16.4**	**0.599**	**2.37**	NA	NA	**0.617**	NA
Lead	mg/L	0.015	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA
Magnesium	mg/L	NV	**54.1**	**15.1**	**22.0**	NA	NA	**2.82**	NA
Manganese	mg/L	1.1*	**3.47**	**2.20**	**0.150**	NA	NA	**0.0635**	NA
Nickel	mg/L	0.49*	**0.0503**	**0.00717**	**0.323**	NA	NA	**0.0835**	NA
Potassium	mg/L	NV	**3.24**	**1.62**	**2.20**	NA	NA	**0.449**	NA

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW2_122017 12/20/17	MW3_122117 12/21/17	MW5_122017 12/20/17	MW7_121317 12/13/17	MW8_121217 12/12/17	MW9_121317 12/13/17	MW10-121117 12/11/17
Location Description:			Site 18/24 - NE, inside the fence line	Site 18/24 - N, inside the fence line	Site 18/24 - NNW, inside the fence line	Site 18/24 - SW, outside the fence line, along the road surrounding the fence line	Site 18/24 - SW, outside the fence line	Site 18/24 - WSW, outside the fence line, along the road surrounding the fence line	Site 18/24 -W, outside the fence line, along the outer loop road
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
Selenium	mg/L	0.05	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	NA	**0.00364**	NA
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA
Sodium	mg/L	NV	**226**	**217**	**117**	NA	NA	**11.8**	NA
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	< 0.00200 U	NA	NA	< 0.00200 U	NA
Vanadium	mg/L	0.72	**0.000998 J**	< 0.00500 U	**0.000869 J**	NA	NA	0.00134 UB	NA
Zinc	mg/L	31	**0.0744**	0.00590 UB	**0.0212**	NA	NA	**0.00528**	NA
Mercury	mg/L	0.002	< 0.000200 U	< 0.000200 U	< 0.000200 U	NA	NA	< 0.000200 U	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	MW14_121817 12/18/17	MW14_121817-a 12/18/17	MW-16_120817 12/8/17	MW17-121117 12/11/17	MW18-121117 12/11/17	MW19-121217 12/12/17	MW20_121417 12/14/17
Location Description:			LHAAP-18/24-inside containment	LHAAP-18/24-inside containment. Duplicate.	Site 18/24-W, outside the fence line, along the road surrounding the fence line	Site 18/24 - W, outside the fence line, along the outer loop road	Site 18/24 - SW, outside the fence line, along the outer loop road	Site 18/24-SSW, outside the fence line, along the outer loop road	Site 18/24- S, outside the fence line, along the outer loop road
Aquifer Zone:			**Wilcox**	**Wilcox**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
Perchlorate (6850)									
Perchlorate	µg/L	17*	**150000**	**150000**	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	**1.9**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	**3.3**	**3.1**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	**28**	**29**	**0.70 J**	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	7	**140**	**140**	**3.6**	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	**90**	**91**	**23**	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/PCL	MW14_121817 12/18/17	MW14_121817-a 12/18/17	MW-16_120817 12/8/17	MW17-121117 12/11/17	MW18-121117 12/11/17	MW19-121217 12/12/17	MW20_121417 12/14/17
Location Description:			LHAAP-18/24-inside containment	LHAAP-18/24-inside containment. Duplicate.	Site 18/24-W, outside the fence line, along the road surrounding the fence line	Site 18/24 - W, outside the fence line, along the outer loop road	Site 18/24 - SW, outside the fence line, along the outer loop road	Site 18/24-SSW, outside the fence line, along the outer loop road	Site 18/24- S, outside the fence line, along the outer loop road
Aquifer Zone:			Wilcox	Wilcox	Shallow	Shallow	Shallow	Shallow	Shallow
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Benzene	µg/L	5	**4.3**	**4.4**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chloroform	µg/L	240	**5.0**	**5.0**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	**2000**	**2000**	**13**	NA	**1.2**	**3.1**	< 1.0 U
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 U	< 1.0 U	< 1.0 UJ	NA	< 1.0 U	< 1.0 U	< 1.0 U
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U	< 2.0 U	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	5	**11**	**12**	< 2.0 U	NA	< 2.0 U	< 2.0 U	< 2.0 U
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 U	< 1.0 U	< 1.0 UJ	NA	< 1.0 U	< 1.0 U	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	MW14_121817 12/18/17	MW14_121817-a 12/18/17	MW-16_120817 12/8/17	MW17-121117 12/11/17	MW18-121117 12/11/17	MW19-121217 12/12/17	MW20_121417 12/14/17
Location Description:			LHAAP-18/24-inside containment	LHAAP-18/24-inside containment. Duplicate.	Site 18/24-W, outside the fence line, along the road surrounding the fence line	Site 18/24 - W, outside the fence line, along the outer loop road	Site 18/24 - SW, outside the fence line, along the outer loop road	Site 18/24-SSW, outside the fence line, along the outer loop road	Site 18/24- S, outside the fence line, along the outer loop road
Aquifer Zone:			**Wilcox**	**Wilcox**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
o-Xylene	µg/L	10,000	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U	0.37 J	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	**22**	**21**	**1.0**	NA	< 1.0 U	< 1.0 U	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	5	**13000**	**13000**	**300**	NA	**4.8**	**3.2**	< 1.0 U
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	2	**5.6**	**5.5**	< 1.0 U	NA	< 1.0 U	< 1.0 U	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	0.0172 UB	0.0162 UB	NA	NA	NA	**0.0492**	NA
Antimony	mg/L	0.006	< 0.00200 U	< 0.00200 U	NA	NA	NA	0.000432 UB	NA
Arsenic	mg/L	0.01	**0.00139 J**	**0.00171 J**	NA	NA	NA	**0.00739**	NA
Barium	mg/L	2	**0.257**	**0.276**	NA	NA	NA	**0.414**	NA
Beryllium	mg/L	0.004	**0.000241 J**	< 0.00200 U	NA	NA	NA	< 0.00200 U	NA
Cadmium	mg/L	0.005	**0.000814 J**	**0.000927 J**	NA	NA	NA	**0.000731 J**	NA
Calcium	mg/L	NV	**88.5**	**92.2**	NA	NA	NA	**31.9**	NA
Chromium	mg/L	0.1	**0.0384**	**0.0431**	NA	NA	NA	**0.00260 J**	NA
Cobalt	mg/L	6.1	**0.0331**	**0.0361**	NA	NA	NA	**0.0184**	NA
Copper	mg/L	1.3	**0.00280**	**0.00334**	NA	NA	NA	**0.00165 J**	NA
Iron	mg/L	NV	**77.3**	**89.8**	NA	NA	NA	**29.2**	NA
Lead	mg/L	0.015	< 0.00200 U	< 0.00200 U	NA	NA	NA	< 0.00200 U	NA
Magnesium	mg/L	NV	**43.2**	**45.1**	NA	NA	NA	**16.9**	NA
Manganese	mg/L	1.1*	**3.82**	**3.81**	NA	NA	NA	**1.96**	NA
Nickel	mg/L	0.49*	**0.304**	**0.344**	NA	NA	NA	**0.0478**	NA
Potassium	mg/L	NV	**17.4**	**17.6**	NA	NA	NA	**2.79**	NA

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW14_121817 12/18/17	MW14_121817-a 12/18/17	MW-16_120817 12/8/17	MW17-121117 12/11/17	MW18-121117 12/11/17	MW19-121217 12/12/17	MW20_121417 12/14/17
Location Description:			LHAAP-18/24- inside containment	LHAAP-18/24- inside containment. Duplicate.	Site 18/24-W, outside the fence line, along the road surrounding the fence line	Site 18/24 - W, outside the fence line, along the outer loop road	Site 18/24 - SW, outside the fence line, along the outer loop road	Site 18/24-SSW, outside the fence line, along the outer loop road	Site 18/24- S, outside the fence line, along the outer loop road
Aquifer Zone:			**Wilcox**	**Wilcox**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
Selenium	mg/L	0.05	**0.00156 J**	< 0.00200 U	NA	NA	NA	< 0.00200 U	NA
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	NA	NA	NA	< 0.00200 U	NA
Sodium	mg/L	NV	**411**	**397**	NA	NA	NA	**282**	NA
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	NA	NA	NA	< 0.00200 U	NA
Vanadium	mg/L	0.72	< 0.00500 U	< 0.00500 U	NA	NA	NA	0.00152 UB	NA
Zinc	mg/L	31	**0.666**	**0.688**	NA	NA	NA	**0.0121**	NA
Mercury	mg/L	0.002	**0.0000760 J**	**0.0000840 J**	NA	NA	NA	< 0.000200 U	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/PCL	MW21_121817 12/18/17	MW22_121817 12/18/17	MW23_121517 12/15/17	MW23_121517-a 12/15/17	(MW-) 109_121417 12/14/17	(MW-) 120_121417 12/14/17	(MW-) 123_121417 12/14/17
Location Description:			Site 18/24 - E, along the fence line	Site 18/24-ESE, inside the fence line	Site 18/24-S, inside the fence line	Site 18/24-S, inside the fence line. Duplicate	Site 18/24-NE, just inside the fence line	Site 18/24- W, inside the fence line, outer region	Site 18/24-NW, outside the fence line, long the outer loop road
Aquifer Zone:			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
Perchlorate (6850)									
Perchlorate	µg/L	17*	**21,000**	**40 J**	**73,000**	**73,000**	**19,000**	**65,000**	**2,200**
Volatile Organic Compounds (8260C)									
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	**11**	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,1-Dichloroethene	µg/L	7	< 1.0 U	< 1.0 U	< 10 U	< 10 U	**7.3**	**250**	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,2-Dichloroethane	µg/L	5	**41**	**5.4**	**80**	**79**	< 1.0 U	**110**	**6.1**
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW21_121817 12/18/17	MW22_121817 12/18/17	MW23_121517 12/15/17	MW23_121517-a 12/15/17	(MW-) 109_121417 12/14/17	(MW-) 120_121417 12/14/17	(MW-) 123_121417 12/14/17
Location Description:			Site 18/24 - E, along the fence line	Site 18/24-ESE, inside the fence line	Site 18/24-S, inside the fence line	Site 18/24-S, inside the fence line. Duplicate	Site 18/24-NE, just inside the fence line	Site 18/24- W, inside the fence line, outer region	Site 18/24-NW, outside the fence line, long the outer loop road
Aquifer Zone:			Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow
4-Isopropyltoluene	µg/L	2,400	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
Benzene	µg/L	5	**3.2**	**3.3**	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Bromoform	µg/L	120	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Chloroform	µg/L	240	**12**	**4.0**	< 10 U	< 10 U	**1.8**	**77**	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	**74**	**6.1**	**16**	**15**	**150**	**3900**	**13**
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Isopropylbenzene	µg/L	2,400	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U	< 2.0 U	< 20 U	< 20 U	< 2.0 U	< 100 U	< 2.0 U
Naphthalene	µg/L	490	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	MW21_121817 12/18/17	MW22_121817 12/18/17	MW23_121517 12/15/17	MW23_121517-a 12/15/17	(MW-) 109_121417 12/14/17	(MW-) 120_121417 12/14/17	(MW-) 123_121417 12/14/17
Location Description:			Site 18/24 - E, along the fence line	Site 18/24-ESE, inside the fence line	Site 18/24-S, inside the fence line	Site 18/24-S, inside the fence line. Duplicate	Site 18/24-NE, just inside the fence line	Site 18/24- W, inside the fence line, outer region	Site 18/24-NW, outside the fence line, long the outer loop road
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
o-Xylene	µg/L	10,000	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Styrene	µg/L	100	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	**7.2**	< 1.0 U	< 10 U	< 10 U	**2.2**	< 50 U	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Trichloroethene	µg/L	5	**8500**	**550**	**3300**	**3200**	**850**	**27000**	**100**
Trichlorofluoromethane	µg/L	7,300	< 1.0 U	< 1.0 U	< 10 U	< 10 U	< 1.0 U	< 50 U	< 1.0 U
Vinyl chloride	µg/L	2	**37**	**1.5**	< 10 U	< 10 U	1.1	**260**	< 1.0 U
Metals (6020A)									
Aluminum	mg/L	100	0.00900 UB	0.00917 UB	NA	NA	NA	NA	NA
Antimony	mg/L	0.006	< 0.00200 U	< 0.00200 U	NA	NA	NA	NA	NA
Arsenic	mg/L	0.01	**0.000400 J**	< 0.00200 U	NA	NA	NA	NA	NA
Barium	mg/L	2	**7.40**	**1.08**	NA	NA	NA	NA	NA
Beryllium	mg/L	0.004	**0.000211 J**	< 0.00200 U	NA	NA	NA	NA	NA
Cadmium	mg/L	0.005	**0.00102 J**	**0.00138 J**	NA	NA	NA	NA	NA
Calcium	mg/L	NV	**206**	**91.9**	NA	NA	NA	NA	NA
Chromium	mg/L	0.1	**1.69**	**0.0174**	NA	NA	NA	NA	NA
Cobalt	mg/L	6.1	**0.129**	**0.0561**	NA	NA	NA	NA	NA
Copper	mg/L	1.3	**0.0714**	**0.00485**	NA	NA	NA	NA	NA
Iron	mg/L	NV	**21.0**	**0.591**	NA	NA	NA	NA	NA
Lead	mg/L	0.015	< 0.00200 U	< 0.00200 U	NA	NA	NA	NA	NA
Magnesium	mg/L	NV	**138**	**26.8**	NA	NA	NA	NA	NA
Manganese	mg/L	1.1*	**3.15**	**0.688**	NA	NA	NA	NA	NA
Nickel	mg/L	0.49*	**2.48**	**0.660**	NA	NA	NA	NA	NA
Potassium	mg/L	NV	**2.28**	**1.83**	NA	NA	NA	NA	NA

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	MW21_121817 12/18/17	MW22_121817 12/18/17	MW23_121517 12/15/17	MW23_121517-a 12/15/17	(MW-) 109_121417 12/14/17	(MW-) 120_121417 12/14/17	(MW-) 123_121417 12/14/17
Location Description:			Site 18/24 - E, along the fence line	Site 18/24-ESE, inside the fence line	Site 18/24-S, inside the fence line	Site 18/24-S, inside the fence line. Duplicate	Site 18/24-NE, just inside the fence line	Site 18/24- W, inside the fence line, outer region	Site 18/24-NW, outside the fence line, long the outer loop road
Aquifer Zone:			**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**	**Shallow**
Selenium	mg/L	0.05	**0.00452**	< 0.00200 U	NA	NA	NA	NA	NA
Silver	mg/L	0.51	< 0.00200 U	< 0.00200 U	NA	NA	NA	NA	NA
Sodium	mg/L	NV	**542**	**371**	NA	NA	NA	NA	NA
Thallium	mg/L	0.002	< 0.00200 U	< 0.00200 U	NA	NA	NA	NA	NA
Vanadium	mg/L	0.72	**0.00108 J**	< 0.00500 U	NA	NA	NA	NA	NA
Zinc	mg/L	31	**0.0269**	**0.00294 J**	NA	NA	NA	NA	NA
Mercury	mg/L	0.002	**0.000121 J**	**0.0000860 J**	NA	NA	NA	NA	NA

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	(MW-) 126_120517 12/5/17
Location Description:			Site 18/24 0 Northwest of the Groundwater Treatment Plant, along the road
Aquifer Zone:			Shallow
Perchlorate (6850)			
Perchlorate	µg/L	17*	< 4.0 U
Volatile Organic Compounds (8260C)			
1,1,1,2-Tetrachloroethane	µg/L	35	< 1.0 U
1,1,1-Trichloroethane	µg/L	200	< 1.0 U
1,1,2,2-Tetrachloroethane	µg/L	4.6	< 1.0 U
1,1,2-Trichloroethane	µg/L	5	< 1.0 U
1,1-Dichloroethane	µg/L	4,900	< 1.0 U
1,1-Dichloroethene	µg/L	7	< 1.0 U
1,1-Dichloropropene	µg/L	9.1	< 1.0 U
1,2,3-Trichlorobenzene	µg/L	73	< 1.0 U
1,2,3-Trichloropropane	µg/L	0.03	< 1.0 U
1,2,4-Trichlorobenzene	µg/L	70	< 1.0 U
1,2,4-Trimethylbenzene	µg/L	1200	< 1.0 U
1,2-Dibromo-3-chloropropane	µg/L	0.2	< 1.0 U
1,2-Dibromoethane	µg/L	0.05	< 1.0 U
1,2-Dichlorobenzene	µg/L	600	< 1.0 U
1,2-Dichloroethane	µg/L	5	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U
1,3,5-Trimethylbenzene	µg/L	1200	< 1.0 U
1,3-Dichlorobenzene	µg/L	730	< 1.0 U
1,3-Dichloropropane	µg/L	9.1	< 1.0 U
1,4-Dichlorobenzene	µg/L	75	< 1.0 U
2,2-Dichloropropane	µg/L	13	< 1.0 U
2-Butanone	µg/L	15,000	< 2.0 U
2-Chlorotoluene	µg/L	490	< 1.0 U
2-Hexanone	µg/L	120	< 2.0 U
4-Chlorotoluene	µg/L	490	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	(MW-) 126_120517 12/5/17
Location Description:			Site 18/24 0 Northwest of the Groundwater Treatment Plant, along the road
Aquifer Zone:			Shallow
4-Isopropyltoluene	µg/L	2,400	< 1.0 U
4-Methyl-2-pentanone	µg/L	2,000	< 2.0 U
Acetone	µg/L	22,000	< 2.0 U
Benzene	µg/L	5	< 1.0 U
Bromobenzene	µg/L	200	< 1.0 U
Bromochloromethane	µg/L	980	< 1.0 U
Bromodichloromethane	µg/L	15	< 1.0 U
Bromoform	µg/L	120	< 1.0 U
Bromomethane	µg/L	34	< 1.0 U
Carbon disulfide	µg/L	2,400	< 2.0 U
Carbon tetrachloride	µg/L	5	< 1.0 U
Chlorobenzene	µg/L	100	< 1.0 U
Chloroethane	µg/L	98,000	< 1.0 U
Chloroform	µg/L	240	< 1.0 U
Chloromethane	µg/L	70	< 1.0 U
cis-1,2-Dichloroethene	µg/L	70	< 1.0 U
cis-1,3-Dichloropropene	µg/L	1.7	< 1.0 U
Dibromochloromethane	µg/L	11	< 1.0 U
Dibromomethane	µg/L	120	< 1.0 U
Dichlorodifluoromethane	µg/L	4,900	< 1.0 U
Ethylbenzene	µg/L	700	< 1.0 U
Hexachlorobutadiene	µg/L	12	< 1.0 UJ
Isopropylbenzene	µg/L	2,400	< 1.0 U
m,p-Xylene	µg/L	10,000	< 2.0 U
Methylene chloride	µg/L	5	< 2.0 U
Naphthalene	µg/L	490	< 1.0 U
n-Butylbenzene	µg/L	1,200	< 1.0 U
n-Propylbenzene	µg/L	980	< 1.0 U

LHAAP-18/24 Sampling Event - December 2017

Location ID: Sample Date:	Units	MCL/MSC/ PCL	(MW-) 126_120517 12/5/17
Location Description:			Site 18/24 0 Northwest of the Groundwater Treatment Plant, along the road
Aquifer Zone:			**Shallow**
o-Xylene	µg/L	10,000	< 1.0 U
sec-Butylbenzene	µg/L	980	< 1.0 U
Styrene	µg/L	100	< 1.0 U
tert-Butylbenzene	µg/L	980	< 1.0 U
Tetrachloroethene	µg/L	5	< 1.0 U
Toluene	µg/L	1,000	< 1.0 U
trans-1,2-Dichloroethene	µg/L	100	< 1.0 U
trans-1,3-Dichloropropene	µg/L	9.1	< 1.0 U
Trichloroethene	µg/L	5	< 1.0 U
Trichlorofluoromethane	µg/L	7,300	< 1.0 U
Vinyl chloride	µg/L	2	< 1.0 U
Metals (6020A)			
Aluminum	mg/L	100	0.0197 UB
Antimony	mg/L	0.006	< 0.00200 U
Arsenic	mg/L	0.01	**0.00279**
Barium	mg/L	2	**8.75**
Beryllium	mg/L	0.004	< 0.00200 U
Cadmium	mg/L	0.005	**0.000627 J**
Calcium	mg/L	NV	**285**
Chromium	mg/L	0.1	< 0.00400
Cobalt	mg/L	6.1	**0.0168**
Copper	mg/L	1.3	**0.00154 J**
Iron	mg/L	NV	**4.50**
Lead	mg/L	0.015	< 0.00200 U
Magnesium	mg/L	NV	**207**
Manganese	mg/L	1.1*	**0.289**
Nickel	mg/L	0.49*	**0.0128**
Potassium	mg/L	NV	**2.82**

LHAAP-18/24 Sampling Event - December 2017

Location ID: / Sample Date:	Units	MCL/MSC/ PCL	(MW-) 126_120517 12/5/17
Location Description:			Site 18/24 0 Northwest of the Groundwater Treatment Plant, along the road
Aquifer Zone:			**Shallow**
Selenium	mg/L	0.05	< 0.00200 U
Silver	mg/L	0.51	< 0.00200 U
Sodium	mg/L	NV	**740**
Thallium	mg/L	0.002	< 0.00200 U
Vanadium	mg/L	0.72	< 0.00500 U
Zinc	mg/L	31	**0.0223**
Mercury	mg/L	0.002	< 0.000200 U

Notes:

Blue Highlighting Indicates concentrations above the MCL/MSC/PCL

MCL/MSC - Maximum Contaminant Limit/Medium-Specific Concentrations/Protective Concentration Level

NA - Not Analyzed

µg/L - micrograms per liter

mg/L - milligrams per liter

J - Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.

UJ - The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

U - Undetected: The analyte was analyzed for, but not detected.

NV - No Value

UB - considered a non-detect due to blank contamination

*Perchlorate, Mn and Ni compared to the PCL

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residentia

LHAAP-Quarterly Surface Water Sampling - December 2017

Location ID: Sample Date:	Units	PCL	HBW7_122617 12/26/17	HBW10_122617 12/26/17	HBW1_122617 12/26/17	GPW1_122617 12/26/17	GPW3_1222617 12/26/17
Perchlorate (6850)			Harrison Bayou			Goose Prairie Creek	
Perchlorate	µg/L	17	< 4.0 U	< 4.0 U	**1.1 J**	< 4.0 U	< 4.0 U

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

µg/L - micrograms per liter

J - Estimated: The analyte was positively identified, the quantitation is between the method detection limit and reporting limit

U - Undetected: The analyte was analyzed for, but not detected.

GWTP Weekly Sampling - December 2017

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_120617 12/6/17	LH18/24-SP650_121317 12/13/17	LH18/24-SP650_122017 12/20/17	LH18/24-SP650_122717 12/27/17
Location Description			**GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.**			
Ammonia as N (350.3)						
Ammonia as N	mg/L	NV	**15**	**12**	**12**	**13**
Ortho-Phosphate (365.3)						
Ortho-Phosphate	mg/L	NV	**2.73**	**2.24**	**2.62**	**3.80**
Organic Carbon (415.1)						
Total Organic Carbon (TOC)	mg/L	NV	**23.8**	**27.7**	**23.2**	**21.2**

mg/L - milligrams per liter

NV - No Value

GWTP Bi-Weekly Sampling - December 2017

Location ID: / Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_121317 12/13/17	LH18/24-SP650_122717 12/27/17
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Biweekly.**	
Volatile Organic Compounds (8260C)				
1,1,1-Trichloroethane	µg/L	7,230	< 1.0 U	< 1.0 U
1,1,2-Trichloroethane	µg/L	216.9	< 1.0 U	< 1.0 U
1,1-Dichloroethane	µg/L	14,032	< 1.0 U	< 1.0 U
1,1-Dichloroethene	µg/L	253	< 1.0 U	< 1.0 U
1,2-Dichloroethane	µg/L	181	< 1.0 U	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U	< 1.0 U
Acetone	µg/L	2,395	< 2.0 U	< 2.0 U
Benzene	µg/L	181	< 1.0 U	< 1.0 U
Carbon tetrachloride	µg/L	181	< 1.0 U	< 1.0 U
Chlorobenzene	µg/L	47,180	< 1.0 U	< 1.0 U
Chloroform	µg/L	3,615	< 1.0 U	< 1.0 U
Ethylbenzene	µg/L	57,025	< 1.0 U	< 1.0 U
m,p-Xylene	µg/L	83.6	< 2.0 U	< 2.0 U
Methylene chloride	µg/L	1,699	< 2.0 U	< 2.0 U
o-Xylene	µg/L	83.6	< 1.0 U	< 1.0 U
Styrene	µg/L	5,987	< 1.0 U	< 1.0 U
Tetrachloroethene	µg/L	180.7	< 1.0 U	< 1.0 U
Toluene	µg/L	4,189	< 1.0 U	< 1.0 U
Trichloroethene	µg/L	181	< 1.0 U	< 1.0 U
Vinyl chloride	µg/L	72	< 1.0 U	< 1.0 U
Anions (9056)				
Chloride	mg/L	NV	**457 J**	**674**
Sulfate	mg/L	NV	**74.7**	**95.8**

J - estimated value between the limit of quantitation and the detection limit

µg/L - micrograms per liter

mg/L - milligrams per liter

U- Undetected: The analyte was analyzed for, but not detected.

NV - No Value

GWTP Monthly Effluent Sampling - December 2017

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_120617 12/6/17
Location Description			GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Quarterly.
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 1.0 U
1,1,2-Trichloroethane	µg/L	216.9	< 1.0 U
1,1-Dichloroethane	µg/L	14,032	< 1.0 U
1,1-Dichloroethene	µg/L	253	< 1.0 U
1,2-Dichloroethane	µg/L	181	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U
Acetone	µg/L	2,395	< 2.0 U
Benzene	µg/L	181	< 1.0 U
Carbon tetrachloride	µg/L	181	< 1.0 U
Chlorobenzene	µg/L	47,180	< 1.0 U
Chloroform	µg/L	3,615	< 1.0 U
Ethylbenzene	µg/L	57,025	< 1.0 U
m,p-Xylene	µg/L	83.6	< 2.0 U
Methylene chloride	µg/L	1,699	< 2.0 U
o-Xylene	µg/L	83.6	< 1.0 U
Styrene	µg/L	5,987	< 1.0 U
Tetrachloroethene	µg/L	180.7	< 1.0 U
Toluene	µg/L	4,189	< 1.0 U
Trichloroethene	µg/L	181	< 1.0 U
Vinyl chloride		72	**0.73 J**
Metals (6020A)			
Barium	mg/L	2	**0.227**
Lead	mg/L	0.0046	< 0.00200 U
Selenium	mg/L	0.012	< 0.00200 U
Silver	mg/L	0.003	< 0.00200 U
Hexavalent Chromium (7196A)			
Hexavalent Chromium	mg/L	0.1244	< 0.0100 U
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	µg/L	134.2	**4.7**

µg/L - micrograms per liter

mg/L - milligrams per liter

J - estimated value between the limit of quantitation and the detection limit

U- Undetected: The analyte was analyzed for, but not detected.

GWTP Monthly Influent Sampling - December 2017

Location ID: Sample Date:	Units	LH18/24-SP140_120617 12/6/17
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Monthly.**
Metals (6020A)		
Selenium	mg/L	< 0.00200 U
Silver	mg/L	< 0.00200 U
Hexavalent Chromium (7196A)		
Hexavalent Chromium	mg/L	< 0.0100 U
Perchlorate (6850)		
Perchlorate	µg/L	**8,000**

mg/L - milligrams per liter

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected.

GWTP Weekly/Effluent Perchlorate Sampling - December 2017

Location ID: Sample Date:	Units	Daily Maximum Conc	LH18/24-SP650_120617 12/6/17	LH18/24-SP650_120617 12/6/17	LH18/24-SP650_121317 12/13/17	LH18/24-SP650_122017 12/20/17	LH18/24-SP650_122017 12/20/17	LH18/24-SP650_122717 12/27/17
Location Description			**GWTP-Collected from a spigot on the discharge of effluent TK-650.**					
			Weekly	Monthly EFF	Weekly	Weekly	Quarterly EFF	Weekly
Perchlorate (6850)								
Perchlorate	µg/L	17	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	**1.5 J**

µg/L - micrograms per liter

U- Undetected: The analyte was analyzed for, but not detected.

J - estimated value between the limit of quantitation and the detection limit

GWTP Quarterly Influent Sampling - December 2017

Location ID: Sample Date:	Units	LH18/24-SP140_122017 12/20/17
Location Description		GWTP – Collected from a spigot on the influent to TK-140. Sampled Quarterly.
Oil and Grease (1664A)		
Oil & Grease	mg/L	< 2.00 U
Chemical Oxygen Demand (410.4)		
Chemical Oxygen Demand	mg/L	**35.0 J**
Perchlorate (6850)		
Perchlorate	µg/L	**8100 J**
Volatile Organic Compounds (8260C)		
1,1,1,2-Tetrachloroethane	µg/L	< 10 U
1,1,1-Trichloroethane	µg/L	< 10 U
1,1,2,2-Tetrachloroethane	µg/L	< 10 U
1,1,2-Trichloroethane	µg/L	< 10 U
1,1-Dichloroethane	µg/L	< 10 U
1,1-Dichloroethene	µg/L	**92**
1,1-Dichloropropene	µg/L	< 10 U
1,2,3-Trichlorobenzene	µg/L	< 10 U
1,2,3-Trichloropropane	µg/L	< 10 U
1,2,4-Trichlorobenzene	µg/L	< 10 U
1,2,4-Trimethylbenzene	µg/L	< 10 U
1,2-Dibromo-3-chloropropane	µg/L	< 10 U
1,2-Dibromoethane	µg/L	< 10 U
1,2-Dichlorobenzene	µg/L	< 10 U
1,2-Dichloroethane	µg/L	**59**
1,2-Dichloropropane	µg/L	< 10 U
1,3,5-Trimethylbenzene	µg/L	< 10 U
1,3-Dichlorobenzene	µg/L	< 10 U
1,3-Dichloropropane	µg/L	< 10 U
1,4-Dichlorobenzene	µg/L	< 10 U
2,2-Dichloropropane	µg/L	< 10 U
2-Butanone	µg/L	< 20 U
2-Chlorotoluene	µg/L	< 10 U
2-Hexanone	µg/L	< 20 U
4-Chlorotoluene	µg/L	< 10 U
4-Isopropyltoluene	µg/L	< 10 U
4-Methyl-2-pentanone	µg/L	< 20 U
Acetone	µg/L	< 20 U
Benzene	µg/L	< 10 U
Bromobenzene	µg/L	< 10 U

GWTP Quarterly Influent Sampling - December 2017

Location ID: / Sample Date:	Units	LH18/24-SP140_122017 12/20/17
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Quarterly.**
Bromochloromethane	µg/L	< 10 U
Bromodichloromethane	µg/L	< 10 U
Bromoform	µg/L	< 10 U
Bromomethane	µg/L	< 10 U
Carbon disulfide	µg/L	< 20 U
Carbon tetrachloride	µg/L	< 10 U
Chlorobenzene	µg/L	< 10 U
Chloroethane	µg/L	< 10 U
Chloroform	µg/L	**14**
Chloromethane	µg/L	< 10 U
cis-1,2-Dichloroethene	µg/L	**4300**
cis-1,3-Dichloropropene	µg/L	< 10 U
Dibromochloromethane	µg/L	< 10 U
Dibromomethane	µg/L	< 10 U
Dichlorodifluoromethane	µg/L	< 10 U
Ethylbenzene	µg/L	< 10 U
Hexachlorobutadiene	µg/L	< 10 U
Isopropylbenzene	µg/L	< 10 U
m,p-Xylene	µg/L	< 20 U
Methylene chloride	µg/L	**21**
Naphthalene	µg/L	< 10 U
n-Butylbenzene	µg/L	< 10 U
n-Propylbenzene	µg/L	< 10 U
o-Xylene	µg/L	< 10 U
sec-Butylbenzene	µg/L	< 10 U
Styrene	µg/L	< 10 U
tert-Butylbenzene	µg/L	< 10 U
Tetrachloroethene	µg/L	**43**
Toluene	µg/L	< 10 U
trans-1,2-Dichloroethene	µg/L	**16**
trans-1,3-Dichloropropene	µg/L	< 10 U
Trichloroethene	µg/L	**9000**
Trichlorofluoromethane	µg/L	< 10
Vinyl chloride	µg/L	**120**
Metals (6020A)		
Aluminum	mg/L	**0.0499**
Antimony	mg/L	0.000843 UB
Arsenic	mg/L	**0.00143 J**

GWTP Quarterly Influent Sampling - December 2017

Location ID: Sample Date:	Units	LH18/24-SP140_122017 12/20/17
Location Description		**GWTP – Collected from a spigot on the influent to TK-140. Sampled Quarterly.**
Barium	mg/L	**0.679**
Beryllium	mg/L	< 0.00200 U
Cadmium	mg/L	**0.000326 J**
Calcium	mg/L	**40.3**
Chromium	mg/L	**0.00190 J**
Cobalt	mg/L	**0.00877**
Iron	mg/L	**0.891**
Lead	mg/L	< 0.00200 U
Magnesium	mg/L	**32.4**
Manganese	mg/L	**0.524**
Nickel	mg/L	**0.0139**
Potassium	mg/L	**1.64**
Selenium	mg/L	< 0.00200 U
Silver	mg/L	< 0.00200 U
Sodium	mg/L	**224**
Thallium	mg/L	< 0.00200 U
Vanadium	mg/L	**0.000627 J**
Zinc	mg/L	**0.121**
Mercury	mg/L	< 0.000200 U
Anions (9056)		
Chloride	mg/L	**459**
Sulfate	mg/L	**61.6**
Semi-Volatile Organic Compounds (8270D SIM)		
1,4-Dioxane	µg/L	**6**

µg/L - micrograms per liter

mg/L - milligrams per liter

J - estimated value between the limit of quantitation and the detection limit

UB - considered non-detect due to blank contamination

U- Undetected: The analyte was analyzed for, but not detected.

GWTP Quarterly Effluent Sampling - December 2017

Location ID: **Sample Date:**	**Units**	**Daily Maximum Conc**	**LH18/24-SP650_122017** **12/20/17**
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Quarterly.**
Oil and Grease (1664A)			
Oil & Grease	mg/L	15	< 2.0 U
Chemical Oxygen Demand (410.4)			
Chemical Oxygen Demand	mg/L	200	**105**
Volatile Organic Compounds (8260C)			
1,1,1-Trichloroethane	µg/L	7,230	< 1.0 U
1,1,2-Trichloroethane	µg/L	216.9	< 1.0 U
1,1-Dichloroethane	µg/L	14,032	< 1.0 U
1,1-Dichloroethene	µg/L	253	< 1.0 U
1,2-Dichloroethane	µg/L	181	< 1.0 U
1,2-Dichloropropane	µg/L	5	< 1.0 U
Acetone	µg/L	2,395	< 2.0 U
Benzene	µg/L	181	< 1.0 U
Carbon tetrachloride	µg/L	181	< 1.0 U
Chlorobenzene	µg/L	47,180	< 1.0 U
Chloroform	µg/L	3,615	< 1.0 U
Ethylbenzene	µg/L	57,025	< 1.0 U
m,p-Xylene	µg/L	83.6	< 2.0 U
Methylene chloride	µg/L	1,699	< 2.0 U
o-Xylene	µg/L	83.6	< 1.0 U
Styrene	µg/L	5,987	< 1.0 U
Tetrachloroethene	µg/L	180.7	< 1.0 U
Toluene	µg/L	4,189	< 1.0 U
Trichloroethene	µg/L	181	< 1.0 U
Vinyl chloride		72	< 1.0 U
Metals (6020A)			
Aluminum	mg/L	1.644	0.00533 UB
Antimony	mg/L	NV	< 0.00200 U
Arsenic	mg/L	0.722	**0.000623 J**
Barium	mg/L	2	**0.200**
Beryllium	mg/L	NV	< 0.00200 U
Cadmium	mg/L	0.0034	< 0.00200 U
Calcium	mg/L	NV	**13.3**
Chromium	mg/L	0.752	< 0.00400 U
Cobalt	mg/L	11.495	< 0.00500 U
Iron	mg/L	2.395	**0.0174 J**
Lead	mg/L	0.0046	< 0.00200 U

GWTP Quarterly Effluent Sampling - December 2017

Location ID: Sample Date:	**Units**	**Daily Maximum Conc**	**LH18/24-SP650_122017 12/20/17**
Location Description			**GWTP – Collected from a spigot on the discharge of effluent TK-650. Sampled Quarterly.**
Magnesium	mg/L	NV	**23.6**
Manganese	mg/L	15.494	**0.0531**
Nickel	mg/L	0.184	**0.00184 J**
Potassium	mg/L	NV	**2.00**
Selenium	mg/L	0.012	< 0.00200 U
Silver	mg/L	0.003	< 0.00200 U
Sodium	mg/L	NV	**538**
Thallium	mg/L	NV	< 0.00200 U
Vanadium	mg/L	3.592	< 0.00500 U
Zinc	mg/L	0.31	0.00385 UB
Mercury	mg/L	NV	< 0.000200 U
Anions (9056)			
Chloride	mg/L	NV	**583**
Sulfate	mg/L	NV	**56.5**
Semi-Volatile Organic Compounds (8270D SIM)			
1,4-Dioxane	μg/L	134.2	**2.9 J**

μg/L - micrograms per liter

mg/L - milligrams per liter

J - estimated value between the limit of quantitation and the detection limit

UB - considered non-detect due to blank contamination

NV - No Value

U- Undetected: The analyte was analyzed for, but not detected.

OFFICE SYMBOL 5 DECEMBER 2017

MEMORANDUM FOR RECORD

SUBJECT: Longhorn Army Ammunition Plant (AAP) administrative record and information repository clarified

1. Longhorn AAP has kept a Bates-stamped record of documents supporting decisions and decision documents for over two decades. The Commander's Representative refers to this record as the Administrative Record and maintains it in the Army Trailer in the Groundwater Treatment Plant Compound on Avenue Q at the former LHAAP.

2. Another group of records which includes all those documents, as well as community involvement records and other documents not required in the Administrative Record are maintained at the Marshall public library, which is publicly accessible. This has also been referred to as the Administrative Record in meetings with the public and Restoration Advisory Board, in the community involvement plan and in contractual documents. These more clearly meet the intent of an information repository as described in 40 CFR 300.420.

3. Although both terms may be used interchangeably, the records maintained in the library comprise the official information repository and those maintained at Longhorn AAP are the official administrative record. Since the term Admin Record has been used historically to identify both sets of records, it will continue to be used to avoid confusion.

4. Documents included in the official administrative record are defined in 40 CFR 300.800; the records maintained at Longhorn AAP meets the requirements for an official Administrative Record.

Rose M. Zeiler

Rose M. Zeiler
Commander's Representative