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

1976 - 2018

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

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

VOLUME 19 (cont'd)

2018

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

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

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 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

AGENDA

(479) 635-0110

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 EndingSurface Water Sampling Update

- Termination of perimeter well sampling

06:50 Next RAB Meeting Schedule and Closing Remarks

07:00 Adjourn {RMZ}

A=COM

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}

Ongoing Outreach - Notifications for October RAB Meeting

- " Published RAB meeting announcement in Marshall News Messenger on July 13, 2017
- "Requested the following radio stations to air January 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 or USPS to individual RAB members and other interested parties
- Mailed RAB announcement to churches in Karnack on July 13, 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

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

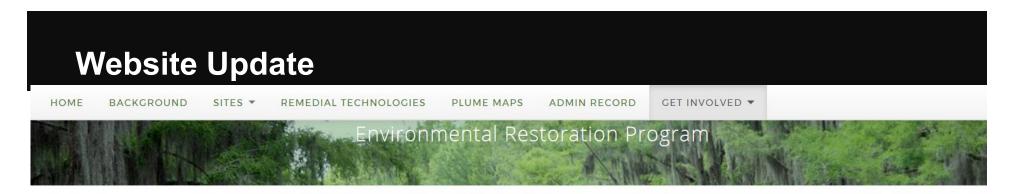
Minutes from Past RAB Meetings

"Discussion of January 2017 RAB Meeting Minutes/Motion to accept



Website Update



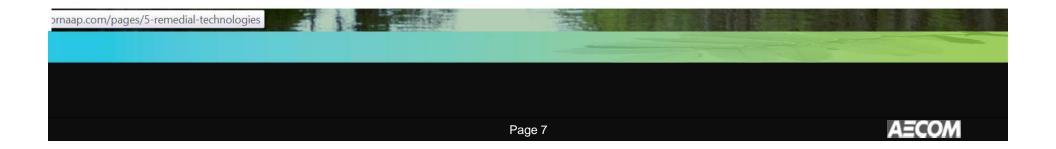


LHAAP Fact Sheets

- 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



Website Update



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









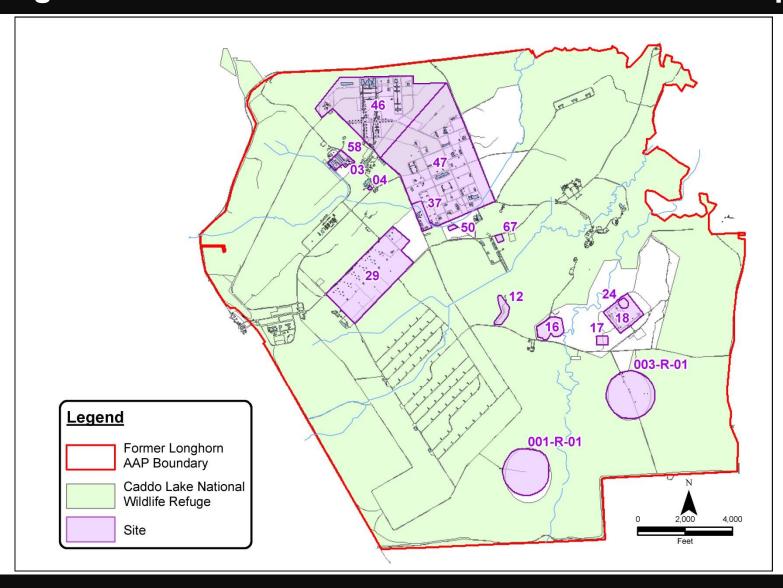


Site-wide Environmental Restoration Issues

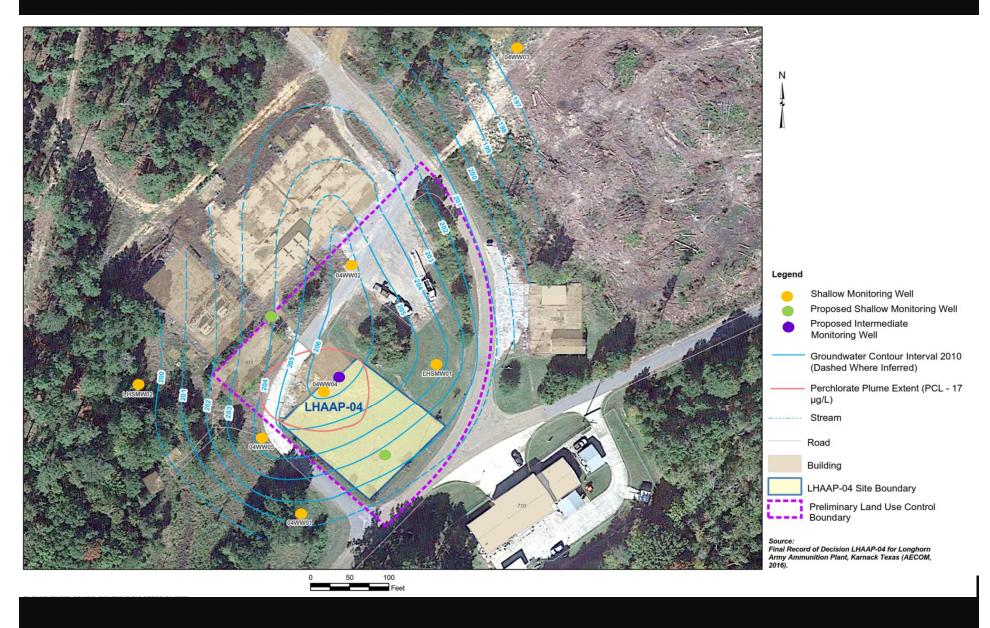
Active LHAAP Performance-Based Remediation Sites

Building 722 Paint Shop
Pilot Wastewater Treatment Plant
Landfill 12
Landfill 16
Burning Ground No.2/Flashing Area
Burning Ground No.3
Unlined Evaporation Pond
Former TNT Production Area
Chemical Laboratory Waste Pad
Plant Area 2
Plant Area 3
Former Sump Water Tank
Maintenance Complex
Aboveground Storage Tank Farm
South Test Area/Bomb Test Area
Ground Signal Test Area

Longhorn Performance-Based Remediation Sites Map



- "LHAAP-04. 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
- "Final Record of Decision (ROD)
 - Signed by Army BRAC December 15, 2017
 - Concurrence by TCEQ February 7, 2017
 - Signed by EPA March 30, 2017



"Remedial 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.

"Selected 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

- "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

- " Post ROD Schedule
 - Draft Remedial Design . March 2018
 - Draft Remedial Action Work Plan . August 2018

" LHAAP-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

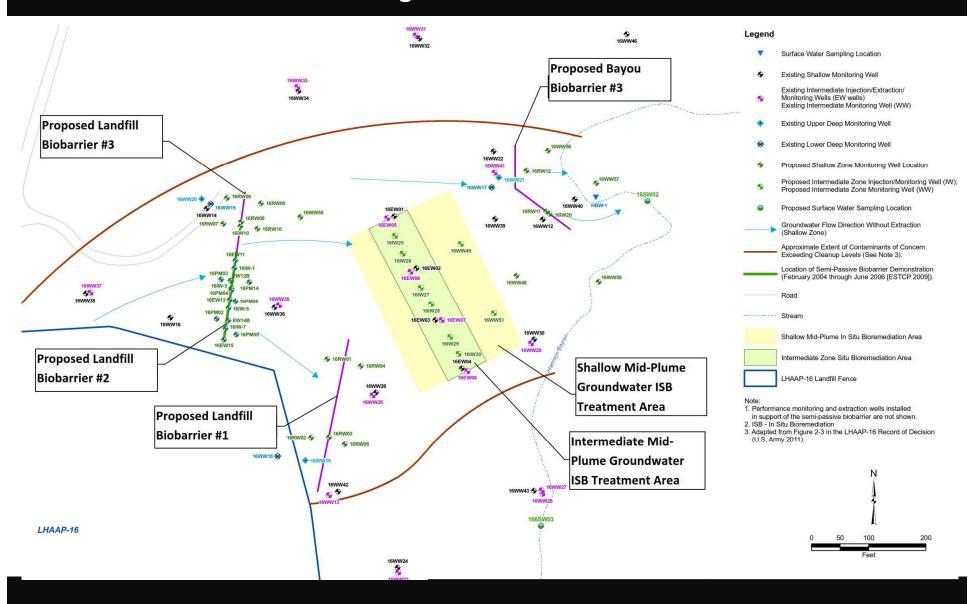
" LHAAP-16 Remedial Design finalized January 2017

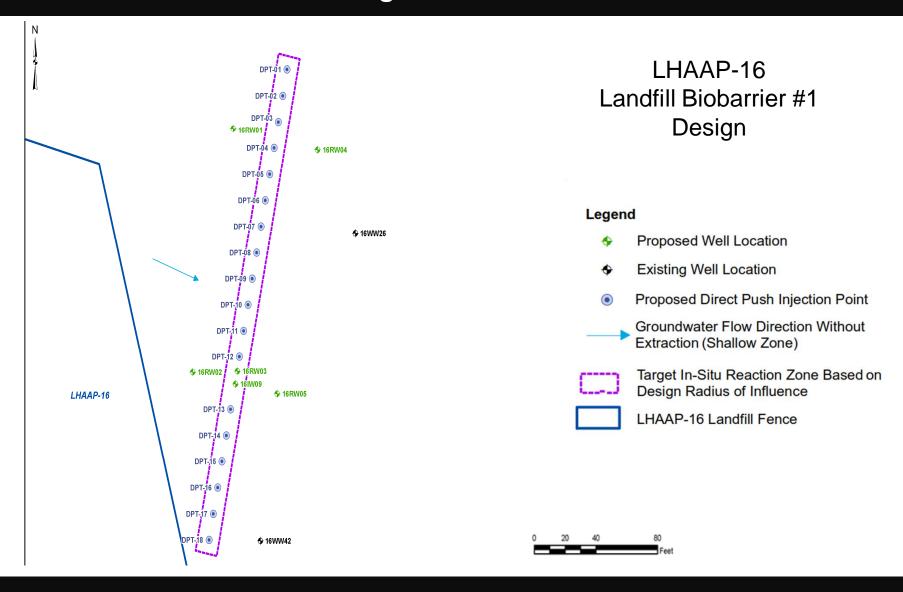
- Landfill Cap Maintenance
 - Monitor, maintain, and repair the existing landfill cap, as necessary.
 - Perform cap inspections annually or as needed to evaluate vegetation, erosion, settlement, and drainage system.
- In-Situ Bioremediation (ISB)
 - Emulsified vegetable oil will be used to reduce contaminant 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.

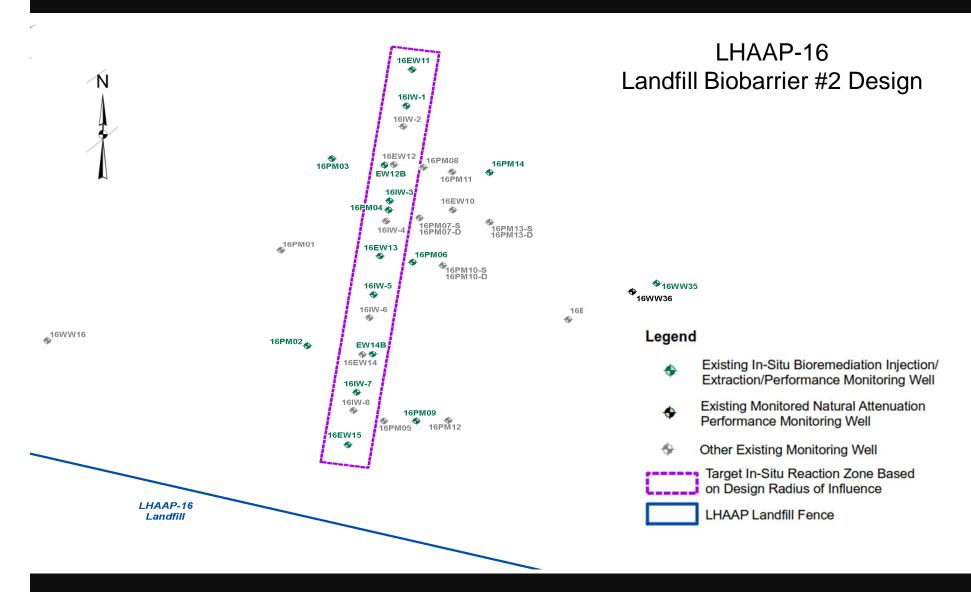
- " LHAAP-16 Remedial Design (continued)
 - Performance Monitoring/MNA
 - First two years:
 - Monitor groundwater in the areas of active ISB to evaluate its effectiveness and to assess changes in groundwater geochemistry, concentrations of COCs, and their degradation products.
 - Perform quarterly groundwater 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.

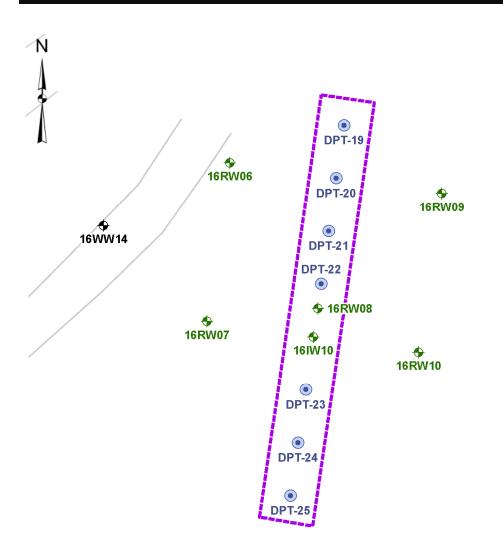
- " LHAAP-16 Remedial Design (continued)
 - Land Use Controls
 - Prohibit access to contaminated groundwater except for environmental monitoring and testing;
 - Preserve the integrity of the landfill cap and restrict intrusive activities (e.g., digging) that would degrade or alter the cap;
 - Restrict 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 (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.







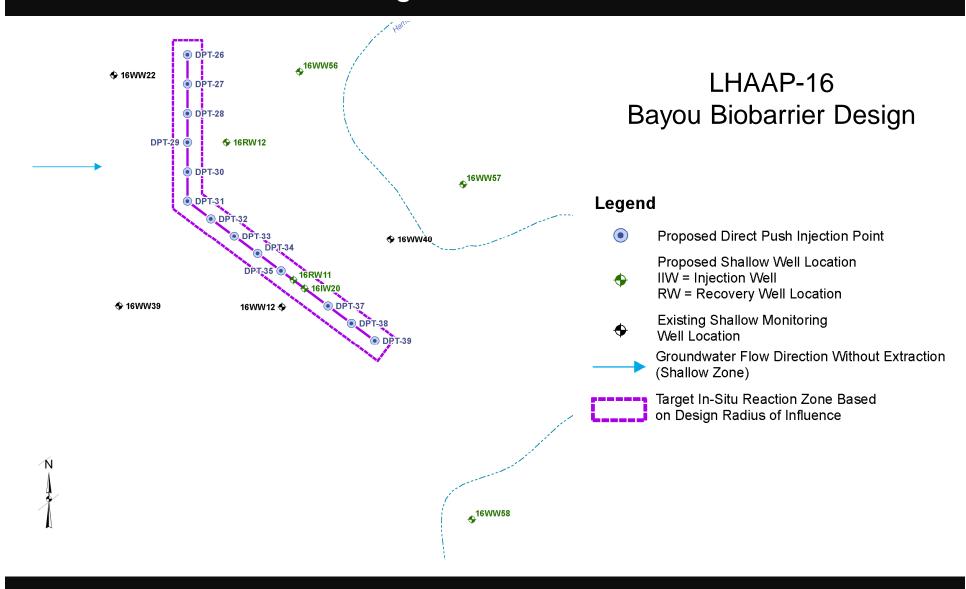


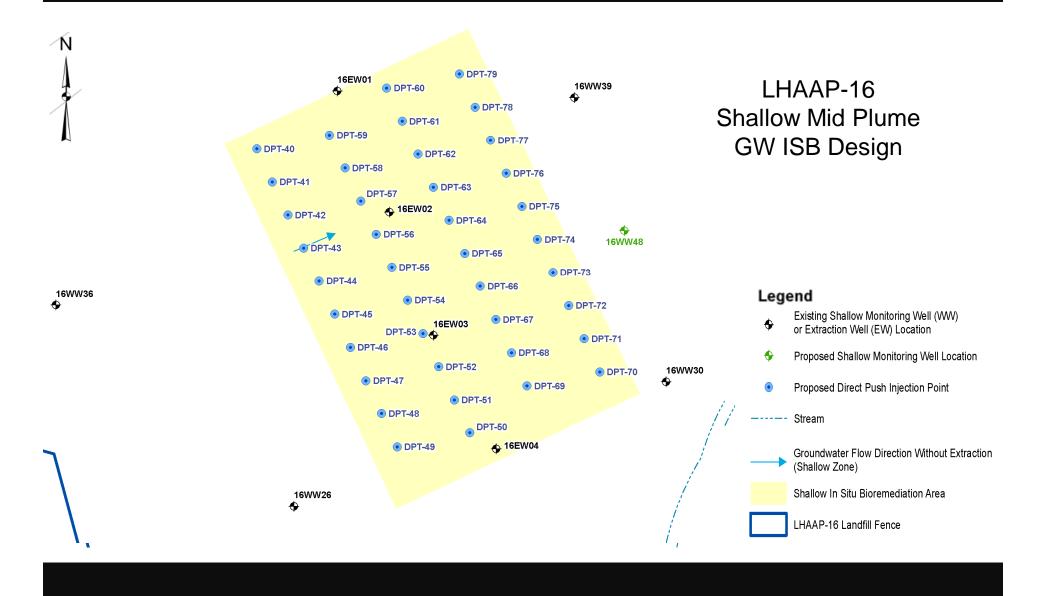
LHAAP-16 Landfill Biobarrier #3 Design

16WW55

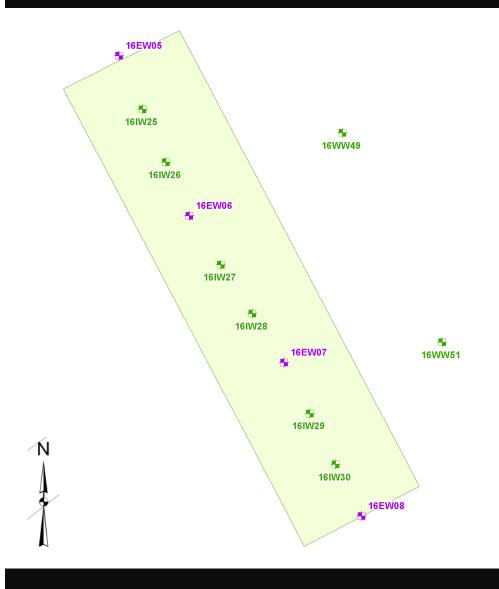
Legend

- 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 Intermediate Mid Plume GW ISB Design

Legend

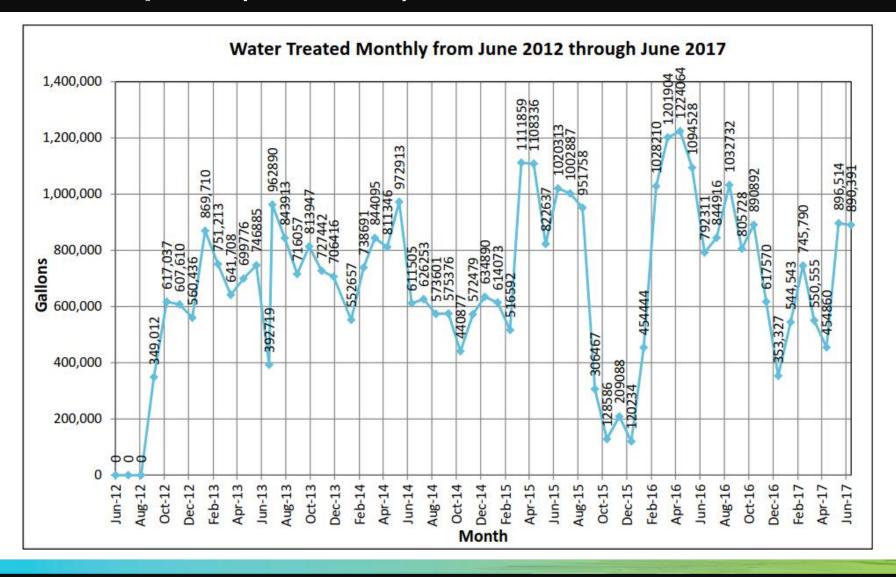
- Existing Intermediate Injection/Extraction/Monitoring Well (EW well) Existing Intermediate Monitoring Well (WW)
- Proposed Intermediate Zone Injection/Monitoring Well (IW);
 Proposed Intermediate Zone Monitoring Well (WW)
- Intermediate Zone Situ Bioremediation Area



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

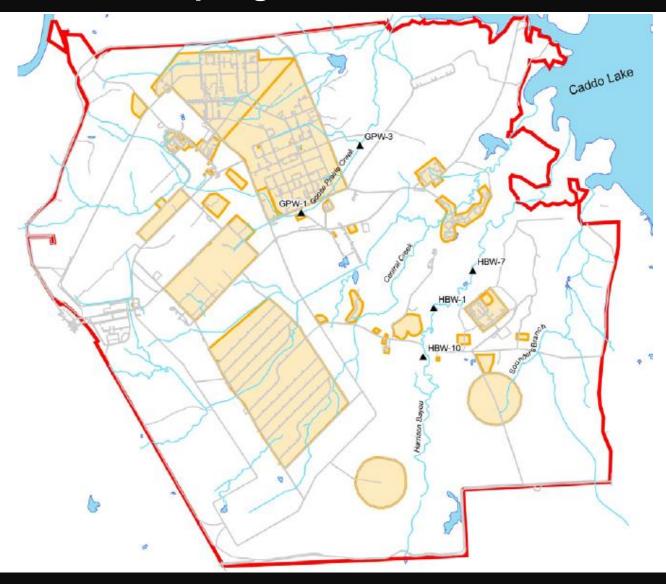
GWTP Update (continued)



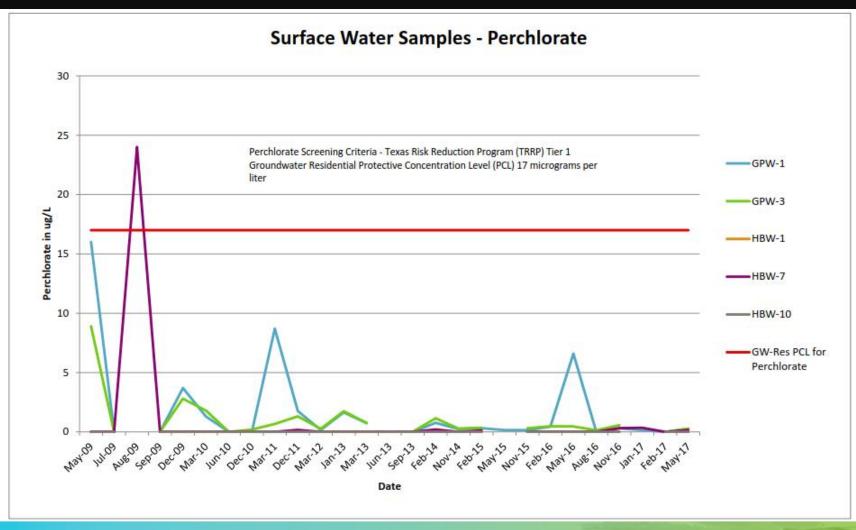
Deliverables, Environmental Contract Ending

- "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



Surface Water Sampling



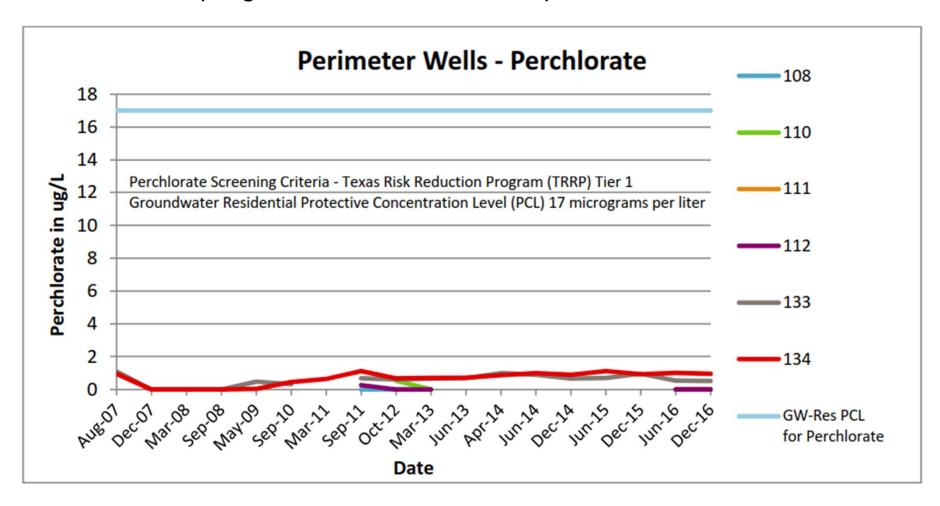
GPW . Goose Prairie Creek HBW . Harrison Bayou

Perimeter Well Sampling

- A 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.
- "FFA representatives agreed that perimeter well sampling should be discontinued.

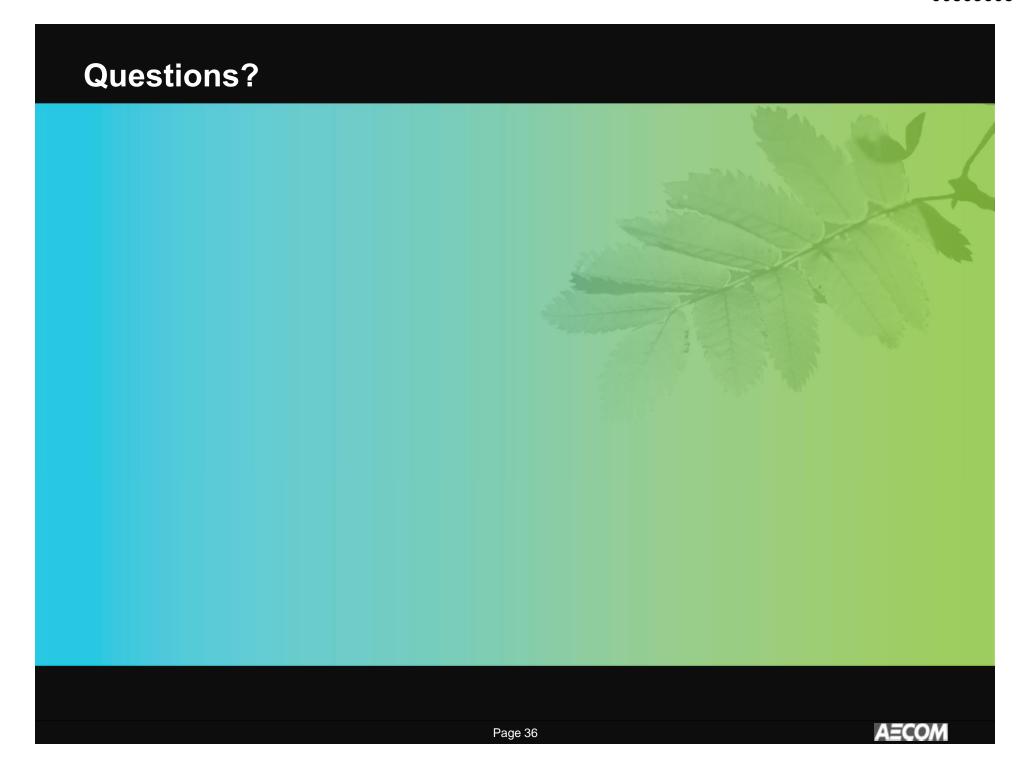
Perimeter Well Sampling

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



Next RAB Meeting Schedule and Closing Remarks

- "Schedule October 2017 RAB Meeting
- Other Issues/Remarks?



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 insitu 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.

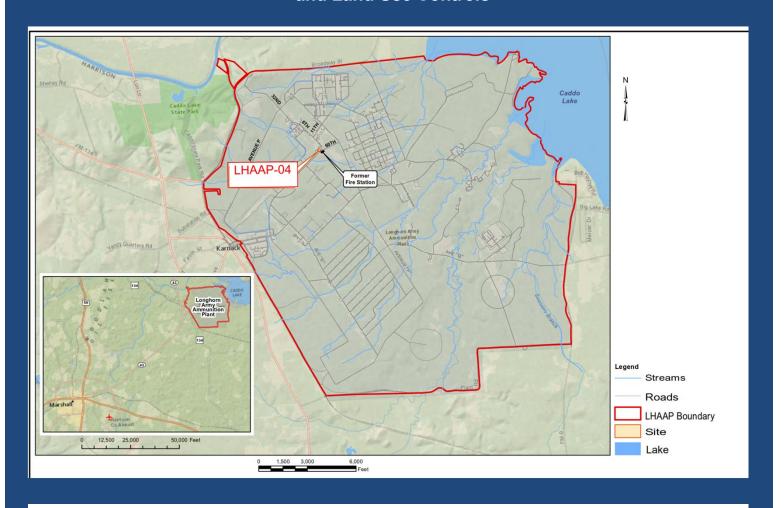
LUCs include:

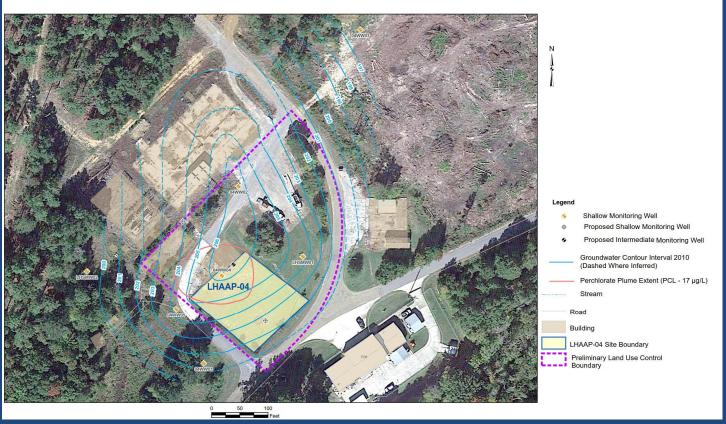
- · Maintain the integrity of any current or future remedial or monitoring systems until these components of the remedy are no longer needed to achieve the groundwater cleanup levels.
- Prohibit the use of groundwater as a drinking water source until the levels of COCs in the soil and groundwater allow 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.

LHAAP-04, Former Pilot Wastewater Treatment Plant 00863607 SELECTED REMEDY In-Situ Bioremediation, Groundwater Long-Term Monitoring, and Land Use Controls





Groundwater Treatment Plant - Processed Groundwater Volumes

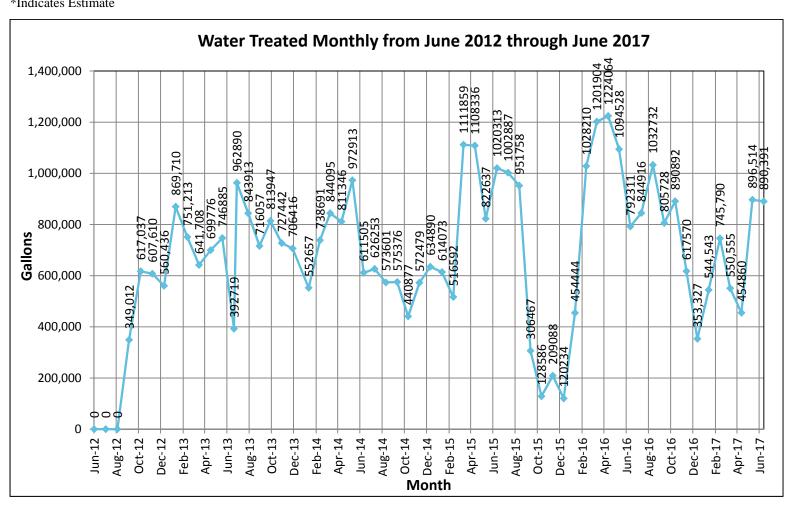
The amount of groundwater treated is determined by measuring the number of gallons of processed water.

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
			I								
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
0 . 00	N. 00	D 00	T 10	E 1 10	3.5. 10	4 10	3.6 10	T 10	T 1 10	4 10	G 10
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
930,307	703,803	049,712	811,079	000,201	1,090,346	617,323	900,338	910,332	704,309	032,324	755,450
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
- 10											
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	Mov. 15	Jun-15	Jul-15	Δης 15	Con 15
						Apr-15	May-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
- ,	,	-,	- , -	,,	/ - 1	/ 1- "	, ,		,-	/ /	,
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



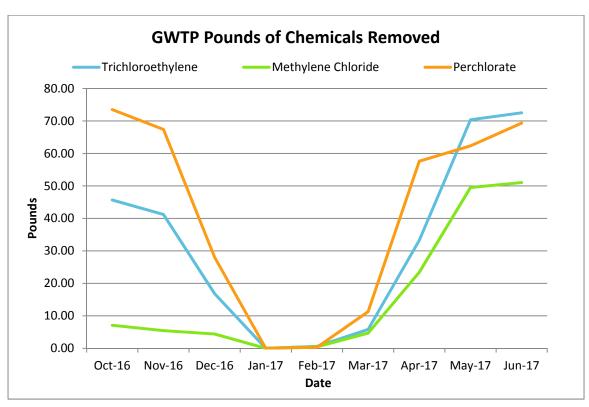
The pounds of chemicals removed for the 4th Quarter of 2016 and 1st and 2nd Quarters of 2017 can be found below and are calculated by the following formula:

(GWTP Influent Contaminant Concentration [μg/L] x Volume [gallons] x 3.785 [liters per gallon]) (453,600,000 μg 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)

	Water Discharge Docation and Volume (Ganons)										
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	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st
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	ı	<80.0 U	310	23	-	1	<4.0 U	1	<4.0 U	<4.0 U	<4.0 U
HBW-7	-	<8.0 U	370	110	-	1	<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	-	-

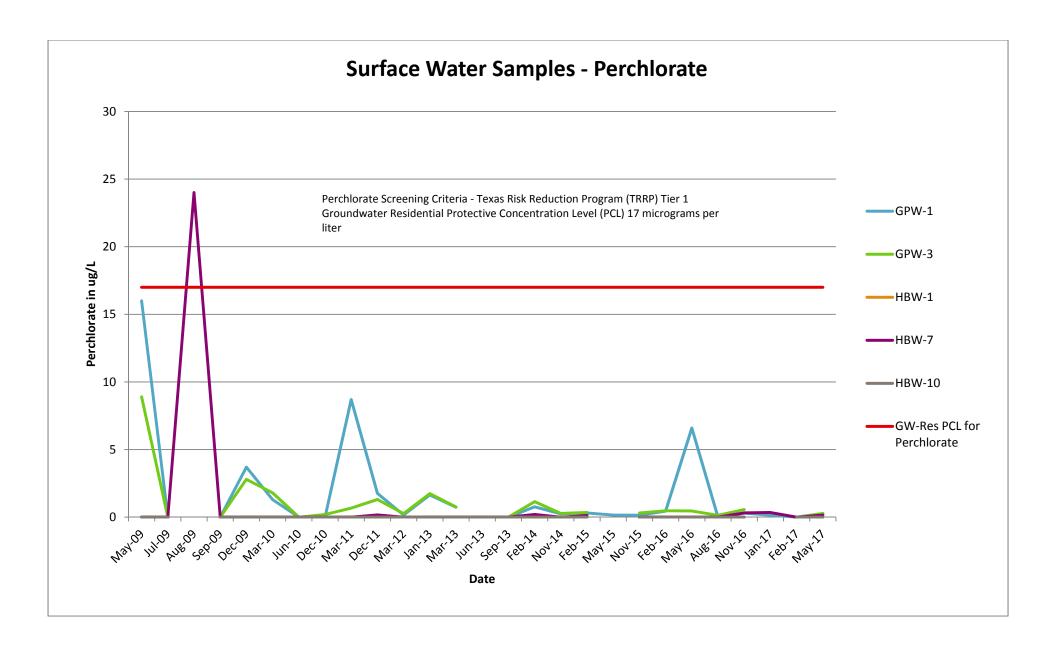
Quarter	2 nd	3 rd	4 th	1 st	2 nd	3 rd	3 rd	4 th	2 nd	3 rd	4 th
Creek Sample ID	June 2002	Sept 2002	Dec 2002	Feb 2003	June 2003	Aug 2003	July 2004	Dec 2006	May 2007	Aug 2007	Dec 2007
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 U	<1.0 U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

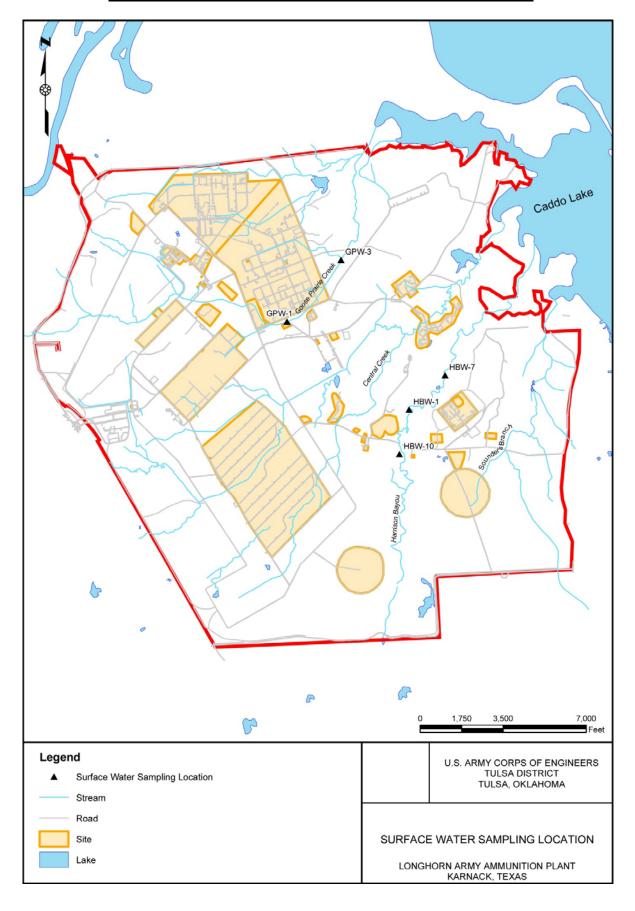
Quarter	3^{rd}	4 th	1^{st}	2 nd	3^{rd}	4 th	1^{st}	2 nd	3 rd	4 th	1 st
Creek Sample ID	Sep 2010	Dec 2010	Mar 2011	Jun 2011	Sep 2011	Dec 2011	Mar 2012	Jun 2012	Not Applicable	Jan & Feb 2013	Mar 2013
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	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	2 nd	3 rd	4 th	1 st	2 nd	3 nd	4 th	1 st	2 nd	3 rd	4 th
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	1 st	2 nd	3 rd	4 th	1 st	2 nd
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



Longhorn Army Ammuntion Plant Creek Sampling Locations



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.

14 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 μ g/L. However, the USEPA has decided to regulate perchlorate under the SDWA and has established an Interim Drinking Water Health Advisory of 15 μ g/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 μ g/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 $17 \mu g/L$, 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.

17 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 μ g/L whereas the USEPA states that the cleanup level for perchlorate shall be 15 μ g/L. The U.S. Army may have to switch over and use 15 μ g/L as the cleanup level.

Response – The cleanup level for perchlorate is $17 \mu g/L$, 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 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			from a spigot after lead ion	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	Units	Daily Maximum	LH1 24- SP6 0-6460	LH1 24- SP6 0-6462	LH1 24- SP6 0-6464		
Sample Date		Conc	7 26 2017	2 2017	2017		
Location Description			GWTP–Collected from a spigot on the discharge of effluent TK-650. Sampled Weekly.				
Ammonia as N (01)							
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	Units	Daily Maximum	LH1 24- SP6 0-64	LH1 24- SP6 0-646
Sample Date		Conc	7 26 2017	2017
Location Description			the discharge of	d from a spigot on f effluent TK-650 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 NA	<0.5 U
1,2,3-TRICHLOROBENZENE	μg/L		NA	<0.3 U
1,2,3-TRICHLOROPROPANE	μg/L		NA NA	<1 U
1,2,4-TRICHLOROBENZENE 1,2,4-TRIMETHYLBENZENE	μg/L		NA NA	<0.4 U <0.5 U
1,2-DIBROMO-3-CHLOROPROPANE	µg/L		NA NA	
1,2-DIBROMO-3-CHLOROPROPANE 1,2-DIBROMOETHANE	µg/L		NA NA	<2 U <0.5 U
1,2-DIGNOMOETHANE 1,2-DICHLOROBENZENE	μg/L μg/L		NA NA	<0.25 U
1,2-DICHLOROBENZENE 1,2-DICHLOROETHANE	μg/L μg/L	181	<0.5 U	<0.25 U
1,2-DICHLOROPROPANE	μg/L μg/L	5	 NA	<0.5 U
1,3,5-TRIMETHYLBENZENE	μg/L μg/L	3	NA NA	<0.4 U
1,3-DICHLOROBENZENE	μg/L μg/L		NA NA	<0.5 U
1,3-DICHLOROPROPANE	μg/L		NA NA	<0.4 U
1,4-DICHLOROBENZENE	μg/L		NA NA	<0.25 U
2,2-DICHLOROPROPANE	μg/L		NA	<0.5 U
2-BUTANONE	μg/L		NA 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 NA	<0.5 U
DICHLORODIFLUOROMETHANE	μg/L	57.005	NA 0.5.11	<0.5 U
ETHYLBENZENE	μg/L	57,025	<0.5 U	<0.5 U
HEXACHLOROBUTADIENE	μg/L		NA NA	<0.5 U
ISOPROPYLBENZENE	μg/L		NA	<0.5 U

GWTP Effluent Bi-Weekly Sampling - July August 2017

Location ID		Daily	LH1 24-	LH1 24-
Sample Date	Units	Maximum Conc	SP6 0-64 7 26 2017	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

μg/L - micrograms per liter

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

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

GWTP Effluent Monthly Sampling - August 2017

Location ID	l locido	Daily Maximum Conc	LH1 24- SP6 0-6461-		
Sample Date	Units		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	Units	LH1 24- SP140-7461-
Sample Date	Omto	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 Technical LLC 112 E Pecan Street Suite 300 San Antonio, Texas 78205

October 2017

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Final Community Involvement Plan W912PL-16-D-0042/0001

Longhorn Army Ammunition Plant October 2017

LIST OF ACRONYMS

AMC Army Materiel Command

Area of Concern **AOC** AR **Army Regulation**

ARAR Applicable or Relevant and Appropriate Requirement

Department of the Army Army Aboveground Storage Tank **AST BRAC** Base Realignment and Closure

Comprehensive Environmental Response, Compensation, and Liability Act **CERCLA**

Code of Federal Regulations CFR CIP Community Involvement Plan Contaminant of Concern COC

COPC Contaminant of Potential Concern

DD **Decision Document**

DERP Defense Environmental Restoration Program

DMM **Discarded Military Munitions**

DoD Department of Defense

Engineering Evaluation/Cost Analysis EE/CA

Explosive Ordnance Division EOD Federal Facility Agreement FFA Final Remedial Action FRA Feasibility Study FS

FY Fiscal Year

GWTP Groundwater Treatment Plant

HTRW Hazardous, Toxic and Radioactive Waste

Interim Remedial Action IRA

IRP Installation Restoration Program LAP

Load, Assembly, and Pack

LHAAP Longhorn Army Ammunition Plant

LTM Long-Term Management

Land Use Control LUC **Munitions Constituents** MC

MEC Munitions and Explosives of Concern

mm Millimeter

Military Munitions Response Program **MMRP**

Monitored Natural Attenuation MNA MOA Memorandum of Agreement

MR **Munitions Response**

Munitions Response Site Prioritization Protocol **MRSPP**

MSC Medium-Specific Concentration

NCP National Oil and Hazardous Substances Pollution Contingency Plan

NFA No Further Action **NPL National Priorities List** PA **Preliminary Assessment** Polychlorinated Biphenyl PCB

Final Community Involvement Plan W912PL-16-D-0042/0001

Longhorn Army Ammunition Plant October 2017

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.

JSite 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.

JLong-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

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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.

J 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.

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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						
		RI/FS						
LHAAP-003	BUILDING 722-PAINT SHOP	RD						
		RA-C						
		RD						
LHAAP-004	LHAAP PILOT WASTEWATER TREATMENT PLANT	RA-C						
	LAW	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 A VE P&Q (SWMU11)	LTM						
LHAAP-012	ACTIVE LANDFILL (SWMU 12)	RA-O						
	OLD LANDFILL (SWMU 16)	RD						
LHAAP-016		RA-C						
		RA-O						
	NO 2 FLASHING AREA BRN GROUND (SWMU 17)	RI/FS						
LHAAP-017		RD						
LHAAP-01/		RA-C						
		RA-O						
	BURNING GROUND/WASHOUT POND (SWMU 18)	RD						
LHAAP-018		RA-C						
	(5 11 11 10)	RA-O						
LHAAP-019	CONSTRUCTION MATERIALS LANDFILL	LTM						
		RD						
LHAAP-024	FORMER UNLINED EVAP POND (SWMU 24)	RA-C						
		RA-O						
		RI/FS						
LHAAP-029	FORMER TNT PRODUCTION AREA (SWMU	RD						
	29)	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			
		RI/FS			
1 11 A D 047	PLANT 3 AREA	RD			
LHAAP-047	PLANI 3 AREA	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+
1114 A D 001 D 01	COLUMN TEST A DEA (DOME) TEST A DEA	RI/FS						
LHAAP-001-R-01 SOUTH TEST	SOUTH TEST AREA/BOMB TEST AREA	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

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Harrison County Population by Race:	
) 68.6% Caucasian) 0.7% American Indian/Alaska Native
J 21.9% African American) 8.3% Other
) 0.5% Asian	
Harrison County Population by Age:	
) 14.3% - 0 to 9 years) 27.4% - 45 to 64 years
) 27% - 10 to 29 years) 13.2% - 65+ years
J 18.1% - 30 to 44 years	
4.1.1 City of Uncertain	
The City of Uncertain is located within Harris	son County. The city is located along the shores of
Caddo Lake.	
Census data from 2010 for the City of Uncerta	in showed the following:
J 94 people	J 146 housing units
) 55.3% male	
) 44.7% female	
City of Uncertain Population by Race:	
J 78.7% Caucasian) 0% American Indian/Alaska Native
J 21.3% African American) 0% Other
) 0% Asian	
City of Uncertain Population by Age:	
) 1.1% - 0 to 9 years) 44.7% - 45 to 64 years
) 6.4% - 10 to 29 years) 39.3% - 65+ years
) 8.5% - 30 to 44 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
2.) How would you describe the current relationship between the community and the installation?	answer. 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?	a. Yes = 23 No = 32 Somewhat = 13
b. If so, do you feel you have the opportunities you need to learn about it/have input regarding the program/site?	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
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
7.) What is your current source of	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. Site visits = 5
information about the restoration program/site?	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	a.
boards, storefronts, or other places	Yes = 6
where people post notices or signs	No = 7
about local events or activities?	L
b. Where are the best places to post signs or notices about site activities and	b. Local Stores/Restaurants/Gas Stations = 44
events?	Karnack Post Office = 24
events.	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
	Signage – i
	Note: Several responses listed multiple
	answers. Some respondents did not provide an
	answer.
9.) What are the most popular newspapers,	ABC Channel 3 KTBS-TV = 29
TV stations, and radio stations in the	NBC Channel 6 KTAL-TV = 22
area?	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	Yes = 10 $No = 52$
program? a. If so, what was the nature of the contact? b. What kind of response did you receive?	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?	Yes = 12 No = 50
a. Do you get information from RAB members?	a. Yes = 7 No = 23
b. Do you feel they represent your interests regarding the program/site?	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?	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. What locations should meetings be held?	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
 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? 	answer. 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	Yes = 12
to be added to the site mailing list? If	No = 24
so, would it be ok to get their contact	
information?	Note: Some respondents did not provide an
	answer.
18.) Do you have any other comments,	See Section 4.5.
questions, or concerns about the	
installation?	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 email 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

	Environmental Restoration Program Steps								
Public Participation Activities	Preliminary Assessment		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

Final Community Involvement Plan W912PL-16-D-0042/0001

Longhorn Army Ammunition Plant October 2017

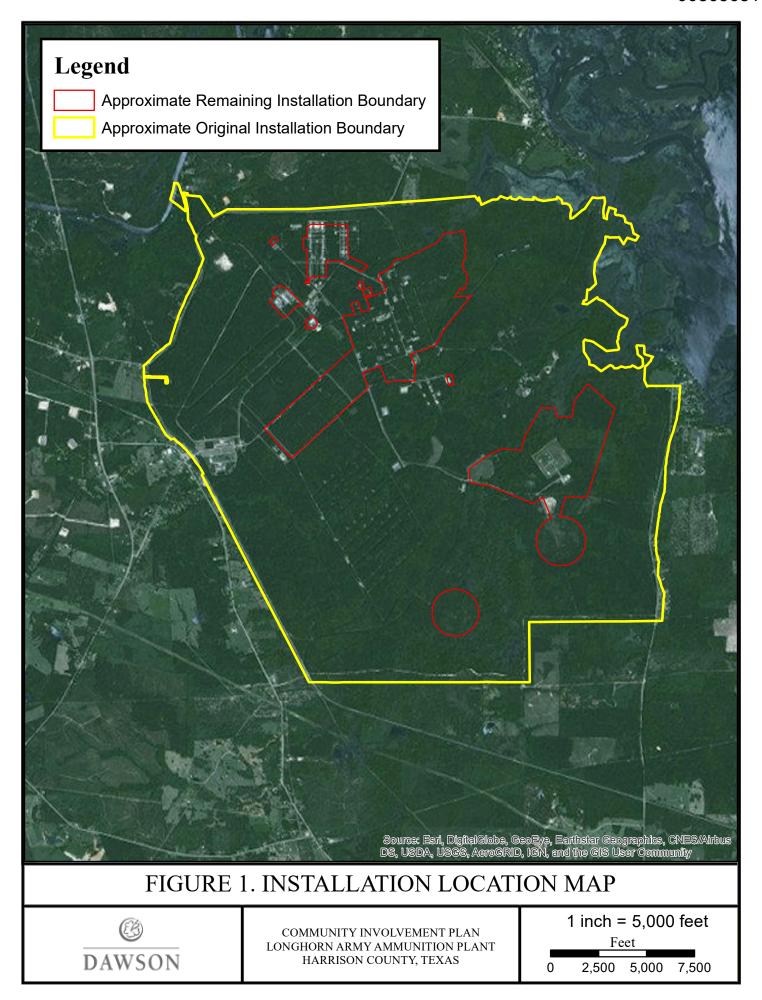
www.cityofuncertain.com

www.epa.gov

www.harrisoncountytexas.org

www.longhornaap.com

FIGURE



APPENDIX A

CERCLA/RCRA Equivalents

CERCLA	RCRA		
Preliminary Assessment (PA)	RCRA Facility Assessment (RFA)		
Site Inspection (SI)	Confirmation Sampling (CS)		
Remedial Investigation/Feasibility Study	RCRA Facility Investigation/Corrective		
(RI/FS)	Measures Study (RFI/CMS)		
Proposed Plan (PP)/ Record of Decision	Statement of Basis		
(ROD)			
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:

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

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ABC Channel 3-1 KTBS-TV www.ktbs.com
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- 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 Church902 TJ Taylor AvenueKarnack, Texas 75661
- Old Border Baptist Church 680 Lotta Road Karnack, Texas 75661
- Antioch Baptist Church410 FM 1999Karnack, Texas 75661
- Church of Uncertain2936 Dorough RoadKarnack, Texas 75661
- Karnack Methodist Church925 TJ Taylor AvenueKarnack, 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

State Elected Officials:

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

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    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)

O 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 UpdateKN 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 remeasurement 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

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



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}



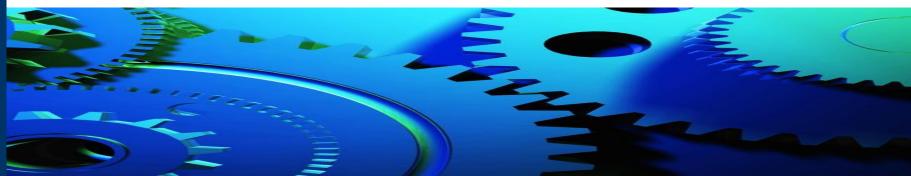






Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting

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



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}
•	· · · · · · hhatc



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



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

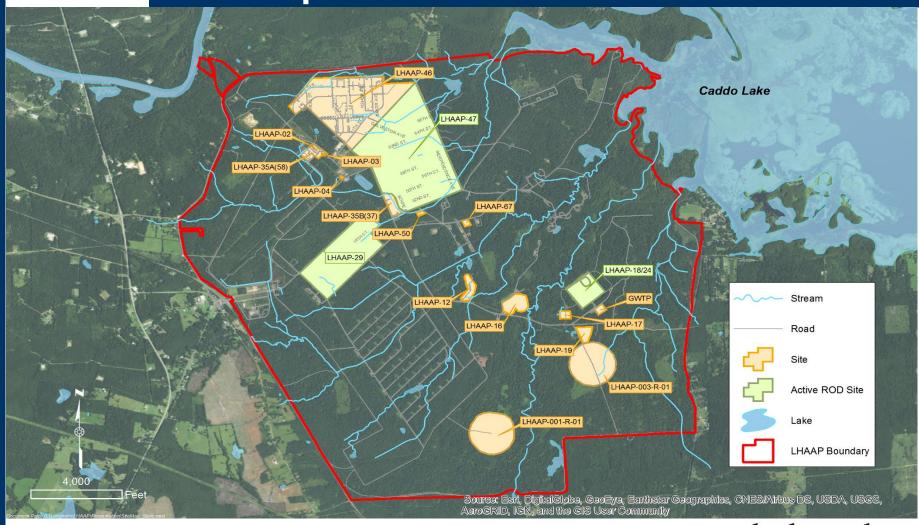


New Environmental Contract

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



Site Map





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



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:

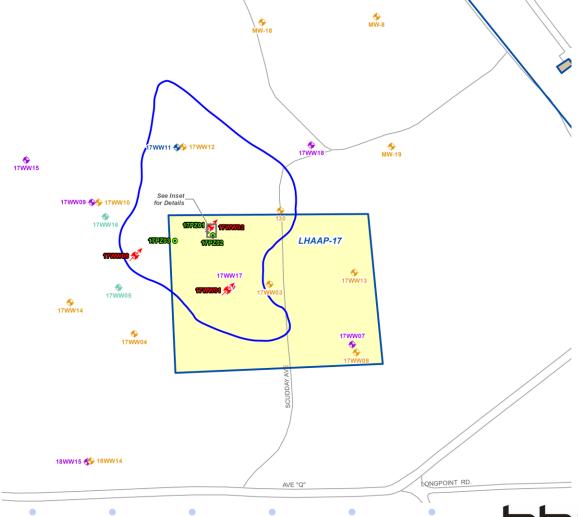
- Soil excavation
- Groundwater extraction to reduce perchlorate concentrations to less than 20,000 micrograms per liter ($\mu g/L$), an interim cleanup level. Once level is reached, the remedial action will transition from extraction to monitored natural attenuation (MNA).

Scope of PDI:

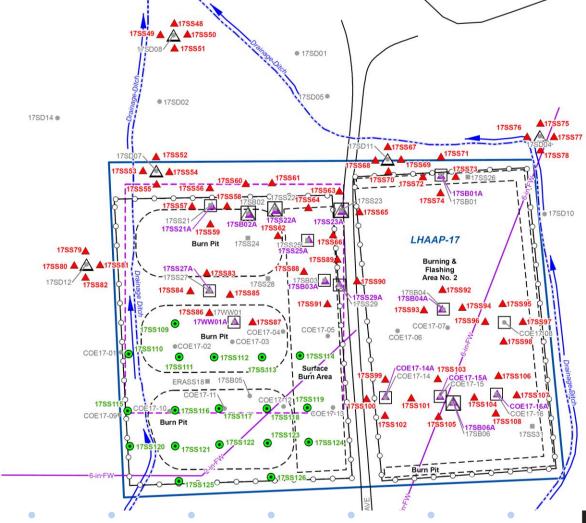
- Conduct groundwater gauging and sampling and install up to 3 monitoring wells to define current groundwater plumes
- Conduct soil sampling to define soil contamination to design excavation
- Conduct aquifer pumping tests to collect data to design the extraction system



LHAAP-17: Site Map (Groundwater Wells)

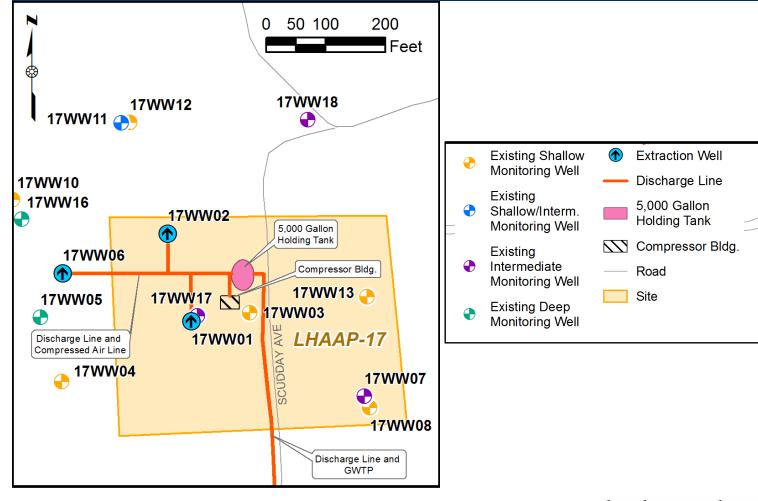


LHAAP-17: Soil Sampling





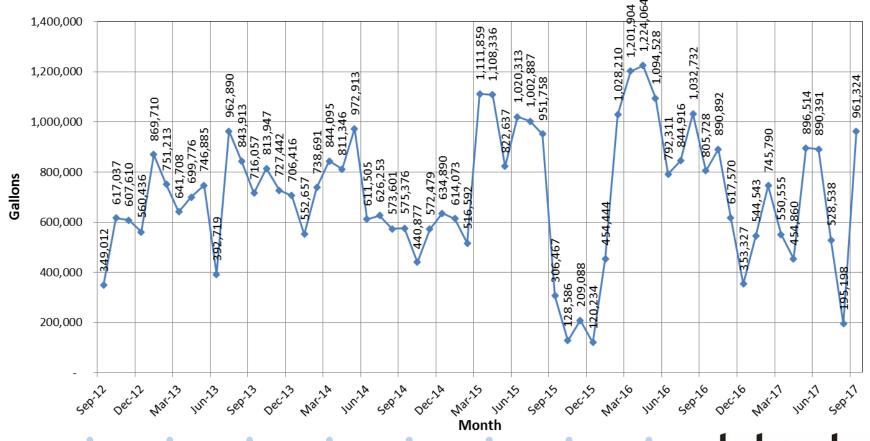
LHAAP-17: Proposed Extraction System





GWTP UPDATE

Water Treated Monthly from September 2012 through September 2017

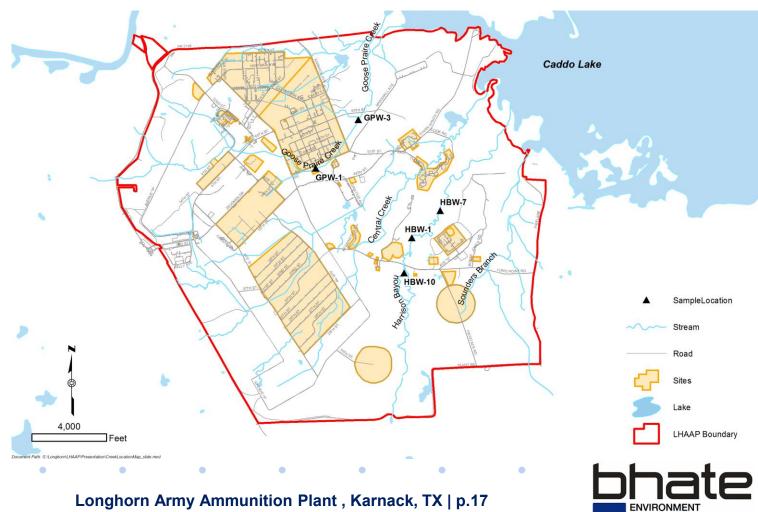




INFRASTRUCTURE

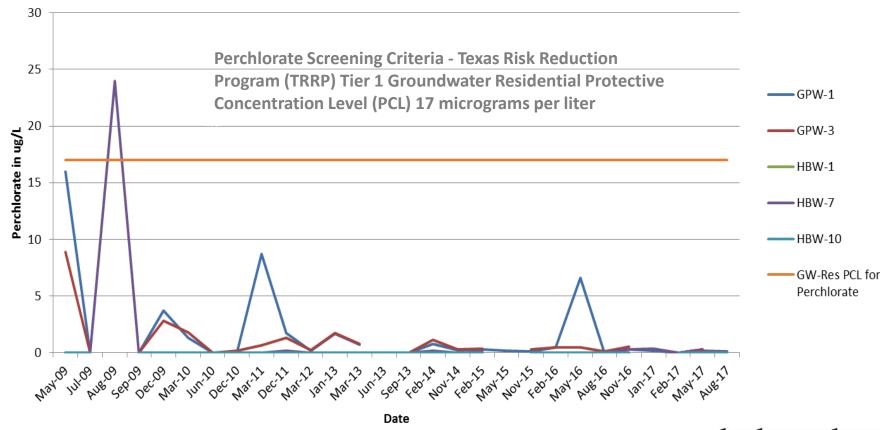
Restoration Advisory Board Meeting

Surface Water Sample Locations



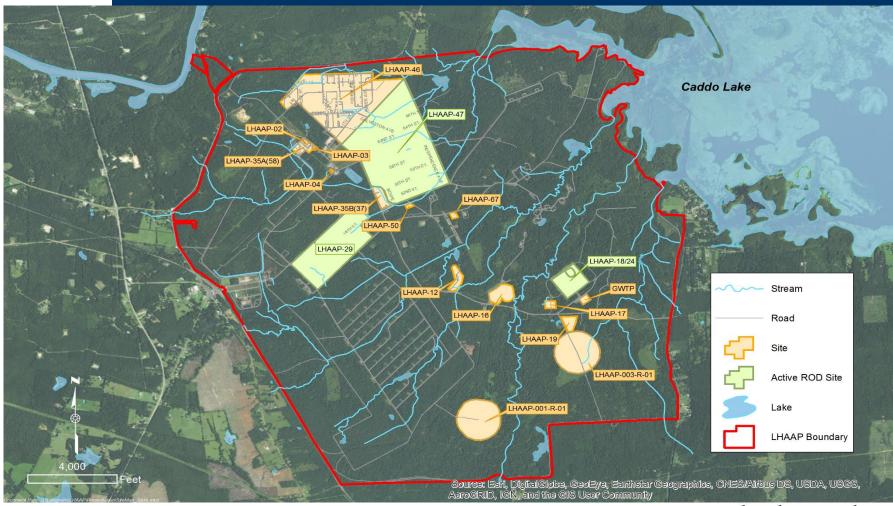
Surface Water Sample Results

Surface Water Samples - Perchlorate





Environmental Sites Under Separate Contract





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
0&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



Next RAB Meeting Schedule & Closing Remarks

- Schedule January 2018 RAB Meeting
- Other Issues/Remarks



Groundwater Treatment Plant - Processed Groundwater Volumes

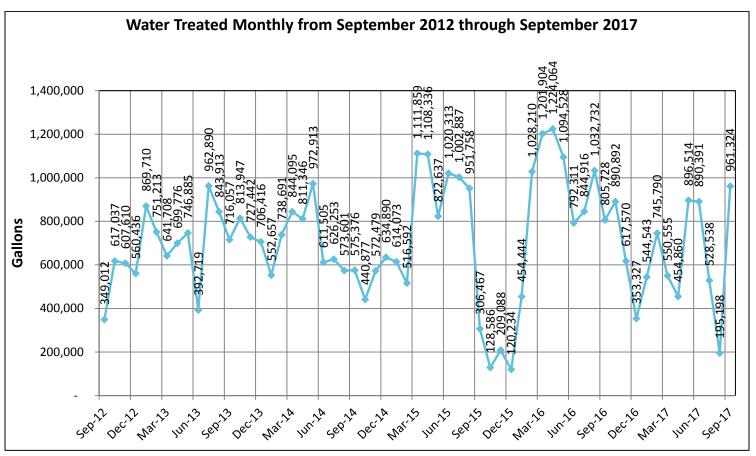
The amount of groundwater treated is determined by measuring the number of gallons of processed water.

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
		1	1								
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
	ı						I				
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
	I						I				
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
	I										
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
- 1-									~		~
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
0.45	NY 4.5	D 41	Y 45	F 1 45	3.5.45		37. 45	· 45	Y 1 45		0 15
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

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	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st
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	-	-

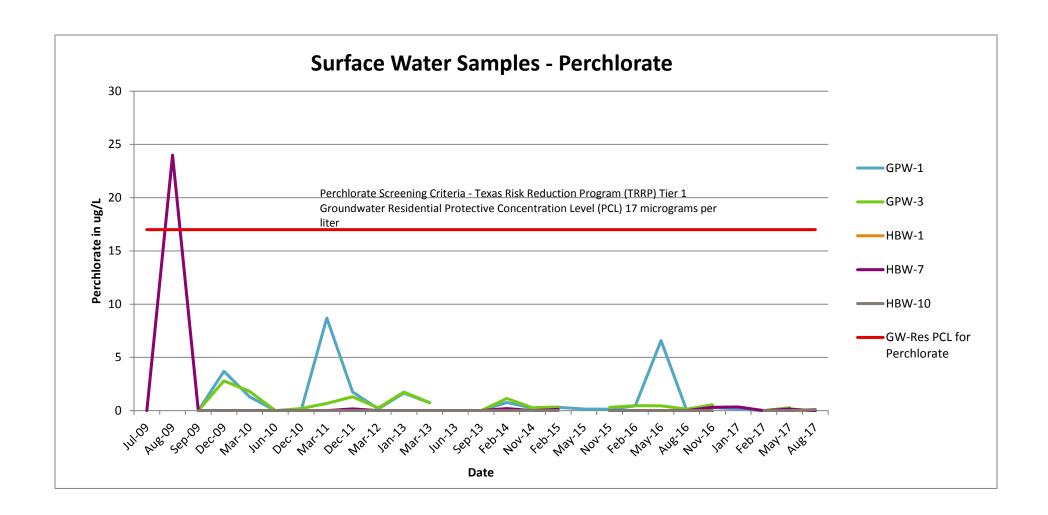
Quarter	2 nd	3 rd	4 th	1 st	2 nd	3 rd	3 rd	4 th	2^{nd}	$3^{\rm rd}$	4 th
Creek Sample ID	June 2002	Sept 2002	Dec 2002	Feb 2003	June 2003	Aug 2003	July 2004	Dec 2006	May 2007	Aug 2007	Dec 2007
GPW-1	<4.0 U	<4.0 U	18.3	18.6	59.9	-	2.25	-	<1.0 U	<1.0 U	10.7
GPW-3	<4.0 U	<4.0 U	5.49	12.6	14.7	-	2.2	-	<1.0 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	1 st	2 nd	3 rd	4 th	2 nd	3 rd	3 rd	3 rd	4 th	1 st	2 nd
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

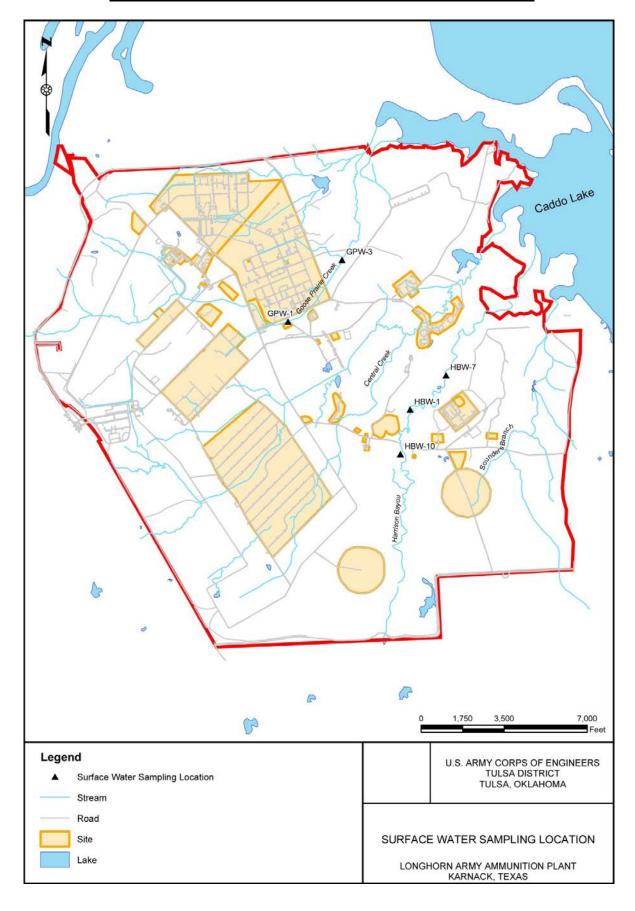
Quarter	$3^{\rm rd}$	4 th	1 st	2 nd	$3^{\rm rd}$	4 th	1 st	2 nd	3 rd	4 th	1 st
Creek Sample ID	Sep 2010	Dec 2010	Mar 2011	Jun 2011	Sep 2011	Dec 2011	Mar 2012	Jun 2012	Not Applicable	Jan & Feb 2013	Mar 2013
GPW-1	dry	<0.1U	8.7	dry	dry	1.76	0.163J	dry	NS	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	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

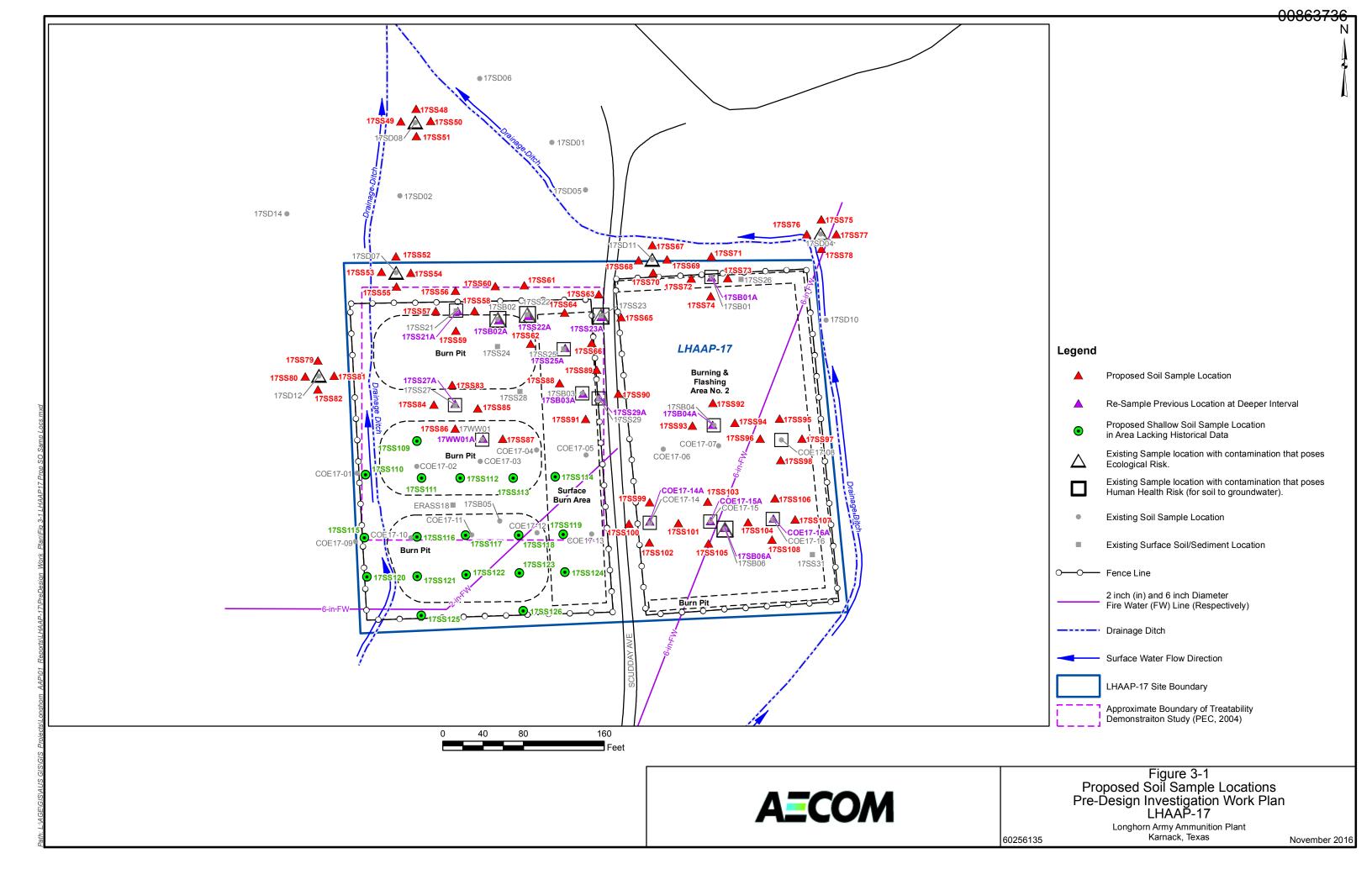
Quarter	2 nd	3 rd	4 th	1 st	2 nd	3 nd	4 th	1 st	2 nd	3 rd	4 th
Creek Sample ID	Jun 2013	Sept 2013	Dec 2013	Feb 2014	May 2014	Aug 2014	Nov 2014	Feb 2015	May 2015	Aug 2015	Nov 2015
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry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



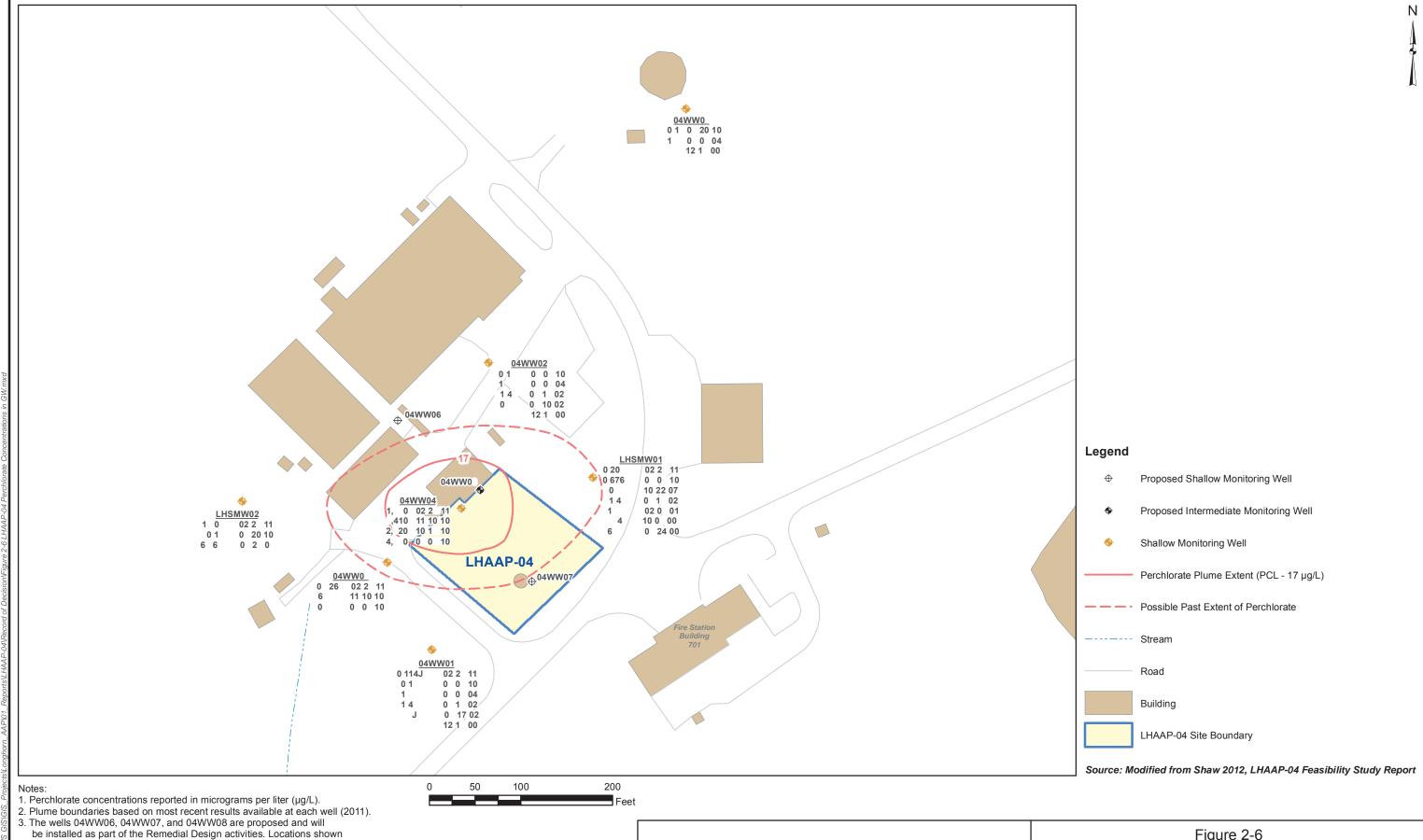
Longhorn Army Ammuntion Plant Creek Sampling Locations





Document Path: L:\AGE\GIS\AUS GIS\GIS Projects\Longhom_AAP\01_Reports\LHAAP-17\PreDesign_Work_Plan\Fig 3-2 LHAAP17 Prop WLs for Pumping Test.mxc <u>INSET</u> 18WW10 **⊙ 177PZ01 ⊙1777Z02** LHAAP-18 **₩W-18 ♦** MW-19 17WW11 🙌 17WW12 17WW15 See Inset for Details 17WW16 LHAAP-17 17WW13 17WW17 17WW05 17WW14 17WW04 17WW07 18WW15 🛟 18WW14 LONGPOINT RD. AVE "Q" LHAAP-19 75 150 300 Legend **Existing Shallow Monitoring Well** Proposed Piezometer Location Existing Shallow/Intermediate Monitoring Well **•** Perchlorate Plume (PCL = 17 μ g/L) LHAAP-17 Site Boundary **Existing Intermediate Monitoring Well** Other Site Boundary Existing Deep Monitoring Well Existing Shallow Monitoring Well for Proposed Pumping Test Note: PCL - Protective Concentration Level for residential groundwater Figure 3-2
Wells for Proposed Pumping Test
Pre-Design Investigation Work Plan
LHAAP-17 **AE**COM

Longhorn Army Ammunition Plant Karnack, Texas



are approximate and will be adjusted in the field based on site conditions

4. PCL - Texas Risk Reduction Program Protective Concentration Level for

and any additional data that may be available at that time.

Residential Groundwater.



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

Karnáck, Texa:

October 2016

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

Notes:

60256135

- 1. All concentrations are reported in microgram per liter (µg/L).
- ND non detect
 GW-Ind groundwater TCEQ MSC for industrial use
- 4. MCL Maximum Contaminant Level5. PCL Protective Concentration Level for residential groundwater
- 6. TCE trichloroethene
- 7. 1,1-DCE 1,1-dichloroethene 8. 1,2-DCA - 1,2-dichloroethane

Figure 2-2

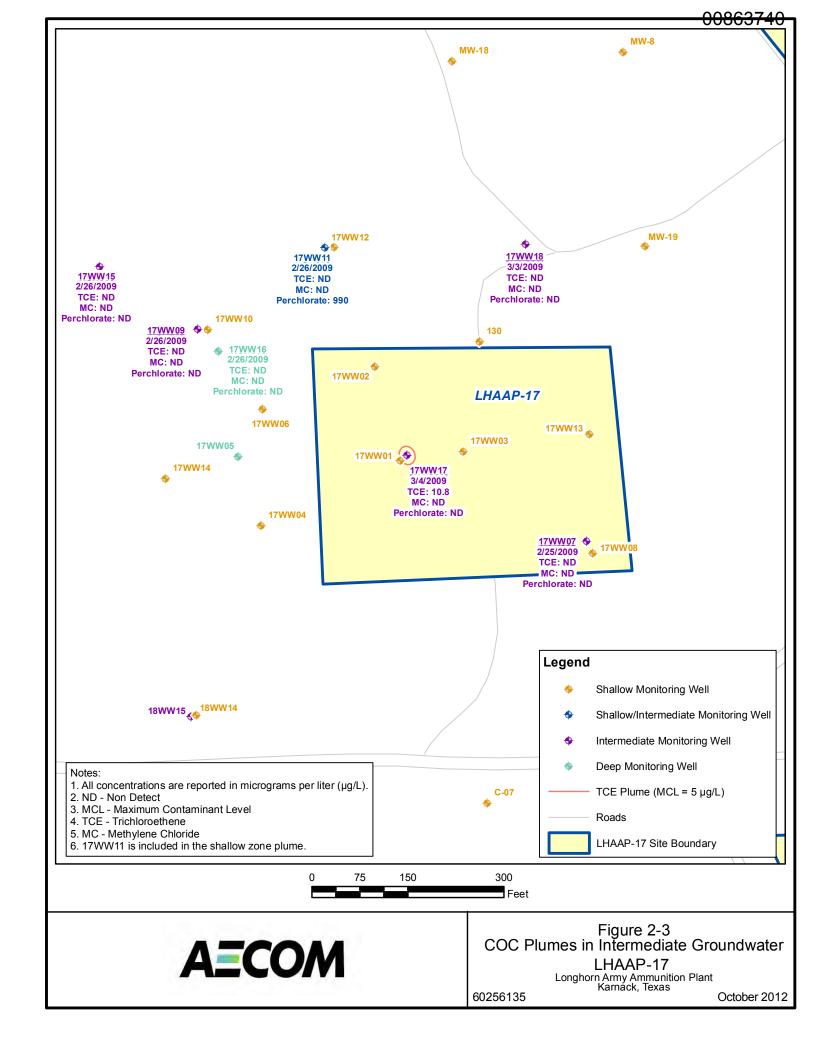
Figure 2-2 COC Plumes in Shallow Groundwater Data Gap Investigation Work Plan LHAAP-17

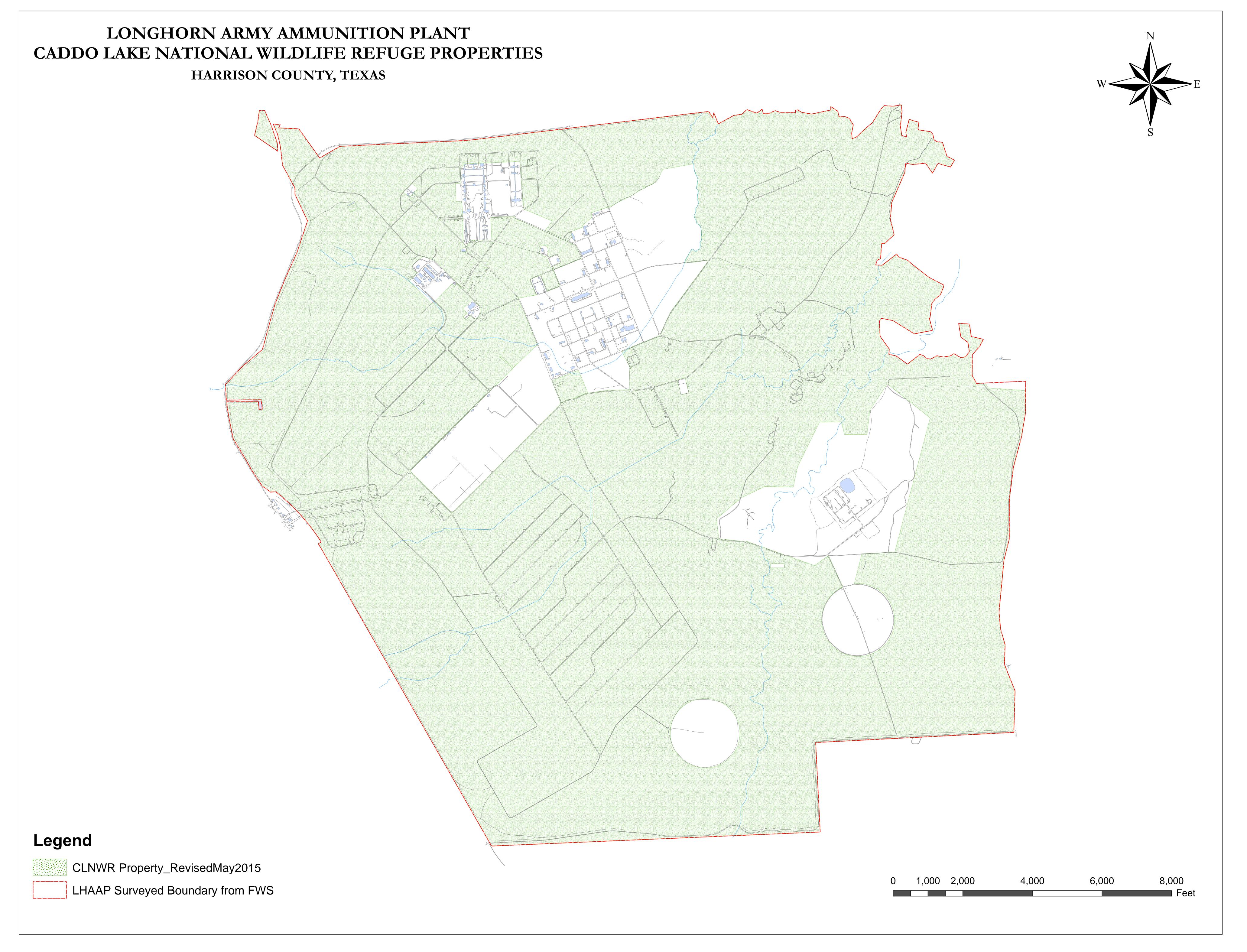
Longhorn Army Ammunition Plant Karnack, Texas

August 2016

LHAAP-19







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

Comprehensive Land Use Control (LUC) Management Plan

Former Longhorn Army Ammunition Plant (LHAAP) Karnack, Texas

COMPREHENSIVE LUC & NOTIFICATION MANAGEMENT PLAN

REVISION LOG

Year Original 9-13-07 2008 2009 2010 2011 2011 2012 2012 2-4-13			na lo Idda.	
		Army	EPA	TCEQ
	N/A			
	None Required			
	Add LHAAP-06,-07,-08,-35/36,-35B (37)/67, -46, -49,			
	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			
	Add Notices for LHAAP-35B(37), -50 and -35A(58)			
2015 9-14-15	(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 Zulenkolby panolby Mandley Mandley Malley Coorment, Old Co	RICHARD Deabs/specify (October DAN TRI) Deabs/specify (October DAN TRI) Decate Comment of DAN TRI) Address of Comment of DAN TRI) Decate Comment of DAN TRI)	April Palmie Dogus 2017.11.28 0922.31

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

TABLE OF CONTENTS

Revision Log. ii
LUC & Notification Management Plan 1
List of Sites
LHAAP-02 Vacuum Truck Overnight Parking (LHAAP-02)
Nonresidential Land Use site included within the groundwater use restriction
LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-03 Former Waste Collection Pad Building 722-P Paint Shop (LHAAP-03)
Nonresidential Land Use site included within the groundwater use restriction
LUC boundary for LHAAP-35A(58)- see LHAAP-35A(58)
LHAAP-06 Building 54F Solvent (LHAAP-06)
Notice of Nonresidential Land Use for LHAAP-06 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-07 Building 50G Drum Processing (LHAAP-07)
Notice of Nonresidential Land Use for LHAAP-07 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-08 Former Sewage Treatment Plant (LHAAP-08)
Notice of Nonresidential Land Use for LHAAP-08 Filed in Public Records of Harrison County, Texas (including survey plat)
LHAAP-12 Landfill 12 (LHAAP-12)
12-1 LUC Inspection and Maintenance Log Filed in Public Records of Harrison County, Texas (including survey plat)
12-2 LUCs from Final Remedial Design Addendum
12-3 Notice of Land Use Controls and Nonresidential Land Use at LHAAP-12
12-4 Land Use Control Compliance Inspection Form

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

MMRP-4 Land Use Control Compliance Insp	pection Form Pending
---	----------------------

Table 1 Summary of Land Use Controls and Notifications

Figure 1 Sites with Land Use Controls

Figure 2 Sites with Restricted Uses Notifications

List of Appendices

Appendix A GSA Transfer Letters

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.

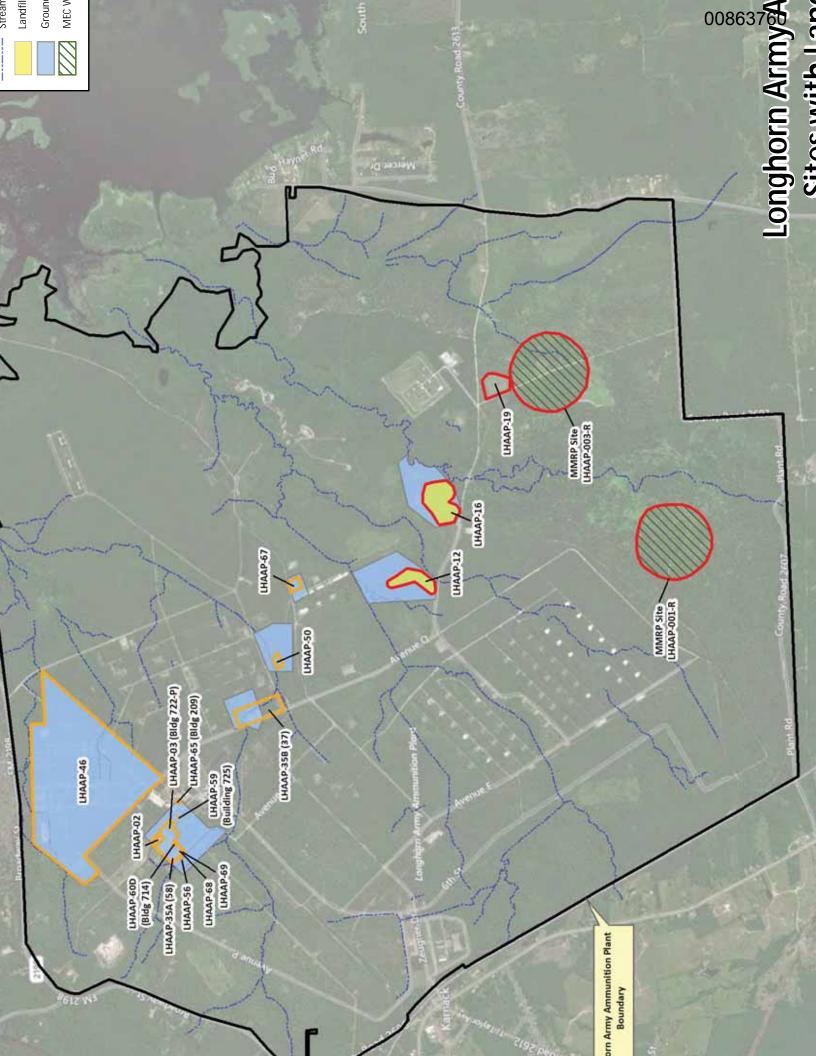
Table 1 -Summary of Land Use Controls and Notifications

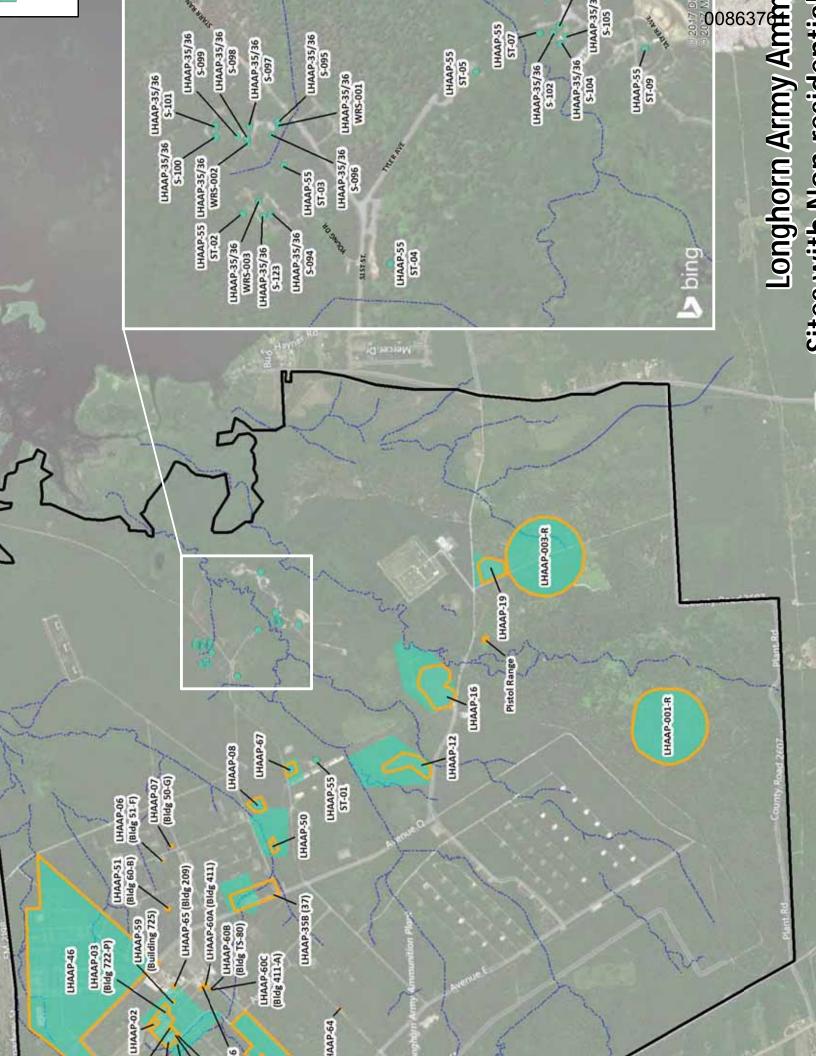
Site Name	Transfer Documents	ocuments	Decision Documents	ion nents		Land	Land Use Controls			Notifications
IRP MMRP* LHAAP-	GSA Transfer To USFWS	ECP/ ECOP	ROD	DD	Groundwater Use Restriction	Nonresidential Land Use Restriction	Intrusive Activities Prohibition	MEC Warning	Landfill Cap Maintenance	Nonresidential Use Notification
2					*					*
3					*					*
9				2008						>
7				2008						>
8	2015	VI		2008						>
12	2014	>	2007		>	Cap Only	Cap Only		7	>
16			2016		>	Cap Only	Cap Only		r	>
19		VII		2014		Cap Only	Cap Only			>
32/36	2015	VI		2010						>
37			2010		7					\wedge
46			2010		\wedge					\nearrow
49	2015	VI	2010							\nearrow
05			2010		>					\wedge
51				2008						\nearrow
25	2015	VI		2008						\nearrow
95				2014	*					*
58			2010		\wedge					\nearrow
65				2008	*					\nearrow
09				2008	*					\wedge
64				2008						\nearrow
65				2014	*					*
99				2008						\nearrow

Site Name	Transfer Documents	ocuments	Decision Documents	ion rents		Land	Land Use Controls	z a n		Notifications
IRP MMRP* LHAAP-	GSA Transfer ECP/ To USFWS ECOP	ECP/ ECOP	ROD	DD	Groundwater Use Restriction	Nonresidential Intrusive Land Use Activities Restriction Prohibitic	Intrusive Activities Prohibition	MEC Warning	Landfill Cap Maintenance	Nonresidential Use Notification
<i>L</i> 9			2010							>
89				2008	*					>
69				2014	*					* *
Pistol Range		VII	2010							\nearrow
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





LHAAP - 06

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

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:	
Amount: \$ 36.00	
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 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.

 \mathbf{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 multifamily 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.

Ш

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 /Oth day of March, 2010.

BEFORE ME, on this the 10 th day of MOVO, 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 <u>lo</u> day of <u>Mwch</u>, 2010.

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



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,

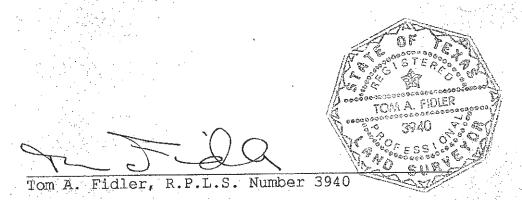
THENCE S 67deg37'19"W 10.93' along the S.B.L. of this tract to an E.C.C.W. found for this tract's S.W.C.,

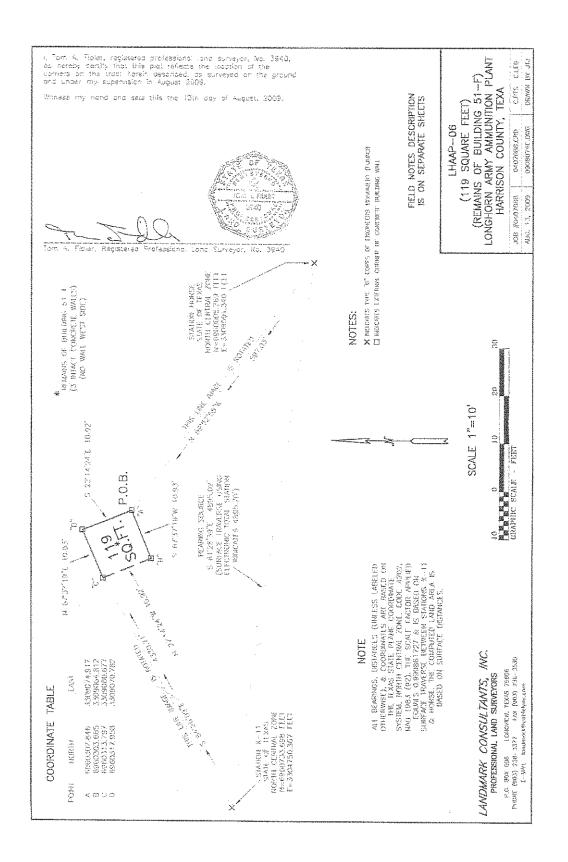
THENCE N 22deg14'24"W 10.92' along the W.B.L. of this tract to an E.C.C.W. found for this tract's N.W.C.,

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.





LHAAP-07

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

2010-000005556

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

7 Pages

FILED AND RECORDED - OF	PR CLERKS NOTES
On: 04/27/2010 04:08 PM	-
Document Number: 2010-000005556	
Amount: \$ 36.00	, Deputy
By: Ann Turner	, behaty
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 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-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.

П

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 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.

Ш

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

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 // th day of // breb, 2010.

BEFORE ME, on this the 10 th day of 100 M, 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 100 day of 100.

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



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,

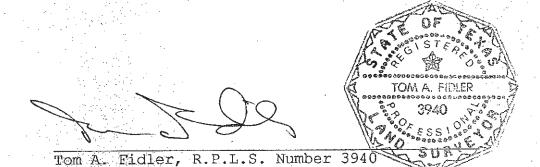
THENCE S 69deg02'55"W 30.36' along the S.B.L. of this tract to an E.C.C.F.S.W. found for this tract's S.W.C.,

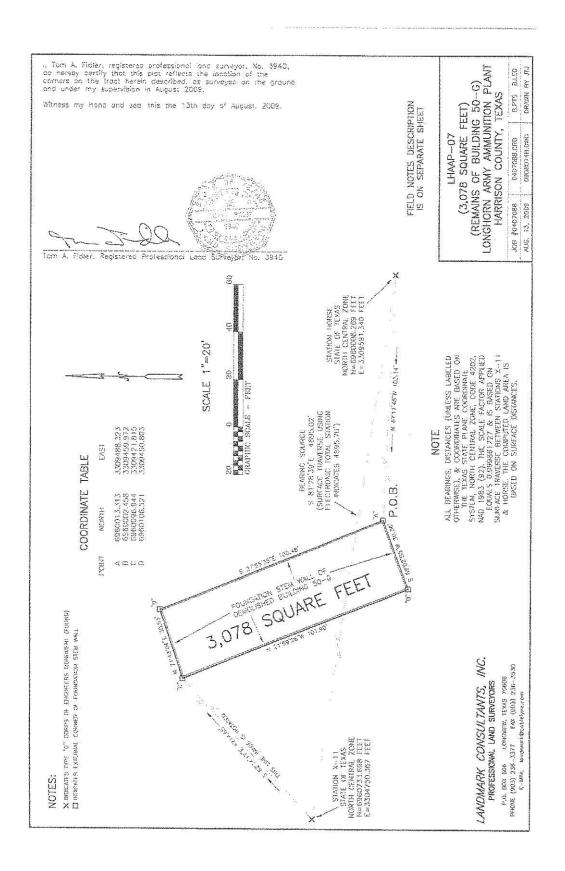
THENCE N 21deg59'26"W 101.90' along the W.B.L. of this tract to an E.C.C.F.S.W. found for this tract's N.W.C., and being S 82deg14'17"E 4714.65' from monument "X-11" referenced above,

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.





eres

LHAAP-08

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

2011-000003377

DO NOT REMOVE THIS PAGE - IT IS A PART OF THIS INSTRUMENT

NOTICE

6 Pages

3

FILED AND RECORDED - OPR	CLERKS NOTES
On: 03/24/2011 03:52 PM	
Document Number: 2011-000003377	
Receipt No: 1103745	
Receipt No. 1103743	
Amount: \$ 32.00	
D. I D. I D. I	
By: Lauren Boyd , 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:



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:

Ι

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.

 Π

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.

Ш

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 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.

BEFORE ME, on this the 25 th day of 700, 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.

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, 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,

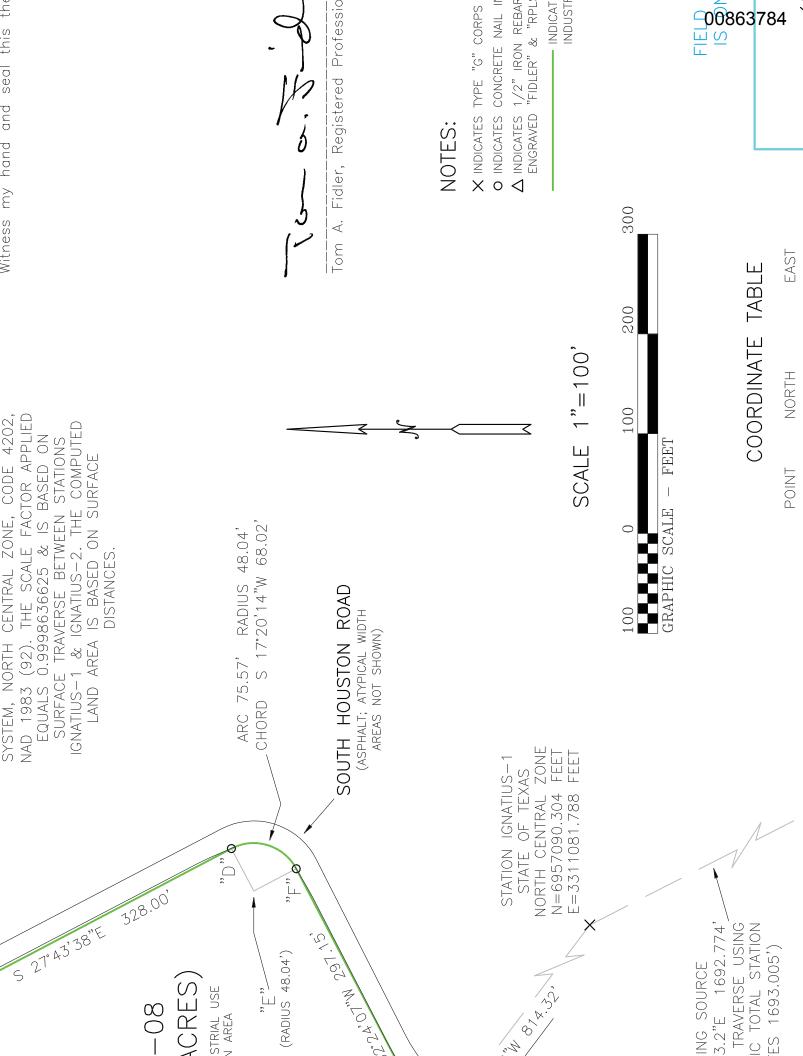
THENCE S 27deg43'38"E 328.00' along the N.E. B.L. of this tract to a C.N.I.B.C. set (in the asphalt pavement of South Houston Road) for the North end of a curve,

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.





3310/31 Q50

6057581 018

LHAAP-12, 12-1 LUC INSPECTION AND MAINTENANCE LOG

LUC Inspection and Maintenance Log - LHAAP 12

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

LHAAP-12, 12-2 LUCs FROM FINAL REMEDIAL DESIGN ADDENDUM

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



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

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

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

June 2007

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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

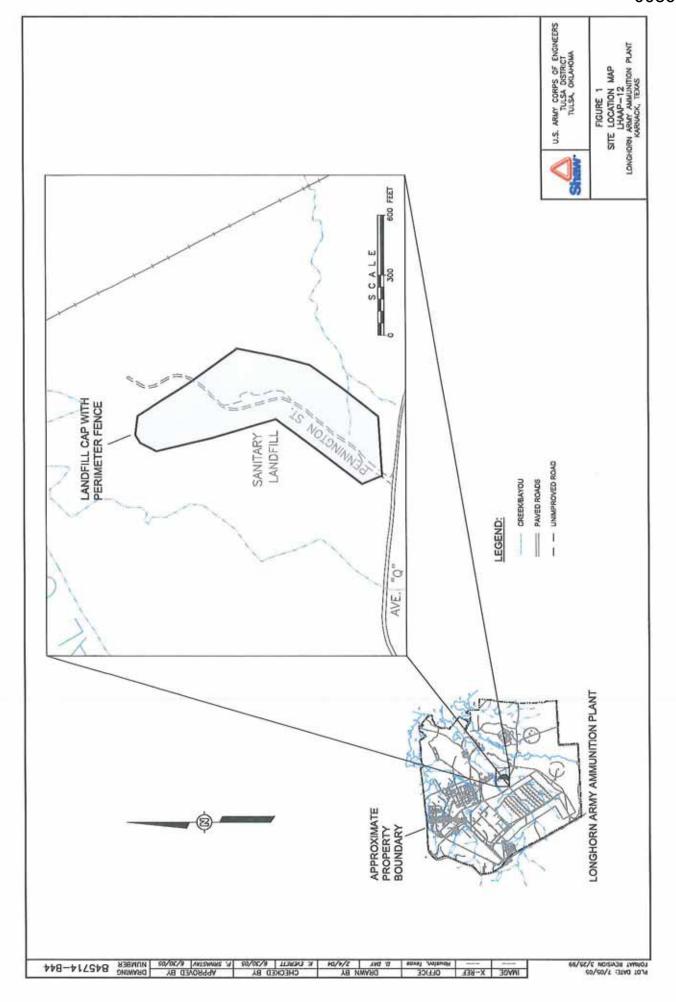
The Army shall not, without USEPA concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA concurrence before commencing actions that may impact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

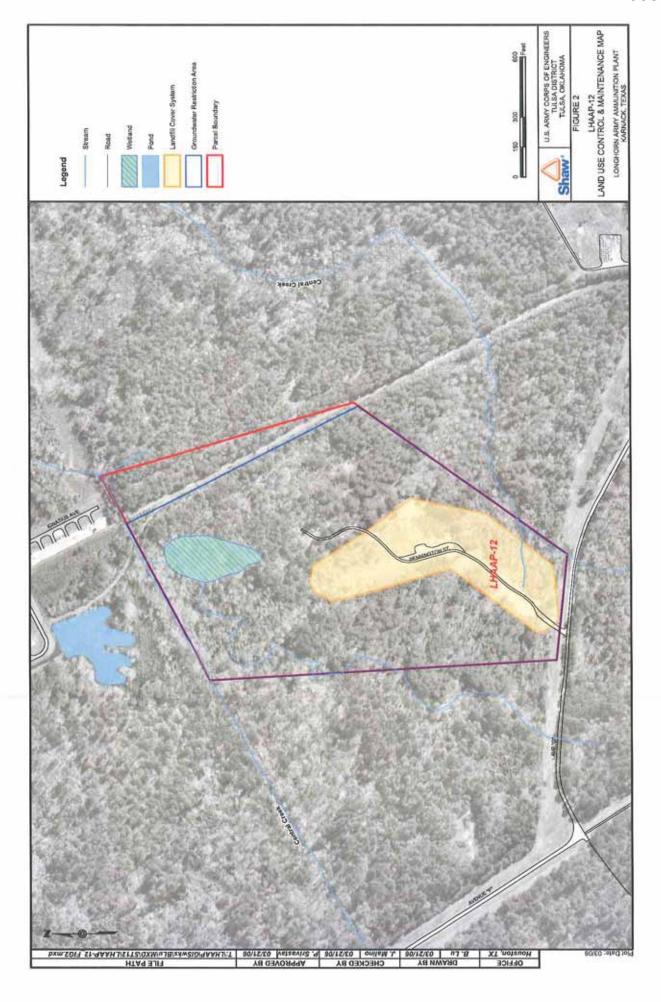
The LUCs shall remain in effect until such time as the Army and USEPA agree that the concentrations of hazardous substances have been reduced to levels that allow for unlimited exposure and unrestricted use. When this occurs, the LUCs will be terminated as needed. The decision to terminate LUCs will 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*





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)

7009064 OR 36400863799

FILED FOR RECORD

07 JUN 13 AM 10: 09

CO CLERK, HARRISON CO

BY COLL 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

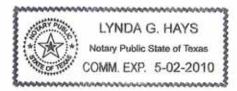
Rose M. Zeiler

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.

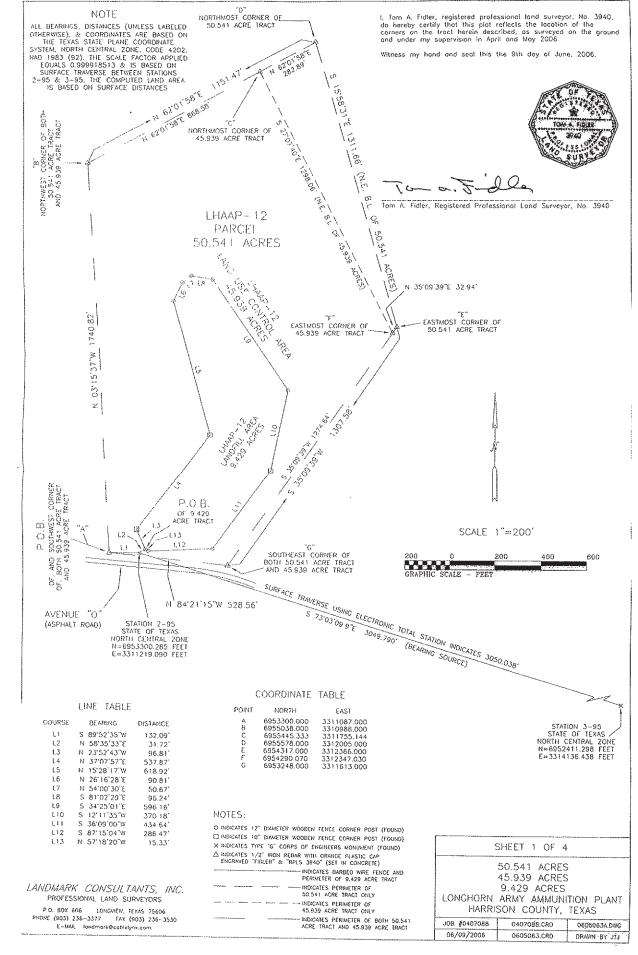
GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the /3 day of June , 2007.



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

Doc Bk Vol Pa 7009064 OR 3640 4

EXHIBIT A



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 84 deg 21'15"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.



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

SHEET 3 OF 4

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.

Jille

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,

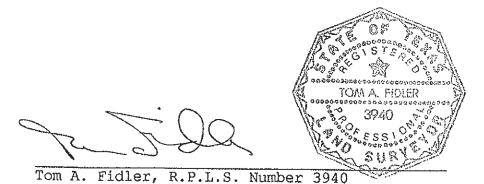
THENCE generally along a barbed wire fence the following eleven courses,

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,

SHEET 4b OF 4

- 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.



Doc 8k Vo1 Pa 7009064 0R 3640 10

FIGURE 1

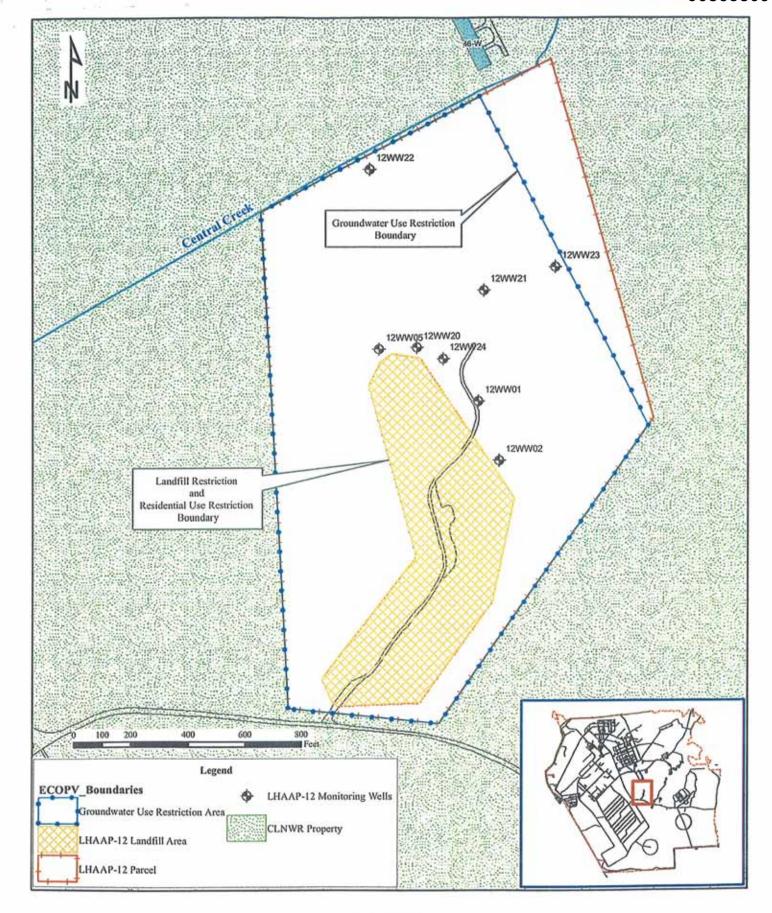


FIGURE 1

Land Use Control Boundaries

Doc Vol 7009064 OR 3640

STATE OF TEXAS

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

LHAAP-12, 12-4 LAND USE CONTROL COMPLIANCE INSPECTION FORM

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 Rer 2007, an inspection of LHAAP-12 was conducted by	
to visually confirm compliance with the LUCs.	on
I, the undersigned, do document that the inspection the above information is true and correct to the best	•
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)

RAO Inspection and Maintenance Checklist

					General Information
Proje	Project Name	RAO Insp	pection	and M	RAO Inspection and Maintenance, LHAAP-16 Landfill, Longhorn Army Ammunition Plant, Karnack, TX
Contr	Contractor				
Inspe	Inspector's Name				
Inspe	Inspector's Title				
Inspe	Inspector's Signature				
Inspe	Inspector's Contact Number				
Inspe	Inspection Date				
Туре	Type of Inspection	Qua	Quarterly Prior to fore	scast ra	Quarterly Semiannual Annual Prior to forecast rain After a rain event Other
Desc	Description	Yes	No	A/N	A Comments (Attach photos/location sketches) Corrective Action (Attach photos)
Ą	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?				
ы О	CAP Vegetation and Animal Burrows	S			
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?				

Desc	Description	Yes	No	N/A	Comments (Attach photos/location sketches)	Corrective Action (Attach photos)
	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?					

E.1 Are the perimeter fence and gates E.2 Gate(s) damaged? E.3 Liftle encountered within the target bocks missing? E.4 Are the gate bocks missing? E.5 Are the gate some treatment observations? E.6 Are the access roads in unvasible or proving conditions? E.6 Any other relevant observations? E.7 Are there any significant cracks F.7 Are there any damaged areas? F.3 Any other relevant observations?	Desci	Description	Yes	No	N/A	Comments (Attach photos/location sketches) Corrective Acti	Corrective Action (Attach photos)
- i i i i i i i i i i i i i i i i i i i		Site Access Features					
	E.1	Are the perimeter fence and gates damaged?					
8	E.2	Gate(s) damaged?					
8	E.3	Litter encountered within the area?					
	E.4	Are the gate locks missing?					
3	E.4	Are signs to prevent unauthorized entry missing?					
3	E.5	Are the access roads in unusable or poor condition?					
8	E.6	Any other relevant observations?					
		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 GROUN	D						
Protective casing?						\square Yes	□ No
Material						<u> </u>	
Condition:	\square Good	☐ Broken		Cracked			
Lid Condition:	\square Good	☐ Broken		Cracked			
Hinge Condition:	□ Good	☐ Less than	50% r	usted \square	More than 50% rusted		
☐ FLUSH MOUNTED							
Well cover present?						□ Yes	\square No
Condition:	\square Good	☐ Broken		Cracked			
Condition of Sump:	\square Clean	\square Dry		Standing W	ater		
CONCRETE PAD:							
Visible?						□ Yes	\square No
Dimensions		T	hickne	SS			
Sloped away from cas	ing?					□ Yes	\square No
Check any of the follo	wing feature	s that apply:					
☐ Many Cracks	☐ Gap Arou	and Casing	□ Fe	w Cracks	☐ Ponded Water	□ No Pad Pad	resent
CONCRETE PAD:							
Inner Diameter (inche	s)						
Condition:	\square Good	☐ Broken		Cracked	☐ Other (describe)		
Cap present?						☐ Yes	\square No
Well lock present?						□ Yes	\square No
Lock functioning prop	erly?					□ Yes	\square No
Bump post? \square Yes \square No						\square No	
Well ID visible? \square Yes \square No							
WELL INTEGRITY:							
Bailer present?						☐ Yes	\square No
Visual obstruction?						☐ Yes	\square No
Is well open to comple	eted depth?					□ Yes	□ No
Is silt present in well?	-					☐ Yes	□ No
Is silt greater than 25%		een length?				☐ Yes	□ No
COMMENTS:		<u>~</u>					

LHAAP-16, 16-2 LUCs FROM DRAFT-FINAL REMEDIAL DESIGN

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

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APPENDIX E: ANNUAL LUC COMPLIANCE DOCUMENTATION FORM

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

O&M

NPL National Priorities List

ORP Oxidation-Reduction Potential

RACR Remedial Action Completion Report

operation and maintenance

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.
 - o 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

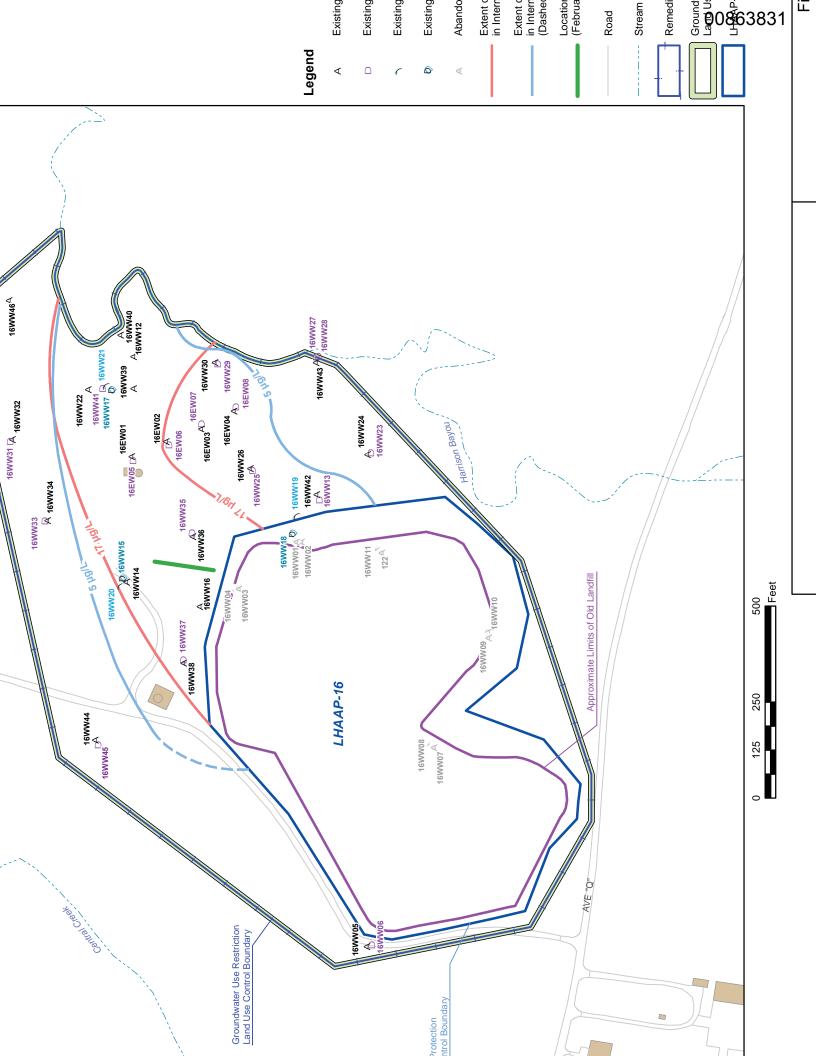
Draft Final Remedial Design – LHAAP-16 Longhorn Army Ammunition Plant, Karnack, Texas

January 2017

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, 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)

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.

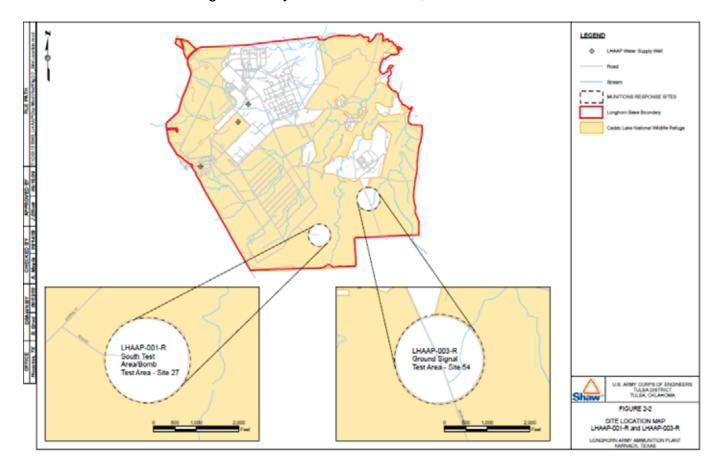
Land Use Controls (LUCs) are applied at LHAAP-001-R and LHAAP-003-R as part of the final remedy in accordance with the Record of Decision signed September 13, 2016. LUCs are necessary to promote ongoing protection of human safety against potential explosive hazards that may remain at the MMRP sites. 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

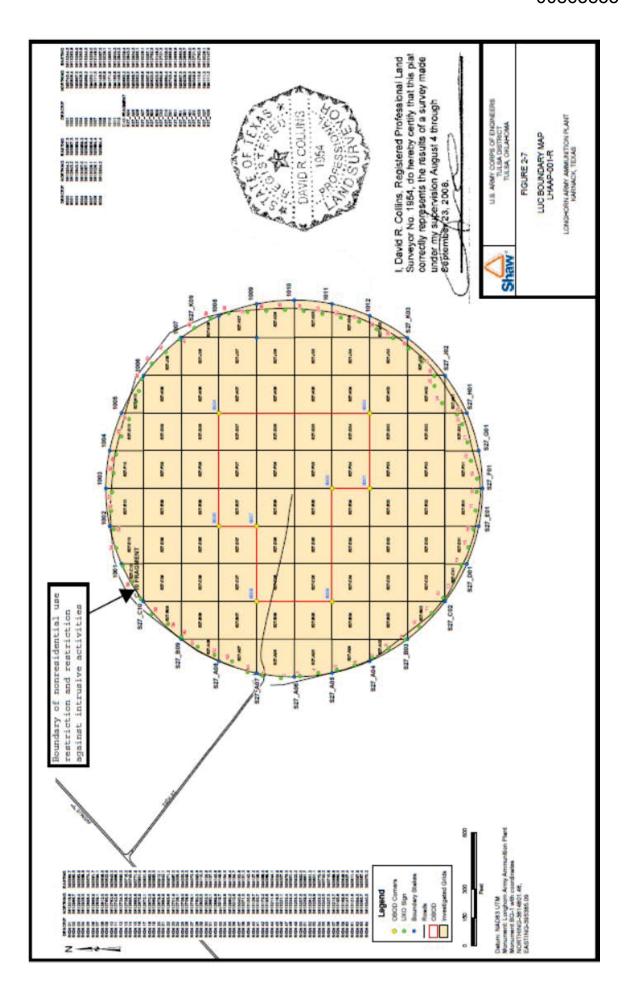
- The LUC to prohibit residential land use will remain in place until it is demonstrated that the MEC no longer presents a threat to public/human safety.
- The LUC restricting land use to nonresidential will remain in place until it is demonstrated that the MEC no longer presents a threat to public/human 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).

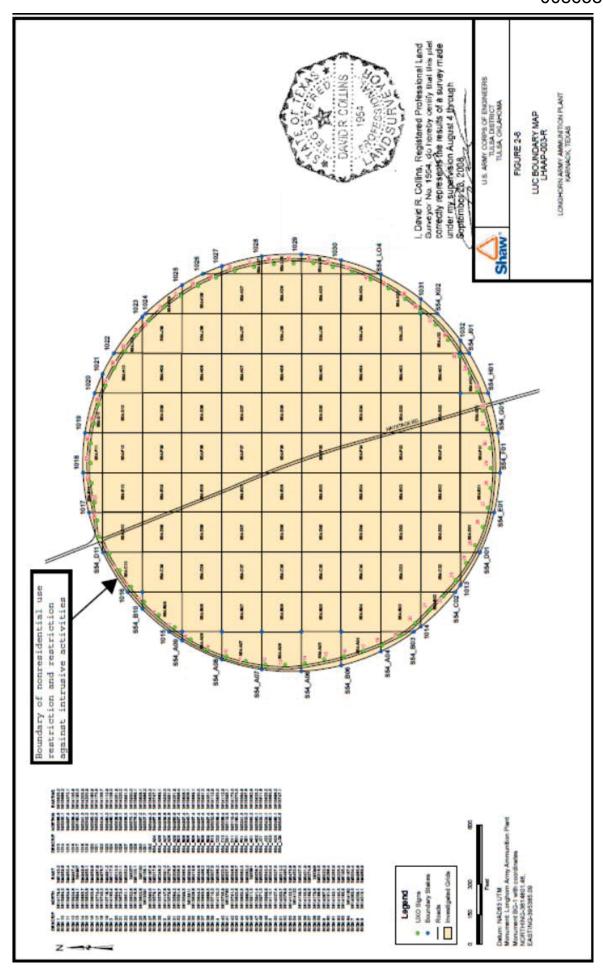
LHAAP-001-R, South Test Area/South Bomb Area and LHAAP-003-R, Ground Signal Test Area Longhorn Army Ammunition Plant, Karnack Texas



LHAAP-001-R, South Test Area/South Bomb Area and LHAAP-003-R, Ground Signal Test Area Longhorn Army Ammunition Plant, Karnack Texas



LHAAP-001-R, South Test Area/South Bomb Area and LHAAP-003-R, Ground Signal Test Area Longhorn Army Ammunition Plant, Karnack Texas



LHAAP – 16, 16-4 LAND USE CONTROL COMPLIANCE INSPECTION FORM

Annual Land Use Control Compliance Inspection Form

In accordance	with the Remedial Design dated	for LHAA	P-16 an
inspection of th	ne site was conducted by	[indicate tra	nsferee] on
The land use co	ontrol mechanisms are:		
environLandfil (e.g., diLand usIntegrit	water restrictions - prohibit access to the mental monitoring and testing only until of integrity - preserve the integrity of the lagging) that would degrade or alter the capse restrictions - restrict land use to nonresity of remedial and monitoring systems - memedial or monitoring systems until clean	cleanup goals are met; ndfill cap and restrict o; dential; aintain the integrity of	intrusive activities
No unauthorize restrictions is a	ed activities or uses have occurred. Comples follows:	iance with land use co	ntrols and
new grownNo land mainterNo land	of groundwater (other than environmental bundwater wells, or tampering with existing dfill intrusive activities (e.g., digging) that hance of vegetative cover and repair of soil d use other than nonresidential; and wities that would compromise the integrity	ng monitoring wells; would degrade or alte l subsidence or erosion	r the landfill cap; n areas on the cap;
	ned, do document that the inspection was or mation is true and correct to the best of m		
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)

2013-000013785

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

5 Pages

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On:	11/14/2013 04:23 PM		
Document	t Number: _2013-000013785		
Receipt N	o: <u>1313735</u>		
Amount:	\$ <u>28.00</u>		
Ву:	Ann Turner , Deputy		
	Patsy Cox, County Clerk Harrison County, Texas		

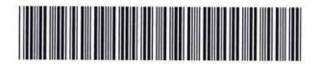


STATE OF TEXAS COUNTY OF HARRISON

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:



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:

1

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.

11

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 Longhorn AAP Site Manager

STATE OF TEXAS COUNTY OF Carego

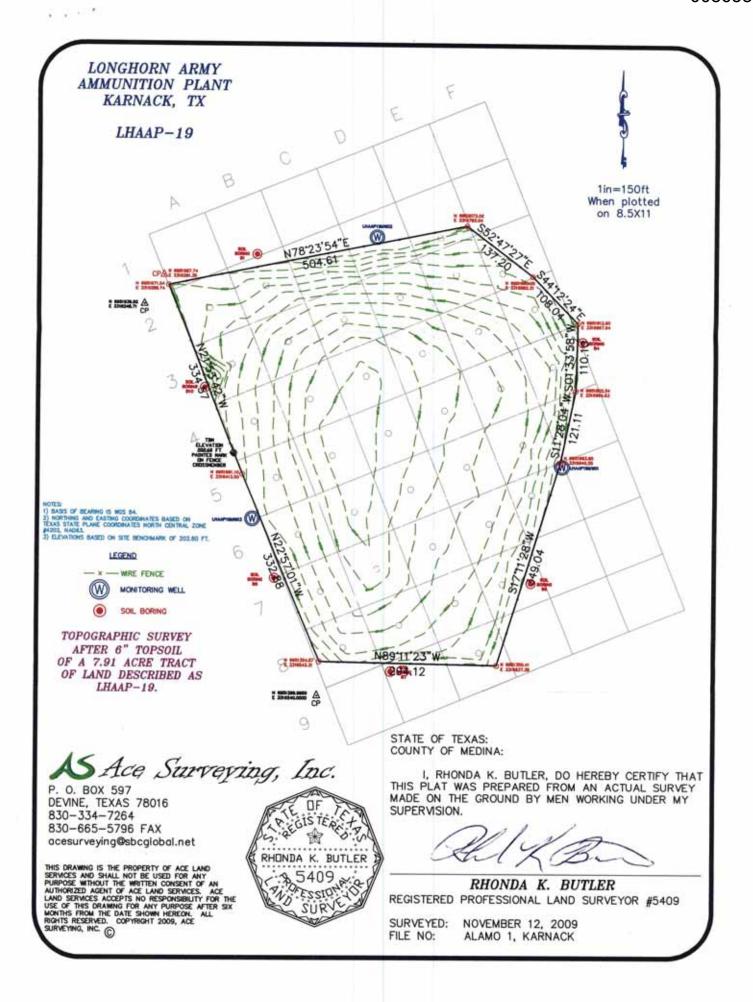
BEFORE ME, on this the _ day of Nov 20 personally appeared Rose M. Zeiler, of The United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 14th day of 100

Notary Public in and for the State of

BRENDA McBRIDE Notary Public State of Texas

COMM. EXP. 5-4-2014



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)

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:, 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:



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 multifamily 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.

Ш

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

Assistant Chief of Staff for Installation Manag ATTN: DAIM-ODB (T. Lederle)	gement
600 Army Pentagon	
Washington D.C. 20310-0600	
0 6	
Krell: Juler	
Rose M. Zeiler	
Longhorn AAP Site Manager	
EXECUTED this theth day of	, 2011.
M. Zeiler, of the United States Army, United to be the person and agent of said agency who instrument, and she acknowledged to me that in the capacity therein expressed.	she executed the same for the purposes and
GIVEN UNDER MY HAND AND SEAL OF	FOFFICE, this the day of Jule,
2011.	\bigcap \bigcap \bigcap \bigcap
	Notary Public in and for the State of Texas, County of Harrison
in the capacity therein expressed. GIVEN UNDER MY HAND AND SEAL OF 2011. JENNIFER LESTER Notary Public State of Texas	FOFFICE, this the 30 day of June, Notary Public in and for the State of 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.



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

NOTE

DISTANCES (UNLESS LABELED HERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE D 1983 (92). THE SCALE FACTOR APPLIED STEM, NORTH CENTRAL ZONE, CODE 4202, EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS LER-1 & TYLER-2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES. BEARINGS,

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

LANDMARK CONSULT PROFESSIONAL LAND SL LONGVIEW, E-MAIL landmark@cable! FAX PHONE (903) 236-3377 P.O. BOX 606

NOTES: 64.0 SQ.FT.) SUMP 094 P.0.B.

O INDICATES UNMARKED CORNER OF SUMP

SCALE 1"=3'

FEET GRAPHIC SCALE

8

NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET STATION TYLER-1 STATE OF TEXAS × N 07'59'31"W 569.56'

ers on the tract herein described, as surveyed on the ground m A. Fidler, registered professional land surveyor, No. 3940, sereby certify that this plat reflects the location of the

3314200.311 3314195.385 3314201.689 3314206.615

6959071.485 6959077.789 6959082.715 6959076.411

<000

EAST

NORTH

POINT

COORDINATE TABLE

under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.

INDICATES 1116.219")

A. Fidler, Registered Professional Land Surveyor,

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' BEARING SOURCE

NORTH CENTRAL ZONE N=6957832.181 FEET E=3315168.140 FEET STATION TYLER-2 STATE OF TEXAS

(64.0 SQUARE FE SUMP 094

FIELD NOTES DESCRIP IS ON SEPARATE SH LONGHORN ARMY AMMENI HARRISON COUNTER JOB #0407088 0407088.CRIES 03/14/2011 1103025H.DWC 03/14/2011

2012-000000707

DO NOT REMOVE THIS PAGE - IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FI	LED AND RECORDED - OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document	Number: 2012-000000707	
Receipt No	1200645	
Amount:	\$ 32.00	
Ву:	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:



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.

П

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 multifamily 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.

Ш

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

Assistant Chief of Staff for Installation Management

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.

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

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) O INDICATES UNMARKED CORNER OF SUMP S 52'00'03"W 1.80' NOTES: FEET (69.6 SQUARE 095 ON PLOCOLIS SCALE 1"=3" GRAPHIC SCALE

ars on the tract herein described, as surveyed on the ground m A. Fidler, registered professional land surveyor, No. 3940, ereby certify that this plat reflects the location of the under my supervision in February & March 2011.

iss my hand and seal March 14, 2011.

NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET

×

STATION TYLER-1 STATE OF TEXAS

P.O.B.

· Co. St. L. B. B. S. V.

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102" INDICATES 1116.219") BEARING SOURCE

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

STATION TYLER-2 STATE OF TEXAS N=6957832.181 E=3315168.140 NORTH CENTRAL

NOTE

LANDMARK CONSULT PROFESSIONAL LAND SU LONGVIEW, T FAX E-MAIL landmark@cablely

PHONE (903) 236-3377

P.O. BOX 606

DISTANCES (UNLESS OTHERWISE), & COORDINATES ARE THE TEXAS STATE PLANE COOR SYSTEM, NORTH CENTRAL ZONE, CC NAD 1983 (92). THE SCALE FACTOR EQUALS 0.9998954238 & IS BA SURFACE TRAVERSE BETWEEN ST TYLER-1 & TYLER-2. THE COMPU AREA IS BASED ON SURFACE DIS ALL BEARINGS,

COORDINATE TABLE

POINT	NORTH	EAST
٧	6959030.826	3314781
m	6959040.282	3314774
O	6959038.373	-4
0	6959043.101	~
ш	6959048.027	্ব
la.	6959043.299	ব
9	6959041.390	3314775
I	6959031.934	ਾਮ

FIELD NOTES DESCRIP IS ON SEPARATE SHI

(69.6 SQUARE FE LONGHORN ARMY AMMURING HARRISON COUNTER SUMP 095

ZONE

FEET

33	7088 0407088,CRD	1103025F, DWG
	#040708	/14/2011
	BOI	03/

2012-000000708

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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:, Deputy	v
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:



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.

 Π

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 multifamily 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.

Ш

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 COMM. EXP. 01/03/2015

otary 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 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.

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

NOTES:

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) O INDICATES UNMARKED CORNER OF SUMP

LANDMARK CONSULT PROFESSIONAL LAND SUF LONGVIEW, TE FAX (E-MAIL landmark@cablelyn

PHONE (903) 236-3377

P.O. BOX 606

NOTE

DISTANCES (UNLESS OTHERWISE), & COORDINATES ARE ITHE TEXAS STATE PLANE COOR! SYSTEM, NORTH CENTRAL ZONE, CC THE SCALE FACTOR 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 ALL BEARINGS.

COORDINATE TABLE

EAST NORTH POINT

3314694 3314688 3314695 3314700 6959066.385 6959072.689 6959077.615 6959071.311

FIELD NOTES DESCRIF IS ON SEPARATE SH

NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET

×

STATION TYLER-1 STATE OF TEXAS

(64.0 SQ.FT.) SUMP 096 P.O.B. * 3634.33.E 836.04.

SCALE 1"=3"

- FEET

GRAPHIC SCALE

ers on the tract herein described, as surveyed on the ground m A. Fidler, registered professional land surveyor, No. 3940, ereby certify that this plat reflects the location of the under my supervision in February & March 2011.

ass my hand and seal March 14, 2011.

BEARING SOURCE

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219")

A. Fidler, Registered Professional Land Survey

(64.0 SQUARE FE LONGHORN ARMY AMMENI HARRISON COUNTER SUMP 096 NORTH CENTRAL ZONE N=6957832.181 FEET E=3315168.140 FEET

STATION TYLER-2 STATE OF TEXAS

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	B #0407	3/14/20
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3	Ser Cer	3wd.
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FILI	ED AND RECORDED - OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document N	lumber: 2012-000000709	
Receipt No:	1200645	
Amount:	\$ 32.00	
Ву:	Ann Turner , Deput	y
	atsy Cox, County Clerk Iarrison 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:



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 TCEO, 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.

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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.

П

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 multifamily 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.

Ш

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 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 ______, 2011

BEFORE ME, on this the Dth day of UML, 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 20 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 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.

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

LANDMARK CONSULT

PROFESSIONAL LAND SI

FAX E-MAIL, londmark@cablel PHONE (903) 236-3377 P.O. BOX 606

COORDINATE

6959207.120 6959220.206 6959216.943 6959210.377

4 B U O

NORTH

POINT

LONGVIEW,

NOTE

THE TEXAS STATE PLANE COORDINATE 1983 (92). THE SCALE FACTOR APPLIED SURFACE TRAVERSE BETWEEN STATIONS LER-1 & TYLER-2. THE COMPUTED LAND REA IS BASED ON SURFACE DISTANCES. STEM, NORTH CENTRAL ZONE, CODE 4202, DISTANCES (UNLESS LABELED EQUALS 0.9998954238 & IS BASED ON BEARINGS,

DIES:

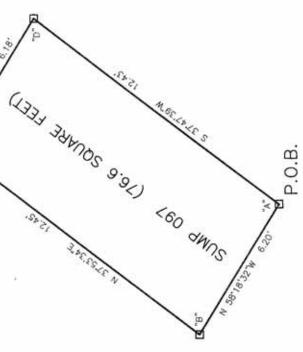
INDICATES CORNER OF EXTERNAL FACE OF CONCRETE INDICATES UNMARKED POINT

INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

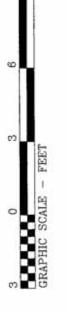
ers on the tract herein described, as surveyed on the ground nm A. Fidler, registered professional land surveyor, No. 3940, nereby certify that this plat reflects the location of the under my supervision in February & March 2011.

. 88.288 J. 82.ES.EF. N

ess my hand and seal March 4, 2011.



SCALE 1"=3'



NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET

×

STATION TYLER-1 STATE OF TEXAS FIELD NOTES DESCRIF IS ON SEPARATE SH 76.6 SQUARE FE SUMP 097 NORTH CENTRAL ZONE STATION TYLER-2 STATE OF TEXAS

> RECENT 10N P

> > n A. Fidler, Registered Professional Land

(SURFACE TRAVERSE USING ÉLECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219") BEARING SOURCE

N=6957832.181 FEET E=3315168.140 FEET

LONGHORN ARMY AMMENI HARRISON COUNTS, 50 108 #0407088 0407088.CRISS MAR. 4, 2011 09080742.DWG

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:	
Amount: \$ 32.00	
By:, 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:



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:

Ι

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.

П

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 multifamily 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.

Ш

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 Assistant Chief of Staff for Installation Management

ATTN: DAIM-ODB (T. Lederle)

600 Army Pentagon

Washington D.C. 20310-0600

Longhorn AAP Site Manager

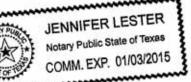
EXECUTED this the 30th day of _

BEFORE ME, on this the the that day of , 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 day of Ture,

2011.



tary 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 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.

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

NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

☐ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE O INDICATES UNMARKED POINT

WC. PROFESSIONAL LAND SURVEYORS LANDMARK CONSULTANTS,

FAX (903) 236-3530 LONGWEW, TEXAS 75608 E-MAIL landmark@cablelynx.com PHONE (903) 236-3377 P.O. BOX 606

NOTE

OTHERWISE), & COORDINATES ARE BASED ON THE SCALE FACTOR APPLIED DISTANCES (UNLESS LABELED SYSTEM, NORTH CENTRAL ZONE, CODE 4202 TYLER-1 & TYLER-2, THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES. EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS THE TEXAS STATE PLANE COORDINATE NAD 1983 (92). BEARINGS.

So of the state of

SCALE 1"=3'

- FEET

COORDINATE TABLE

P.0.B.

EAST NORTH POINT 3314674.744 6959221,331 6959227.327

3314667.072 3314669.837 3314677.534 6959230.288 < 000

> NORTH CENTRAL ZONE E E=3314279.499 FEET STATE OF TEXAS N=6958507.460

> > ×

STATION TYLER-1

.86'SlB 3.81.85.85 N

t herein described, as surveyed on the ground rision in February & March 2011.

nd seal March 4, 2011.

istered professional land surveyor, No. 3940, at this plat reflects the location of the FIELD NOTES DESCRIPTION

IS ON SEPARATE SHEET

NORTH CENTRAL ZONE N=6957832.181 FEET N=6957832.181 FEET E=3315168.140 FEET STATE OF TEXAS

(39.4 SQUARE FEET

SUMP 098

STATION TYLER-2







HARRIS	HARRISON COUNTY, TEXAS 98	TEXAS	0863
JOB #0407088	0407088.CRD	Y.PTS	87
MAR. 4, 2011	0908074Y.DWG	DRAWN BYCEJ	15 /8

2012-000000711

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MISCELLANEOUS 6 Pages

FIL	ED AND RECORDED - OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document !	Number: 2012-000000711	
Receipt No:	1200645	
Amount:	\$ 32.00	
Ву:	Ann Turner , Deputy	



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:



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.

П

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 multifamily 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.

Ш

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 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 _______th day of ____

BEFORE ME, on this the Oth day of Ull, 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 50 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 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.



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

NOTE

COORDINATES ARE BASED ON 1983 (92). THE SCALE FACTOR APPLIED SURFACE TRAVERSE BETWEEN STATIONS ER-1 & TYLER-2. THE COMPUTED LAND REA IS BASED ON SURFACE DISTANCES. TEM, NORTH CENTRAL ZONE, CODE 4202 CQUALS 0.9998954238 & IS BASED ON ERWISE), & COORDINATES ARE BASED THE TEXAS STATE PLANE COORDINATE BEARINGS,

DISTANCES (UNLESS LABELED

COORDINATE TABLE

50.FT.)

SUMP .

NORTH POINT

EAST

6959293.105 6959296.799 6959290.495

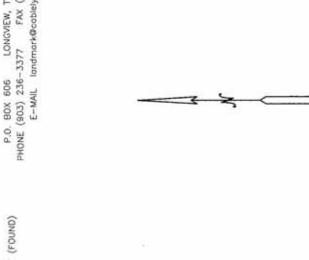
P.O.B.

3314682.173 3314682.173 3314686.901 3314691.827 6959286.801

NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) O INDICATES UNMARKED CORNER OF SUMP

LANDMARK CONSULT PROFESSIONAL LAND SU LONGVIEW, T FAX



SCALE 1"=3'

GRAPHIC SCALE

STATION TYLER-1 STATE OF TEXAS N=6958507.460 .64.86.38.5E.98.48.N ×

> ers on the tract herein described, as surveyed on the ground m A. Fidler, registered professional land surveyor, No. 3940, ereby certify that this plat reflects the location of the

under my supervision in February & March 2011.

ss my hand and seal March 14, 2011.

NORTH CENTRAL ZONE E=3314279.499 FEET

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116,219') BEARING SOURCE

3940

A. Fidler, Registered Professional Land Surveyor,

NORTH CENTRAL ZONE N=6957832,181 FEET E=3315168,140 FEET STATION TYLER-2 STATE OF TEXAS

(48.0 SQUARE FE LONGHORN ARMY AMMIQUITED HARRISON COUNTRY SUMP 099

FIELD NOTES DESCRIP IS ON SEPARATE SHI

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#0407088

2012-000000712

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

MISCELLANEOUS

6 Pages

FIL	LED AND RECORDED - OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document 1	Number: 2012-000000712	
Receipt No	1200645	
Amount:	\$ 32.00	
Ву:	Ann Turner , Deputy	
	Patsy Cox, County Clerk Harrison County, Texas	

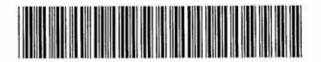


STATE OF TEXAS COUNTY OF HARRISON

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:



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

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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.

П

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 multifamily 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.

Ш

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

for the State of Texas,

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 4 percentage 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 day of June 1.

JENNIFER LESTER Notary Public State of Texas COMM. EXP. 01/03/2015 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.

OUGUES OTHER STANDARDS PROPORTY

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

HERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE STEM, NORTH CENTRAL ZONE, CODE 4202.) 1983 (92). THE SCALE FACTOR APPLIED COUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS LER-1 & TYLER-2. THE COMPUTED LAND REA IS BASED ON SURFACE DISTANCES. DISTANCES (UNLESS LABELED BEARINGS,

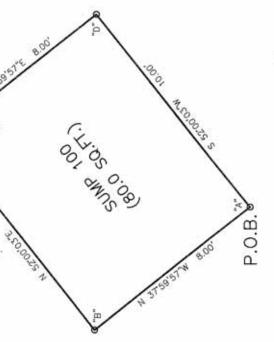
COORDINATE TABLE

< 800

3314682.523 3314677.597 3314685.477 3314690.403 EAST 6959418.170 6959424.474 6959430.630 6959424.326 NORTH POINT

ars on the tract herein described, as surveyed on the ground m A. Fidler, registered professional land surveyor, No. 3940, ereby certify that this plat reflects the location of the under my supervision in February & March 2011.

ess my hand and seal March 14, 2011.



NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET STATION TYLER-1 STATE OF TEXAS N=6958507.460 N 23.52,16°E 995,90°

×

ZONE N=6957832.181 FEET E=3315168.140 FEET STATION TYLER-2 STATE OF TEXAS NORTH CENTRAL

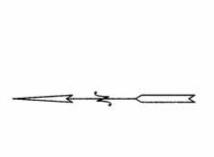
(80.0 SQUARE FE

SUMP 100

LANDMARK CONSULT PROFESSIONAL LAND SL LONGVIEW, 1 FAX E-MAil, landmark@cable!

PHONE (903) 236-3377 P.O. BOX 606

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND O INDICATES UNMARKED CORNER OF SUMP



SCALE 1"=3'



FIELD NOTES DESCRIP IS ON SEPARATE SHI



(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219')

BEARING SOURCE

LONGHORN ARMY AMMIBIT

	363	363
OB #0407088	0407088.CRD	88
03/14/2011	1103025K.DWG	37

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:, 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:



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.

П

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 multifamily 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.

Ш

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 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 10 th day of BEFORE ME, on this the $\mathcal U$ th day of \cup , 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 day of JUNE, 2011. JENNIFER LESTER Notary Public State of Texas Public in and for the State of Texas,

County of Harrison

COMM. EXP. 01/03/2015

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.

To Bildian B. B. I. S. Number 3

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

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) ☐ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE O INDICATES UNMARKED POINT NOTES: SUMP 101 FEET) SCALE 1"=3' 3

t herein described, as surveyed on the ground rision in February & March 2011. gistered professional land surveyor, No. 3940, not this plat reflects the location of the

nd seal March 4, 2011.

NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET STATE OF TEXAS STATION TYLER-1 N=6958507.460 .85.7501 3.64.81.45 N

STATION TYLER-2 STATE OF TEXAS N=6957832.181 E=3315168.140 NORTH CENTRAL

> (SURFACE TRAVERSE USING S 52'46'07.6"E 1116.102' ELECTRONIC TOTAL STATION INDICATES 1116.219")

> > 3940

Surveyor, No.

stered Professional Land

BEARING SOURCE

ZONE FEET

LANDMARK CONSULTANTS, INC. PROFESSIONAL LAND SURVEYORS

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

NOTE

OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE NAD 1983 (92). THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON DISTANCES (UNLESS LABELED SYSTEM, NORTH CENTRAL ZONE, CODE 4202, SURFACE TRAVERSE BETWEEN STATIONS
TYLER-1 & TYLER-2, THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES. ALL BEARINGS,

COORDINATE TABLE

P.O.B.

- FEET

POINT	NORTH	EAST
*	6959420.476	3314751.003
œ	6959429.211	3314743.930
O	6959432.404	3314749.001
Ω	6959423.663	3314756.102

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEETS

LONGHORN ARMY AMMUNITION PLONT HARRISON COUNTY, TEXAS & HARRISON COUNTY, TEXAS (67.0 SQUARE FEET) SUMP 101

#0407088 0407	7088.CRD	A.PTS
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)			
89	A.PTS A	0407088.CRD	JOB #0407088
Ş	4 040 4	500000000000000000000000000000000000000	nontoxon mon

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	t Number: 2012-000000714		
Receipt N	o: <u>1200645</u>		
Amount:	\$ 32.00		
Ву:	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:



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:

Ι

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 TCEO, the lead regulatory agency, no significant releases had occurred and the site could be closed under Texas Administrative Code (TAC) Risk Reduction Rule Standard

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.

П

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 multifamily 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.

Ш

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

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 BEFORE ME, on this the th day of UN , 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 day of June, 2011. JENNIFER LESTER Notary Public State of Texas y Public in and for the State of Texas, County of Harrison COMM. EXP. 01/03/2015

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.



CORPS OF ENGINEERS MONUMENT (FOUND) CORNER OF SUMP

STATION TYLER-1 X NORTH CENTRAL ZONE FEE STATE OF TEXAS N=6958507.460 E=3314279.499

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219")

BEARING SOURCE

LANDMARK CONSULTANTS, INC.

FAX (903) 236-3530

E-MAIL landmark@cablelynx.com

LONGVIEW, TEXAS 75606

PROFESSIONAL LAND SURVEYORS PHONE (903) 236-3377 P.O. BOX 606 NORTH CENTRAL ZONE STATION TYLER-2 STATE OF TEXAS N=6957832.181

FEET

E=3315168.140 FEET

NOTE

NAD 1983 (92), THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS TYLER-1 & TYLER-2. THE COMPUTED LAND OTHERWISE), & COORDINATES ARE BASED ON ALL BEARINGS, DISTANCES (UNLESS LABELED SYSTEM, NORTH CENTRAL ZONE, CODE 4202, AREA IS BASED ON SURFACE DISTANCES. THE TEXAS STATE PLANE COORDINATE

SUMP 102

SCALE 1"=6'

- FEET

(154.4 SQ.FT.)

t herein described, as surveyed on the ground gistered professional land surveyor, No. 3940,

rvision in February & March 2011.

nd seal March 11, 2011.

nat this plat reflects the location of the

331533,565 3315328,664 3315328,474 3315315,030 3315315,030 3315306,110 3315396,13 3315397,433 6957280.203 6957275.965 6957274.278 6957307.354 6957303.409 6957299.870 6957279.797 6957298.077 NORTH KECOMFOI"

COORDINATE TABLE

17'29'41"E 550.28'

P.O.B.

S

×

EAST

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET LONGHORN ARMY AMMUNITION PLENT

LONGHORN ARMY AMMUNITION PLENT

COUNTY, TEXAS 89

DRAWN BYOTA	1103025B.DWG	MAR. 11, 2011
B.PTS B	0407088.CRD	JOB #1101007
3:		

S 36'37'46'W 2.10'

istered Professional Land Surveyor, No. 3940

53'22'14"E 7.10"

2012-000000715

DO NOT REMOVE THIS PAGE - IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILED AND RECORDED - OPR		2	CLERKS NOTES
On:	01/19/2012 10:41 AM		
Document	Number: 2012-000000715		
Receipt No	1200645		
Amount:	\$ 32.00	7.	
Ву:	Ann Turner , D	eputy	
	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

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:

Ι

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 TCEO, 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.

П

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 multifamily 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.

Ш

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 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 4, 2011.

BEFORE ME, on this the 1th day of 1, 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

day of JUNI,
2011.

County of Harrison

h and for the State of Texas,

JENNIFER LESTER
Notary Public State of Texas

COMM. EXP. 01/03/2015

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,

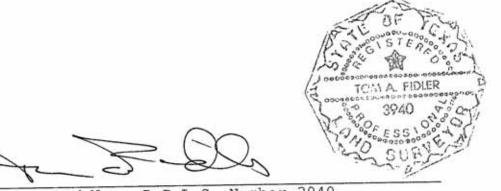
THENCE S 20deg31'34"E 601.43' to a point for the Northmost corner of this sump and this POINT OF BEGINNING,

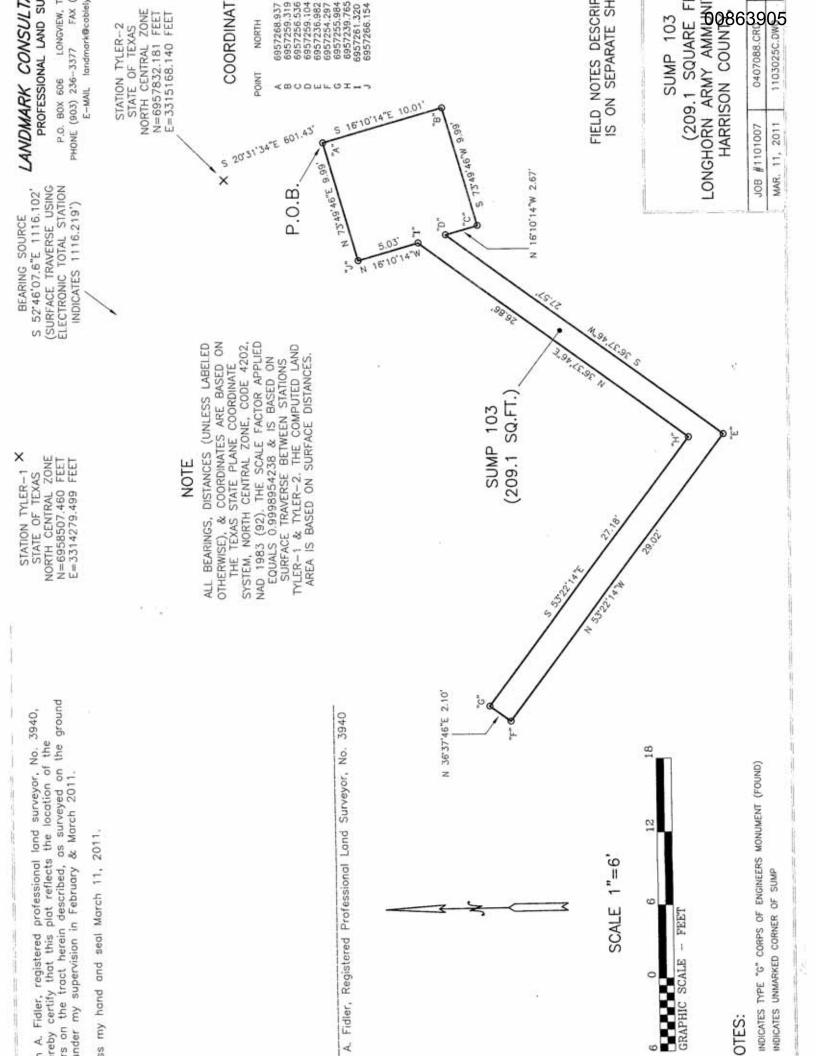
THENCE along the boundary of this tract the following ten courses:

- (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.





2012-000000716

DO NOT REMOVE THIS PAGE - IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FIL	LED AND RECORDED - OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document	Number: 2012-000000716	
Receipt No	1200645	
Amount:	\$ 32.00	
Ву:	Ann Turner, Deputy	
	Patsy Cox, County Clerk Harrison County, Texas	



STATE OF TEXAS COUNTY OF HARRISON

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Patsy Cox, Harrison County Clerk

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STATE OF TEXAS

HARRISON COUNTY

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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 TCEO, 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 multifamily 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.

Ш

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 Assistant Chief of Staff for Installation Management

ATTN: DAIM-ODB (T. Lederle)

600 Army Pentagon

Washington D.C. 20310-0600

Rôse M. Zeiler

Longhorn AAP Site Manager

EXECUTED this the 30th day of The

BEFORE ME, on this the Uth day of Uth, 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 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 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.



rs on the tract herein described, as surveyed on the ground under my supervision in February & March 2011. A. Fidler, registered professional land surveyor, No. 3940, reby certify that this plat reflects the location of the

ss my hand and seal March 11, 2011.

NORTH CENTRAL ZONE E=3314279.499 FEET N=6958507.460 FEET STATION TYLER-1 STATE OF TEXAS

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219") BEARING SOURCE

LANDMARK CONSULT

LONGVIEW, 1

PROFESSIONAL LAND SL E-MAIL landmark@coble! PHONE (903) 236-3377 P.O. BOX 606 NORTH CENTRAL ZONE FEET E=3315168.140 FEET STATION TYLER-2 STATE OF TEXAS N=6957832.181

X

COORDINAT

580.62 09'38'40"E

P.O.B.

6957244.097 6957256.587 6957237.294 6957241.884 6957248.063

KBOOMFOI

6957259,767 6957245.891

NORTH

POINT

(149.2 SQ.FT. **SUMP 104**

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

FIELD NOTES DESCRIP IS ON SEPARATE SHI

> OTHERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE THE SCALE FACTOR APPLIED ALL BEARINGS, DISTANCES (UNLESS LABELED SYSTEM, NORTH CENTRAL ZONE, CODE 4202, SURFACE TRAVERSE BETWEEN STATIONS
> TYLER—1 & TYLER—2. THE COMPUTED LAND AREA IS BASED ON SURFACE DISTANCES. NAD 1983 (92). THE SCALE FACTOR APPLI EQUALS 0.9998954238 & IS BASED ON NOTE

(149.2 SQUARE FE LONGHORN ARMY AMMIBITAL HARRISON COUNTS **SUMP 104**

1103025D.DWG MAR. 11, 2011

INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

DIES:

INDICATES UNMARKED CORNER OF SUMP

SCALE 1"=6"

9

GRAPHIC SCALE - FEET

2012-000000717

DO NOT REMOVE THIS PAGE - IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

FILE	ED AND RECORDED	- OPR	CLERKS NOTES
On:	01/19/2012 10:41 A	М	
Document N	umber: _2012-000000	717	
Receipt No:	1200645	-	
Amount:	\$ <u>32.00</u>	-	
Ву:	Ann Turner	, Deputy	
	atsy Cox, County Cl arrison County, Te		



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:



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.

П

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 multifamily 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.

Ш

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 Assistant Chief of Staff for Installation Management

ATTN: DAIM-ODB (T. Lederle)

600 Army Pentagon

Washington D.C. 20310-0600

Rose M. Zeiler

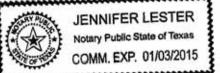
Longhorn AAP Site Manager

EXECUTED this the 30 th day of

BEFORE ME, on this the th day 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 2011.

2011.



he State of 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.



STATION TYLER-2 STATE OF TEXAS NORTH CENTRAL ZONE N=6957832,181 FEET E=3315168.140 FEET

SUMP 105 (201.7 SQ.FT.)

P.O.B.

N 36'37'46"E 2.24'-

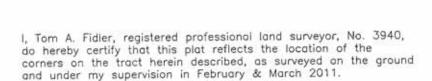
NOTE

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
В	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
Н	6957223.711	3315310.163

SCALE 1"=6"



Witness my hand and seal March 11, 2011.

GRAPHIC SCALE - FEET



X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND)

O INDICATES UNMARKED CORNER OF SUMP

FIELD NOTES DESCRIPTION IS ON SEPARATE SHEET

SUMP 105 (201.7 SQUARE FEET) LONGHORN ARMY AMMUNITION PLANT HARRISON COUNTY, TEXAS

JOB #1101007 0407088.CRD

E.PTS E.LEG



2012-000000718

DO NOT REMOVE THIS PAGE - IT IS A PART OF THIS INSTRUMENT

MISCELLANEOUS

6 Pages

F	ILED AND RECORDED - OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document	t Number: 2012-000000718	
Receipt N	o: <u>1200645</u>	
Amount:	\$ 32.00	
Ву:	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:



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.

 Π

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 multifamily 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.

Ш

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

y Public in and for the State of Texas.

County of Harrison

JENNIFER LESTER
Notary Public State of Texas

COMM. EXP. 01/03/2015

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.



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

NOTE

D 1983 (92), THE SCALE FACTOR APPLIED EQUALS 0.9998954238 & IS BASED ON HERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE STEM, NORTH CENTRAL ZONE, CODE 4202, THE COMPUTED LAND DISTANCES (UNLESS LABELED SURFACE TRAVERSE BETWEEN STATIONS
LER-1 & TYLER-2. THE COMPUTED LAN
AREA IS BASED ON SURFACE DISTANCES. BEARINGS.

NOTES

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) O INDICATES UNMARKED CORNER OF SUMP

LANDMARK CONSULT PROFESSIONAL LAND SI

FAX E-MAIL landmark@cable! LONGVIEW, PHONE (903) 236-3377 P.O. BOX 606

P.O.B.

COORDINATE TABLE

EAST	3314187.907 3314184.213 3314192.093 3314195.787
NORTH	6959122,758 6959127,486 6959133,642 6959128,914
POINT	<800

m A. Fidler, registered professional land surveyor, No. 3940,

SCALE 1"=3'

- FEET

GRAPHIC SCALE

ers on the tract herein described, as surveyed on the ground under my supervision in February & March 2011. nereby certify that this plat reflects the location of the

ess my hand and seal March 14, 2011.

× 08'28'00"W 622.08'

ZONE E=3314279.499 FEET STATE OF TEXAS STATION TYLER-1 N=6958507.460 NORTH CENTRAL

FIELD NOTES DESCRIF (60.0 SQUARE FE **SUMP 123**

A. Fidler, Registered Professional Land Surveyor,

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102" INDICATES 1116.219") BEARING SOURCE

N=6957832.181 FEET E=3315168.140 FEET

NORTH CENTRAL ZONE

STATION TYLER-2 STATE OF TEXAS LONGHORN ARMY AMMENI HARRISON COUNTS JOB #0407088 0407088.CRE6 03/14/2011 11030251.DW/C

2012-000000719

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: 2012-000000719	
Receipt No: 1200645	
Amount: \$ 32.00	
By:, 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:



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 TCEO, 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 multifamily 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.

Ш

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 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 1, 2011.

BEFORE ME, on this the 1th day of 1, 2011.

BEFORE ME, on this the 2 th day of 1, 2011.

BEFORE ME, on this the 3 th day of 1, 2011.

BEFORE ME, on this the 2 th day of 2, 2011.

BEFORE ME, on this the 3 th day of 2, 2011.

BEFORE ME, on this the 3 th day of 2, 2011.

BEFORE ME, on this the 4 th day of 2, 2011.

BEFORE ME, on this the 2 th day of 3 th day of 2, 2011.

BEFORE ME, on this the 4 th day of 5 t

Public in and for the State of Texas,

y of Harrison

JENNIFER LESTER
Notary Public State of Texas

COMM. EXP. 01/03/2015

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:

```
4.50',
     N 36deg36'16"W
(01)
(02) N 51deg51'25"E
                     1.07',
(03) N 38deg08'35"W
                     2.46',
(04) S 63deg07'08"W
                     0.85',
                            being this sump's Westmost corner,
                     7.98',
(05) N 38deg08'35"W
                             being this sump's Northmost corner,
(06) N 51deg51'25"E 3.70',
(07) S 39deg59'44"E 8.17',
(08) S 52deg07'09"W 1.00',
                     2.34',
(09) S 39deg59'44"E
                     1.14',
(10) N 50deg00'16"E
(11) S 39deg59'44"E 4.67',
                             being this sump's Eastmost corner,
                             being the aforementioned POINT OF
(12) S 52deg10'33"W
                     4.68',
                             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.



X INDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) ☐ INDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL O INDICATES UNMARKED POINT N 50'00'16"E 1,14" S 39'59'44"E 2.34' S 52'07'09"W 1.00" NOTES: (57.1 SQUARE , E ₽.₈. N 38'08'35"W 2.46" N 51'51'25"E 1.07" S 63'07'08"W 0.85' SCALE 1"=3" GRAPHIC SCALE - FEET

ers on the tract herein described, as surveyed on the ground under my supervision in February & March 2011. om A. Fidler, registered professional land surveyor, No. 3940, nereby certify that this plat reflects the location of the

ess my hand and seal March 1, 2011.

N=6958507.460 FEET E=3314279.499 FEET BEARING SOURCE

NORTH CENTRAL ZONE

×

STATION TYLER-1 STATE OF TEXAS

· St. OOL Z. BOLCE Z. N

(SURFACE TRAVERSE USING ELECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219")

SUR

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

NORTH CENTRAL ZONE N=6957832,181 FEET E=3315168,140 FEET STATION TYLER-2 STATE OF TEXAS

LANDMARK CONSULT PROFESSIONAL LAND SI

LONGVIEW, FAX E-MAIL landmark@coblel PHONE (903) 236-3377 P.O. BOX 606

NOTE

DISTANCES (UNLES 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 COMPL AREA IS BASED ON SURFACE DIS COORDINATES ARE OTHERWISE), & ALL BEARINGS,

COORDINATE TABLE

EAST 3314753 3314751 3314750 3314744 3314747 3314752 3314752 3314753 3314754 3314757 6959028.519 6959029.252 6959025.676 6959022.804 6959028.627 6959026.415 6959029.012 6959037.183 6959030.925 6959027.074 6959022.804 6959030.313 NORTH

P.O.B.

FIELD NOTES DESCRIP IS ON SEPARATE SHI W.R. SUMP 00 LONGHORN ARMY AMMONI HARRISON COUNTY JOB #0407088 0407088,CREG 2 9 MG.W47 08060 57.1 SQUARE

MAR. 1, 2011

2012-000000720

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MISCELLANEOUS

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On:	01/19/2012 10:41 AM	м		
Document	Number: 2012-0000007	20		
Receipt No	1200645			
Amount:	\$ <u>32.00</u>			
Ву:	Ann Turner	, Deputy		
	Patsy Cox, County Cle Harrison County, Tex			



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:



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:

1

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 multifamily 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.

Ш

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 Assistant Chief of Staff for Installation Management

ATTN: DAIM-ODB (T. Lederle)

600 Army Pentagon

Washington D.C. 20310-0600

Longhorn AAP Site Manager

EXECUTED this the 3Qh day of

, personally appeared Rose BEFORE ME, on this the 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 day of JUNE,

2011.

JENNIFER LESTER Notary Public State of Texas COMM. EXP. 01/03/2015

ary 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:

```
being this sump's Westmost corner,
(01) N 50deg15'02"W
                     4.01',
(02) N 38deg19'51"E
                     7.83',
(03) S 58deg29'13"E 0.84',
                     3.09',
(04) N 41deg11'11"E
                     1.32',
(05) N 51deg30'19"W
                            being this sump's Northmost corner,
(06) N 40deg19'40"E 4.55',
(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',
                            being the aforementioned POINT OF
(12) S 38deg16'58"W
                     7.89',
                             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.



NOTE

LANDMARK CONSULT PROFESSIONAL LAND SL LONGVIEW, 1

E-MAIL landmark@cable!

PHONE (903) 236-3377

P.O. BOX 606

COORDINATE

NORTH

6959229.343 6959232.815 6959230.097 6959226.443

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1983 (92). THE SCALE FACTOR APPLIED OUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS ER-1 & TYLER-2. THE COMPUTED LAND REA IS BASED ON SURFACE DISTANCES. ERWISE), & COORDINATES ARE BASED ON THE TEXAS STATE PLANE COORDINATE DISTANCES (UNLESS LABELED TEM, NORTH CENTRAL ZONE, CODE 4202, BEARINGS,

TES:

NDICATES TYPE "G" CORPS OF ENGINEERS MONUMENT (FOUND) NDICATES CORNER OF EXTERNAL FACE OF CONCRETE WALL NDICATES UNMARKED POINT

ars on the tract herein described, as surveyed on the ground under my supervision in February & March 2011. m A. Fidier, registered professional land surveyor, No. 3940, ereby certify that this plat reflects the location of the

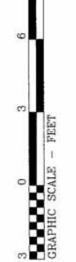
ess my hand and seal March 1, 2011.



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

N 53 12 50 W 1.23 S 39'42'05"W 3.32" S 51'04'42'E 0.79' LAZY ZYMOS 1.19) 200 AMUS P.O.B. N 51'30'19"W 1.32" N 41'11'11"E 3.09" S 58'29'13"E 0.84"

SCALE 1"=3'



NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET

STATION TYLER-1 STATE OF TEXAS

.86'.561 3.61.50.42 N

FIELD NOTES DESCRIP
IS ON SEPARATE SHE

NORTH CENTRAL ZONE N=6957832,181 FEET E=3315168,140 FEET STATION TYLER-2 STATE OF TEXAS N=6957832.181

(SURFACE TRAVERSE USING

S 52'46'07.6"E 1116.102'

BEARING SOURCE

ÉLECTRONIC TOTAL STATION

INDICATES 1116.219")

(61.1 SQUARE FE LONGHORN ARMY AMMUNITY HARRISON COUNTY

SUMP 002

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Amount:	\$ 32.00		
By:	Ann Turner	, Deputy	



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

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 multifamily 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.

Ш

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 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

th day of personally appeared Rose BEFORE ME, on this the 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 day of JUNE ,

2011.

JENNIFER LESTER Notary Public State of Texas COMM. EXP. 01/03/2015

and for the State of Texas,

County of Hartison

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:

```
being this sump's Westmost corner,
                    4.09',
(01) N 37deg49'35"W
(02) N 48deg49'52"E 10.08',
                    0.96',
(03) S 40deg22'17"E
(04) N 51deg37'59"E 1.64',
                     1.27',
(05) N 32deg53'50"W
(06) N 49deg58'25"E 4.65',
                            being this sump's Northmost corner,
                            being this sump's Eastmost corner,
(07) S 41deg50'19"E 4.65',
(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',
                            being the aforementioned POINT OF
(12) S 49deg33'58"W 10.21',
                             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.



NOTE

LANDMARK CONSUL! PROFESSIONAL LAND SI FAX

PHONE (903) 236-3377

P.O. BOX 606

LONGVIEW,

E-MAIL landmark@cable

X INDICATES TYPE "G" CORPS OF ENGINEERS MONUM! ☐ INDICATES CORNER OF EXTERNAL FACE OF CONCRE

NOTES:

O INDICATES UNMARKED POINT

COORDINATE

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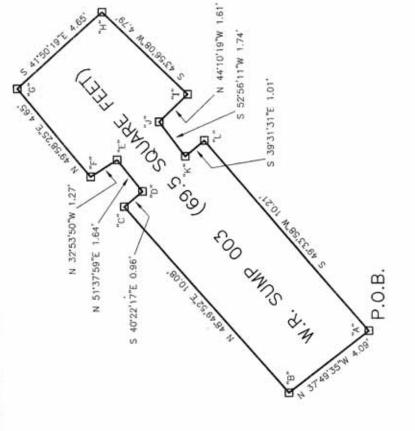
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NORTH

6959159,516 6959158,468 6959157,691

1983 (92). THE SCALE FACTOR APPLIED COUALS 0.9998954238 & IS BASED ON SURFACE TRAVERSE BETWEEN STATIONS LER-1 & TYLER-2. THE COMPUTED LAND REA IS BASED ON SURFACE DISTANCES. DISTANCES (UNLESS LABELED IERWISE), & COORDINATES ARE BASED ON STEM, NORTH CENTRAL ZONE, CODE 4202 THE TEXAS STATE PLANE COORDINATE BEARINGS,



ars on the tract herein described, as surveyed on the ground under my supervision in February & March 2011. m A. Fidier, registered professional land surveyor, No. 3940, ereby certify that this plat reflects the location of the

ess my hand and seal March 1, 2011.

SCALE 1"=3'

FEET GRAPHIC SCALE

> NORTH CENTRAL ZONE N=6958507.460 FEET E=3314279.499 FEET

STATION TYLER-1 STATE OF TEXAS

N 00.00,48,M 642.61

FIELD NOTES DESCRIP
IS ON SEPARATE SHE



Fidler, Registered Professional Land Surveyor, No. 3940

(SURFACE TRAVERSE USING ÉLECTRONIC TOTAL STATION S 52'46'07.6"E 1116.102' INDICATES 1116.219') BEARING SOURCE

NORTH CENTRAL ZONE N=6957832.181 FEET E=3315168.140 FEET

STATION TYLER-2 STATE OF TEXAS

W.R. SUMP 003 (69.5 SQUARE FE LONGHORN ARMY AMMAMIT HARRISON COUNT JOB ; MAR.

#0407088	0407088.CRD
1, 2011	D908074V.DWG

LHAAP-37, 37-1 LUCs FROM FINAL REMEDIAL DESIGN

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

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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

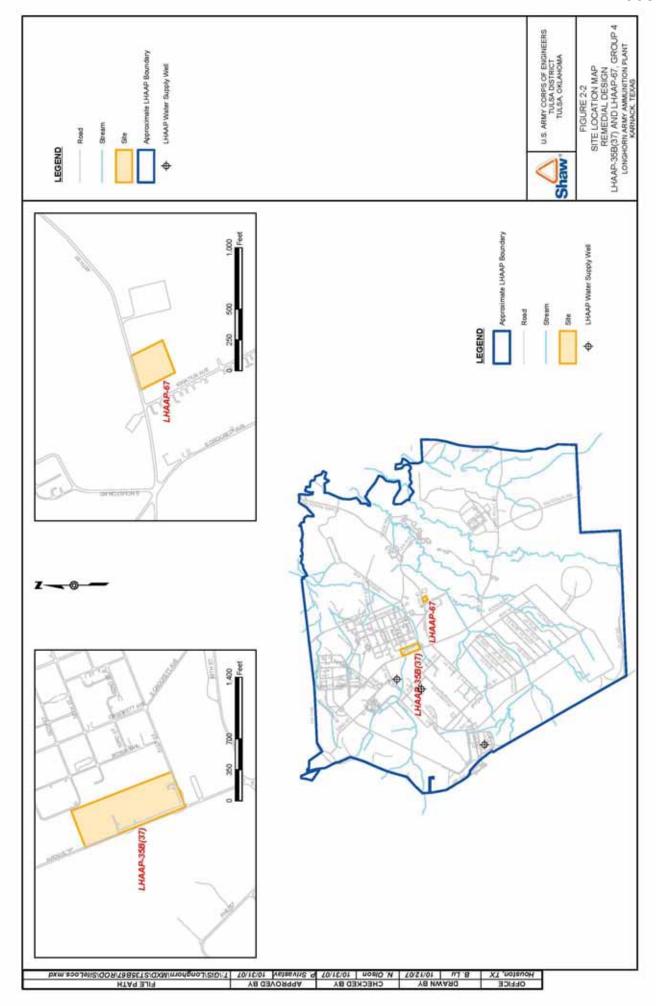
The Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA and TCEQ concurrence before commencing actions 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



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)

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	8
	Tumber: _2015-000002401	
Receipt No:	1502837	
Amount:	\$ 50.00	
Ву:	Denise Kio , Deputy	
	atsy Cox, County Clerk Iarrison 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:



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

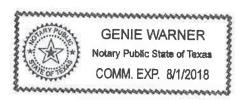
Longhorn AAP Site Manager

EXECUTED this the 19 th day of February, 2015.

BEFORE ME, on this the 19 th day of February 201 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 10th day of February, 2015.

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



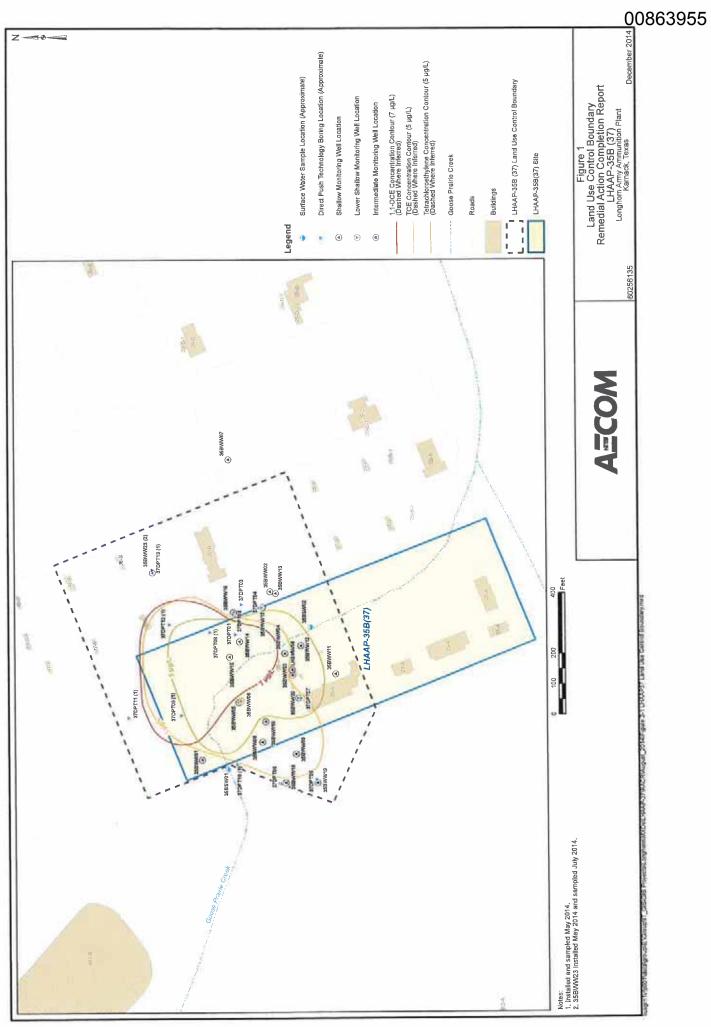


EXHIBIT A SURVEY PLAT

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,

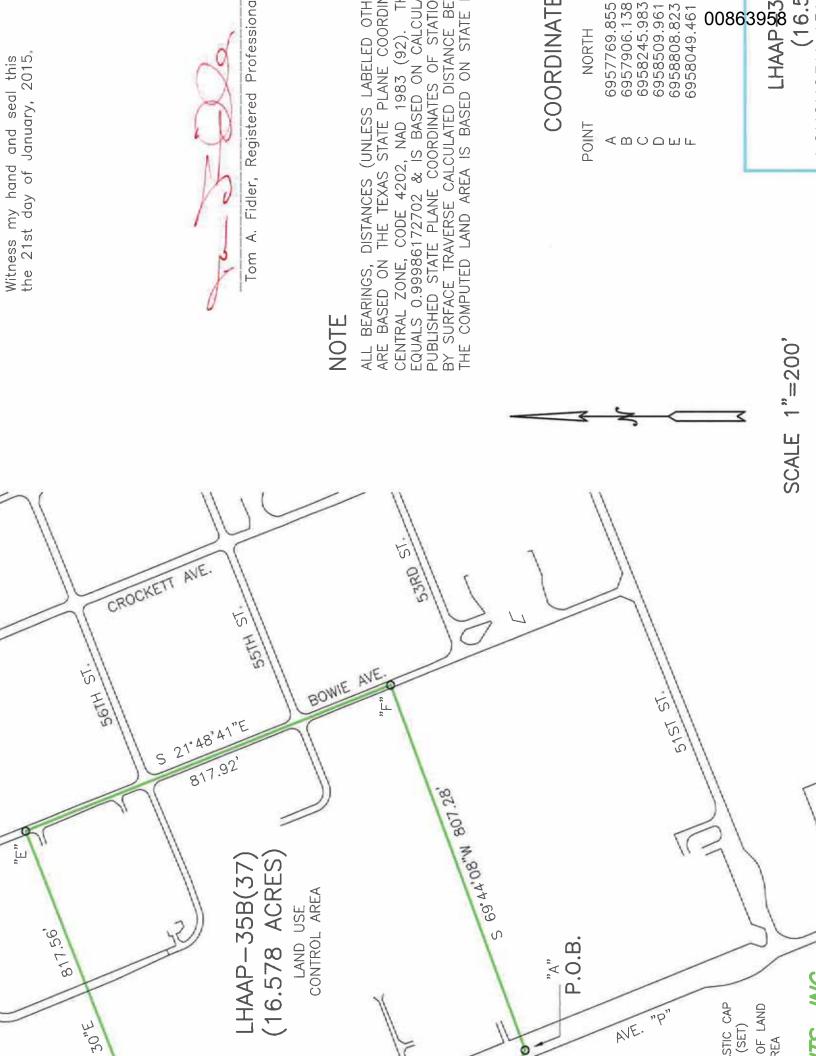
THENCE N 68deg33'30"E 817.56' along the N.B.L. of this tract to a concrete nail set (near the centerline of the asphalt pavement of "Bowie Avenue") for this tract's Northmost corner,

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.





LHAAP-37, 37-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

Sample Annual Land Use Control Compliance Certification Documentation

In accordance with the R	emedial Design dated 8/1/11 for LHAAP-35B (3/), a certification of
site was conducted by	[indicate transferee] on
A summary of land use co	ontrol mechanisms is as follows:
effect until the levels of	on – A restriction against use of groundwater will remain in of the COCs in groundwater and soil allow unrestricted use and JUUE). [Indicate whether groundwater restrictions are still B (37)]
A summary of compliance	e with land use and restriction covenants is as follows:
No use of groundwate existing wells at LHAA	er, installation of new groundwater wells, or tampering with AP-35B (37).
· ·	runent that the certification was performed as indicated above, and that rue and correct to the best of my knowledge, information, and belief.
Date:	
Name/Title:	
Signature:	
Annual compliance certifi	cation forms shall be completed no later than March 1 of each year for

the previous calendar year.

LHAAP-46, 46-1 LUCs FROM FINAL REMEDIAL DESIGN

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



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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:

- <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.
- 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.
- <u>Develop the LUC O&M Plan.</u> 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)

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:	
Amount: \$ 50.00	
By:, 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:



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:

Ι

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.

 Π

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 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 <u>10</u> th day of <u>November</u>, 2014.

BEFORE ME, on this the 10 th day of 10 vew vev, 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.

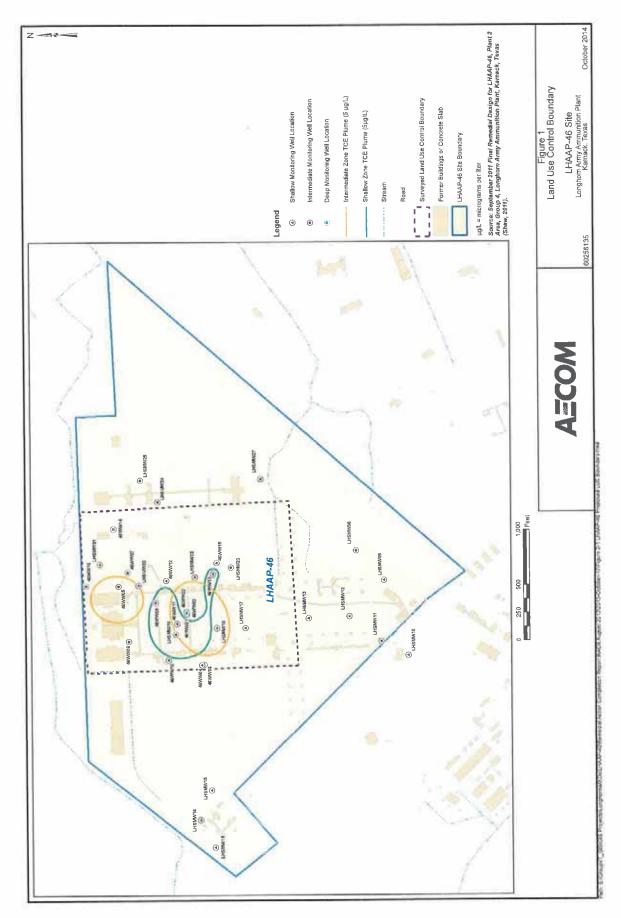
GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the 20 day of November, 2014.

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**



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 $36\deg 34'22''$ 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:

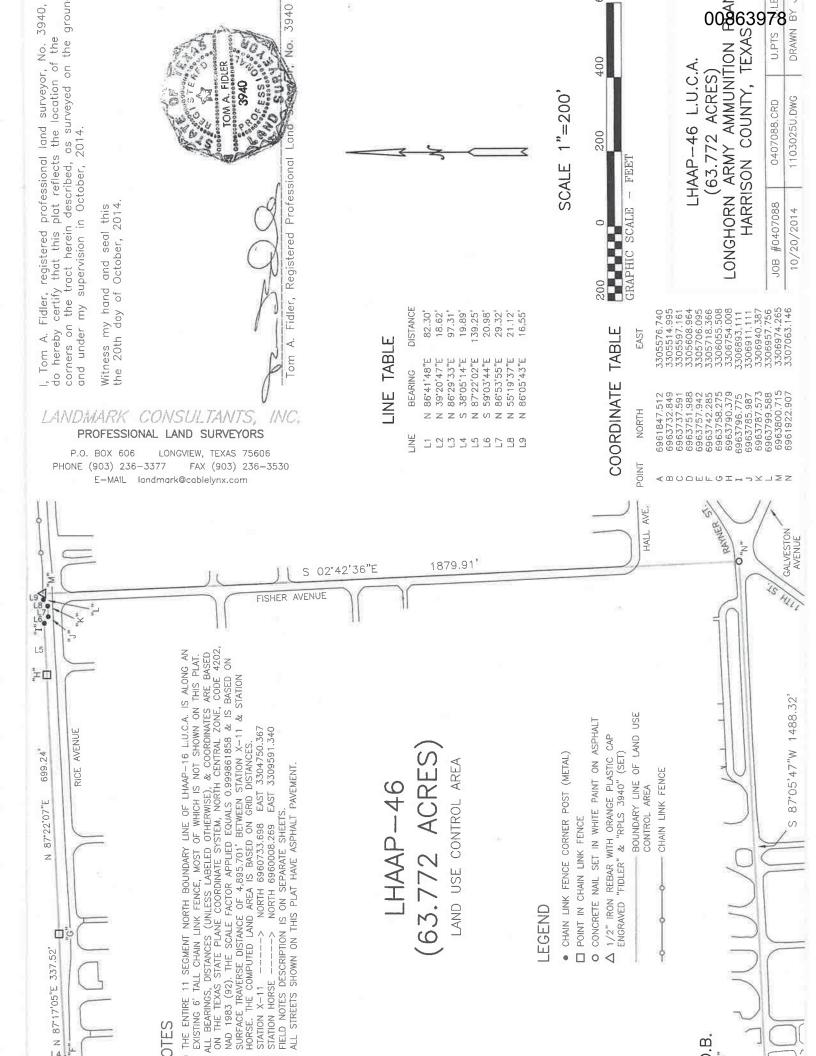
- (01) N 86deg41'48"E 82.30' to a fence corner post,
- (02) N 39deg20'47"E 18.62' to a bent fence corner post,
- (03) N 86deg29'33"E 97.31' to a fence corner post,
- (04) S 38deg05'14"E 19.89' to a fence corner post,
- (05) N 87deg17'05"E 337.52' to a point in said fence,
- (06) N 87deg22'07"E 699.24' 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.,

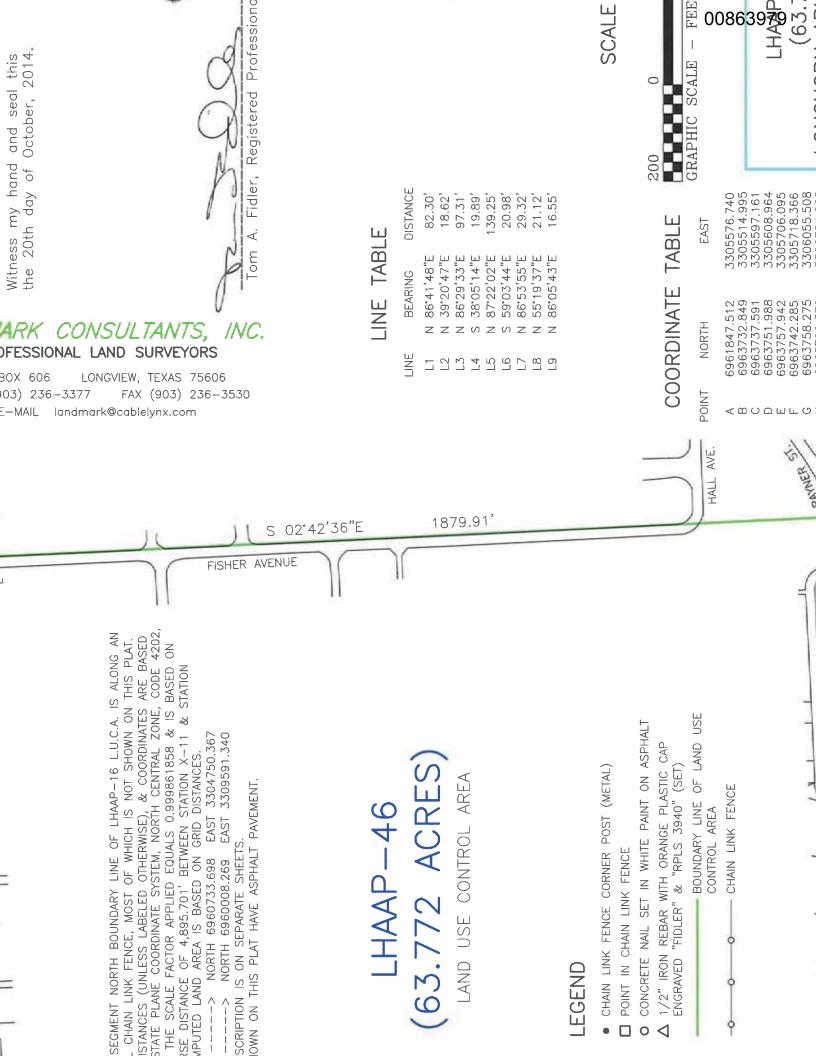
THENCE S 02deg42'36"E 1879.91' along the E.B.L. of this tract to a concrete nail set (in white paint on asphalt) for this tract's S.E.C., from which monument "HORSE" referenced above bears S 52deg51'46"E 3171.37',

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.







LHAAP-46, 46-3

LAND USE CONTROL COMPLIANCE INSPECTION FORM

Sample Annual Land Use Control Compliance Certification Documentation

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.				
ne previous carendar year.				

LHAAP-49

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-49 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

2012-000000704

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

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FILED AND RECORDED - OPR		CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document	t Number: 2012-000000704	
Receipt N	o: <u>1200645</u>	
Amount:	\$ 36.00	
Ву:	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:



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 multifamily 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.

Ш

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

Longhorn AAP Site Manager

EXECUTED this the 2/th day of

BEFORE ME, on this the 2/th day of ______, 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 Ju 2011.

ANGELA HUMPHRI

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 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

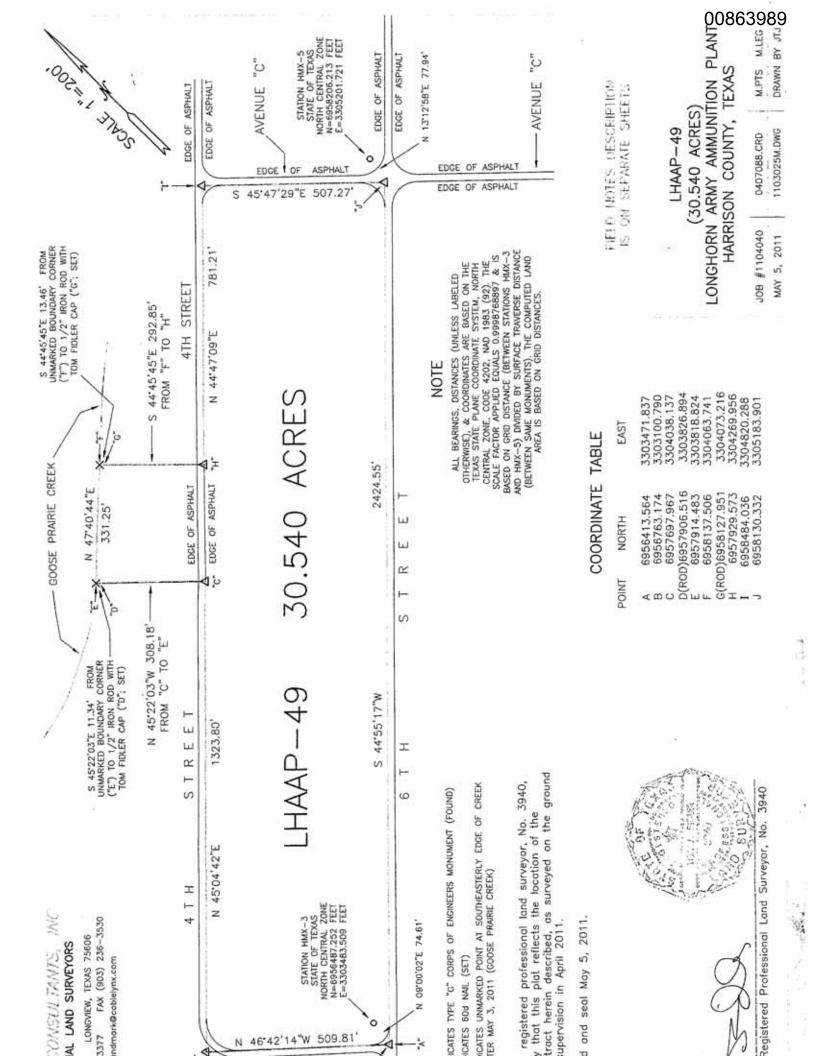
THENCE S 45deg47'29"E crossing some of said pavement, then generally along the Southwest edge of the asphalt pavement of Avenue "C", then entering said pavement at the intersection of Avenue "C" and 6th Street, for a total distance of 507.27' to a 60d nail set for the Eastmost corner of this tract, from 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.

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



LHAAP-50, 50-1 LUCs FROM FINAL REMEDIAL DESIGN

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



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Contract No. W912QR-04-D-0027, Task Order No. DS02. Final • Rev 0 • September 2011

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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)

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:	
Amount: \$ <u>50.00</u>	
By:, 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:



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.

 Π

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).

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

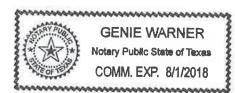
Rose M. Zeiler

Longhorn AAP Site Manager

EXECUTED this the 18 th day of 2015.

BEFORE ME, on this the 18 th day of _______, 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 12th day of June, 2015.



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

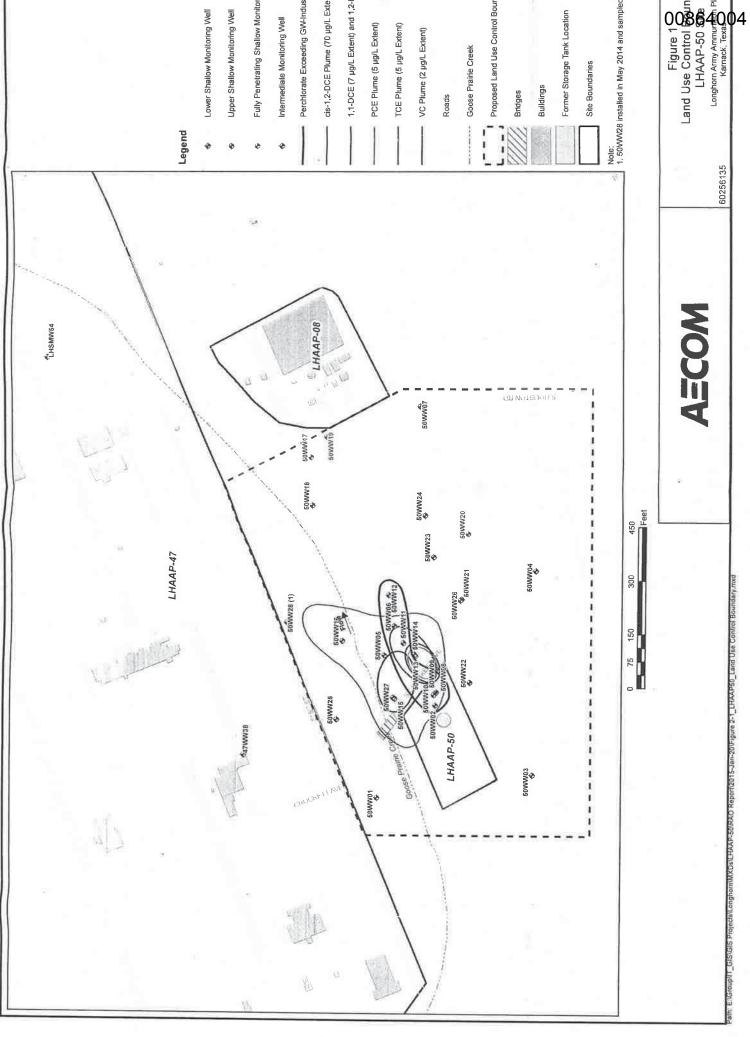


EXHIBIT A

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 "RACE" (N=6958817.935 feet E=3311081.788 feet), and E=3310081.508 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

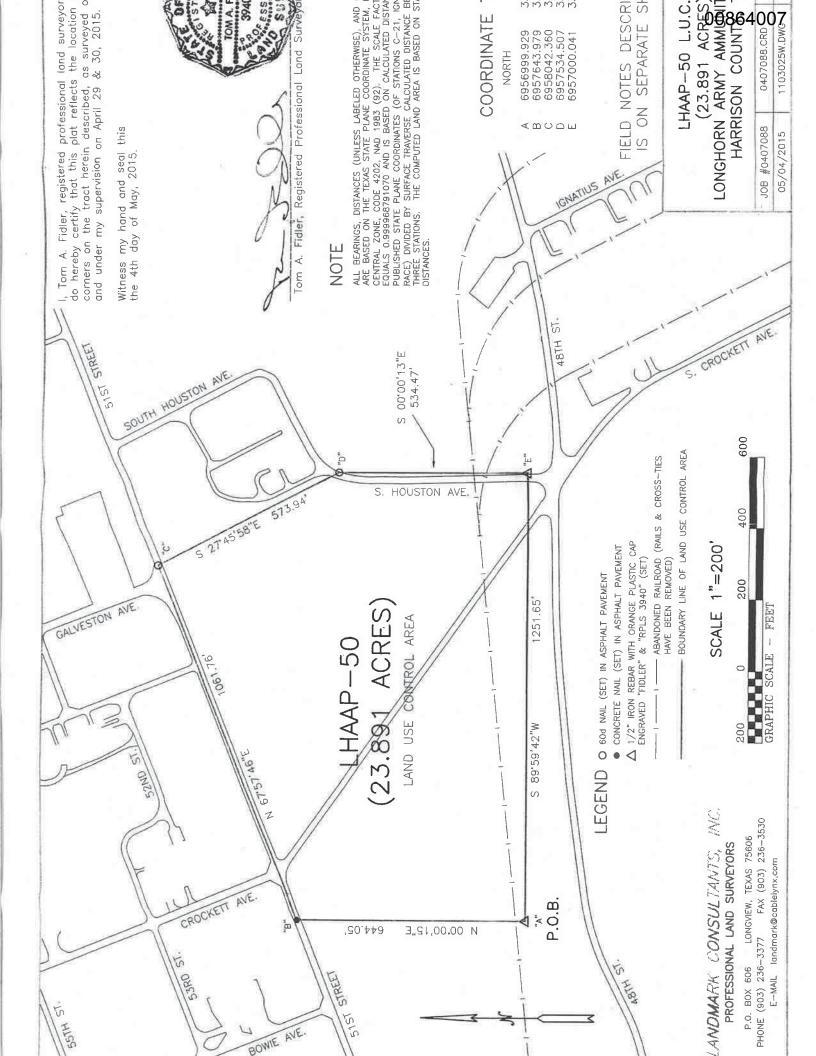
THENCE S $00\deg 00'13"E$ 534.47' along the E.B.L. of this tract to an I.R.O.P.C. set for this tract's S.E.C., from which "IGNATIUS-1" referenced above bears N $81\deg 47'47"E$ 632.57',

THENCE S 89 deg 59'42''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.

R.P.L.S. Number 3940

Tom A. Fidler,



LHAAP-50, 50-3 LAND USE CONTROL COMPLIANCE INSPECTION FORM

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.
t, 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)

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: <u>2010-000005557</u>	
Receipt No: 1006195	•
Amount: \$ 36.00	
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.

rang cog

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:

Ι

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 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.

Ш

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

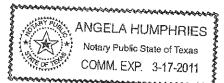
Longhorn AAP Site Manager

EXECUTED this the 10th day of March 2010.

BEFORE ME, on this the <u>l0</u> th day of <u>Marcll</u>, 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 Worch, 2010.

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



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",

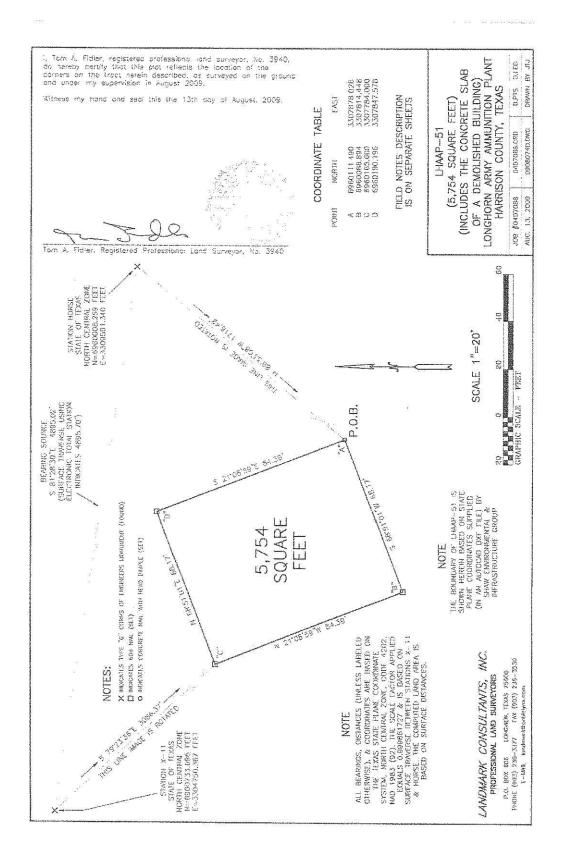
THENCE N 68deg51'01"E 68.17' along the N.B.L. of this tract to a 60d nail set for this tract's N.E.C.,

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.



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



LHAAP-55

NOTICE OF NONRESIDENTIAL LAND USE AT SEPTIC TANK LOCATIONS FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

2010-000005562

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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:, 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 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:

Ι

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 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 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

Longhorn AAP Site Manager

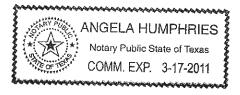
EXECUTED this the /O th day of Warch, 2010.

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 loay of Morch, 2010.

Notary Public in and for the State of Texas,

County of Harrison



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,

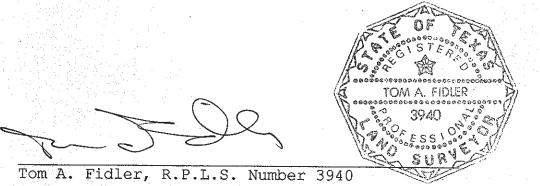
THENCE S 89deg25'37"W 23.40' along a S.B.L. of this tract to a 60d nail set for this tract's Southeast reentrant corner,

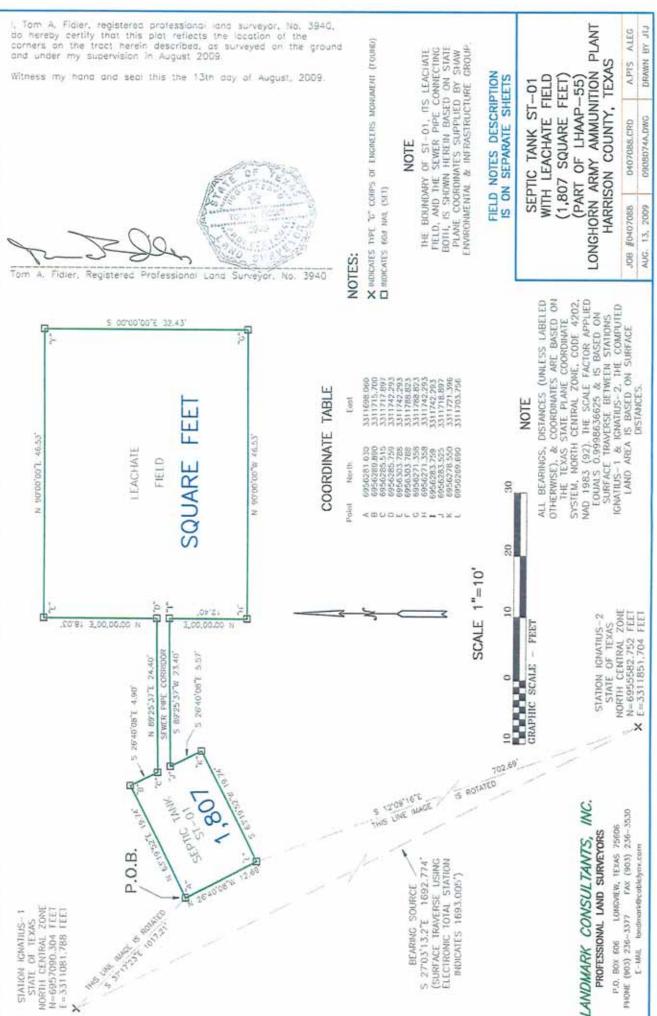
THENCE S 26deg40'08"E 5.57' along an E.B.L. of this tract to a 60d nail set for this tract's Westmost S.E.C.,

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.





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,

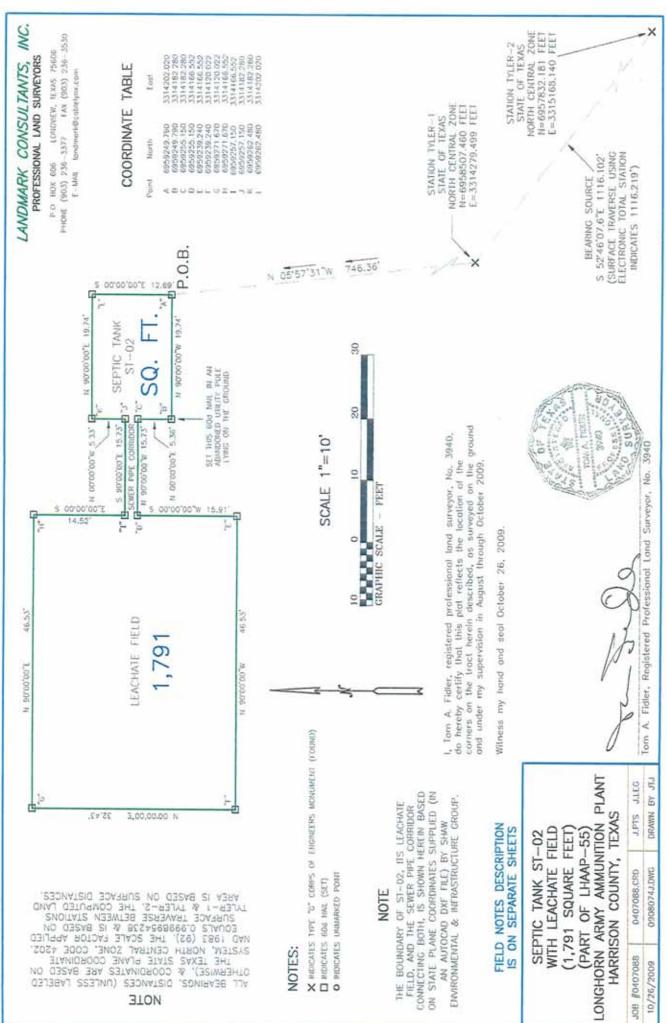
THENCE N 00 deg 00'00"W 5.33' along a W.B.L. of this tract to a 60d nail set for this tract's Eastmost N.W.C.,

THENCE N 90 deg 00'00"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



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,

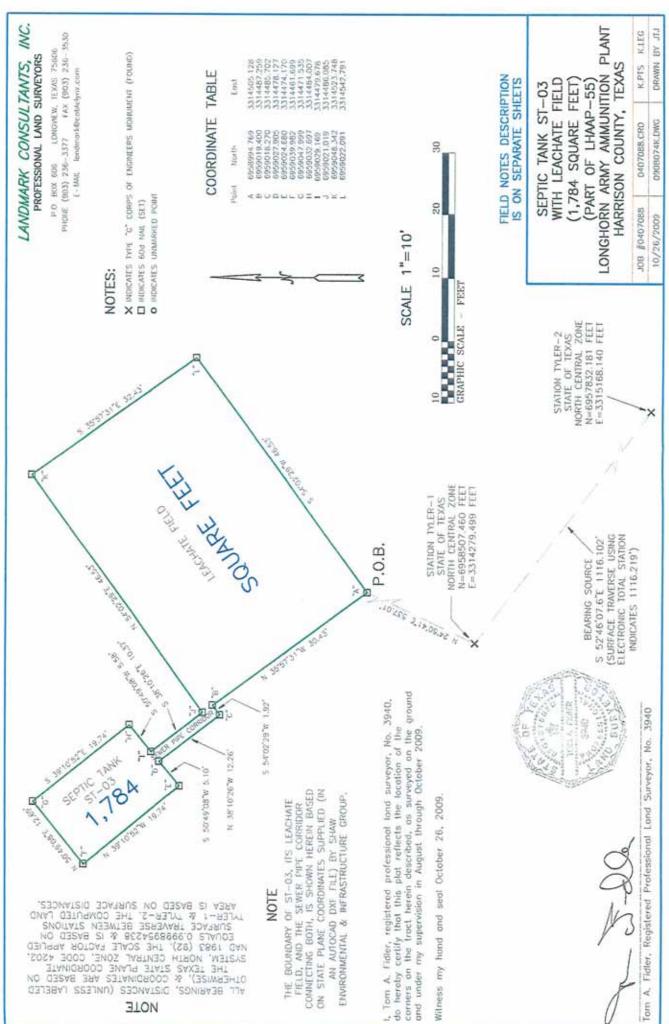
THENCE S 35deg57'31"E 32.43' along a N.E. B.L. of this tract to a 60d nail set for this tract's Eastmost East corner,

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.

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

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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 $00\deg 08'52"$ 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,

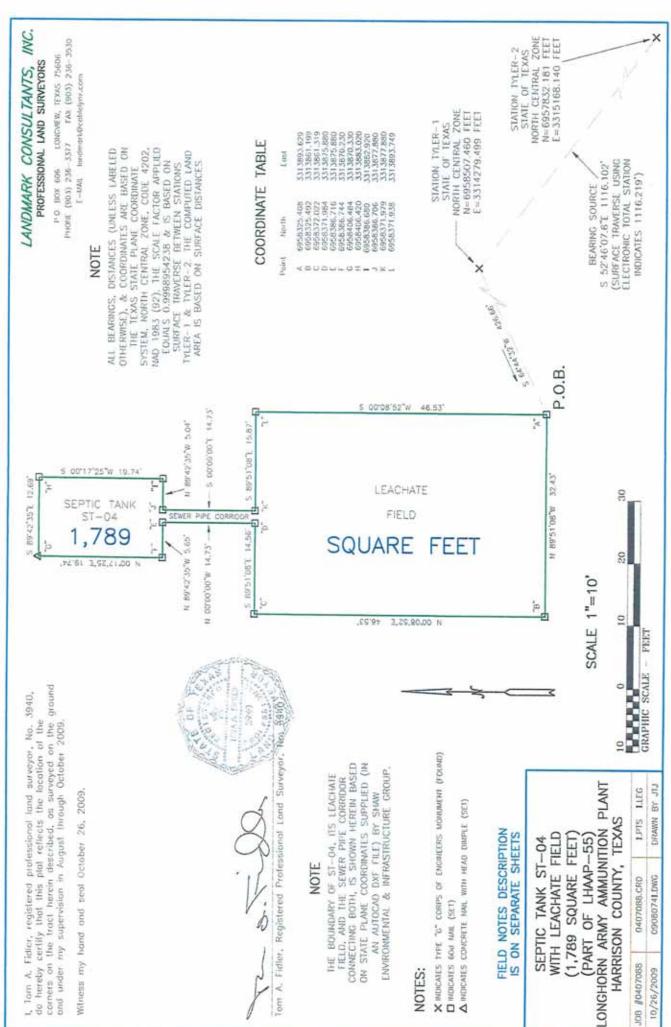
THENCE S 89deg51'08"E 15.87' along a N.B.L. of this tract to a 60d nail set for this tract's Southmost N.E.C.,

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.

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



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 52 deg 46'07.6"W 36.82' to a point, said point being S 52 deg 46'07.6"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,

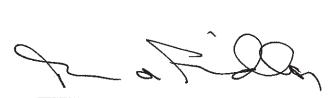
THENCE N 32deg26'48"E 32.43' along a N.W. B.L. of this tract to a 60d nail set for deflection corner,

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,

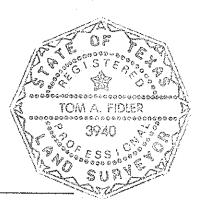
THENCE N 33deg39'28"E 12.69' along a N.W. B.L. of this tract to a 60d nail set for this tract's North corner,

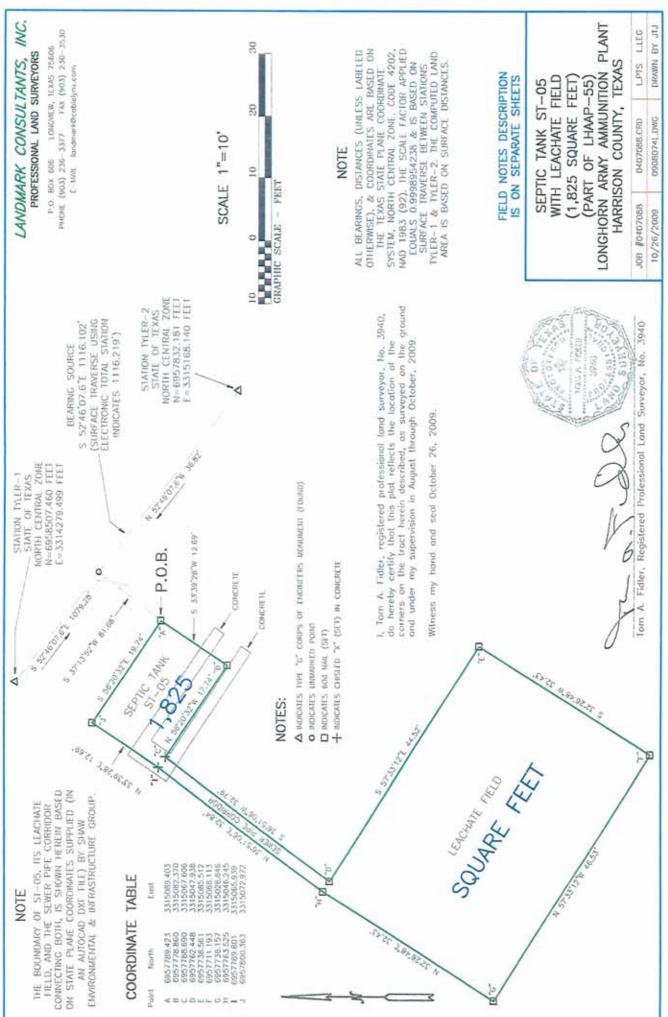
THENCE S 56deg20'32"E 19.74' along a N.E. B.L. of this tract to this POINT OF BEGINNING. This tract contains 1,825 square feet, more or less.

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.



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





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 22 deg 51'48"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,

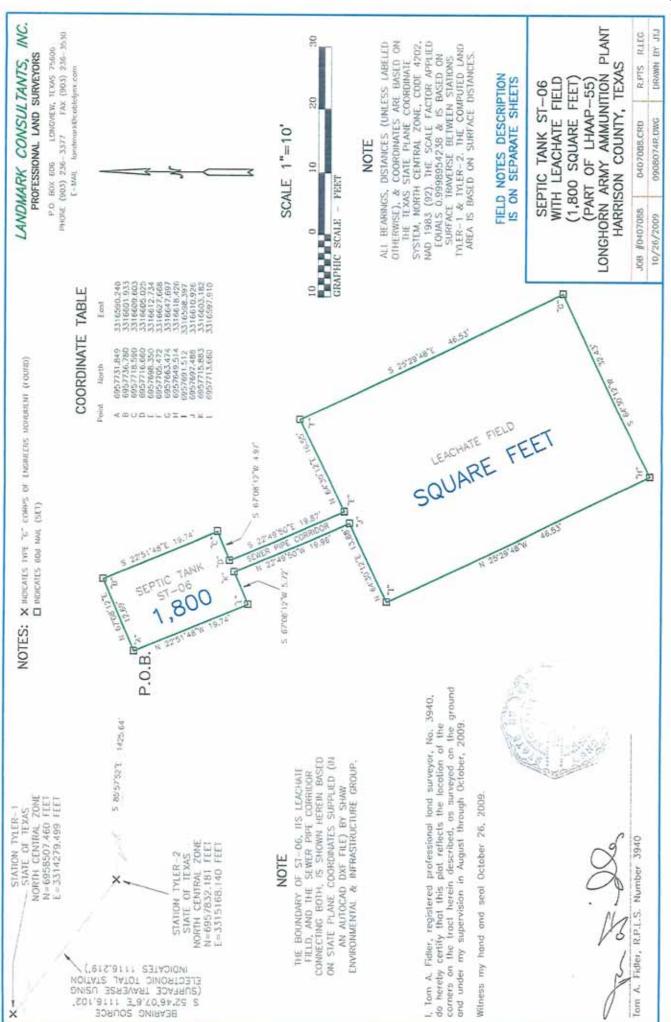
THENCE S 67deg08'12"W 5.72' along a S.B.L. of this tract to a 60d nail set for this tract's Northmost S.W.C.,

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.



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



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 20 deg 14'47''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,

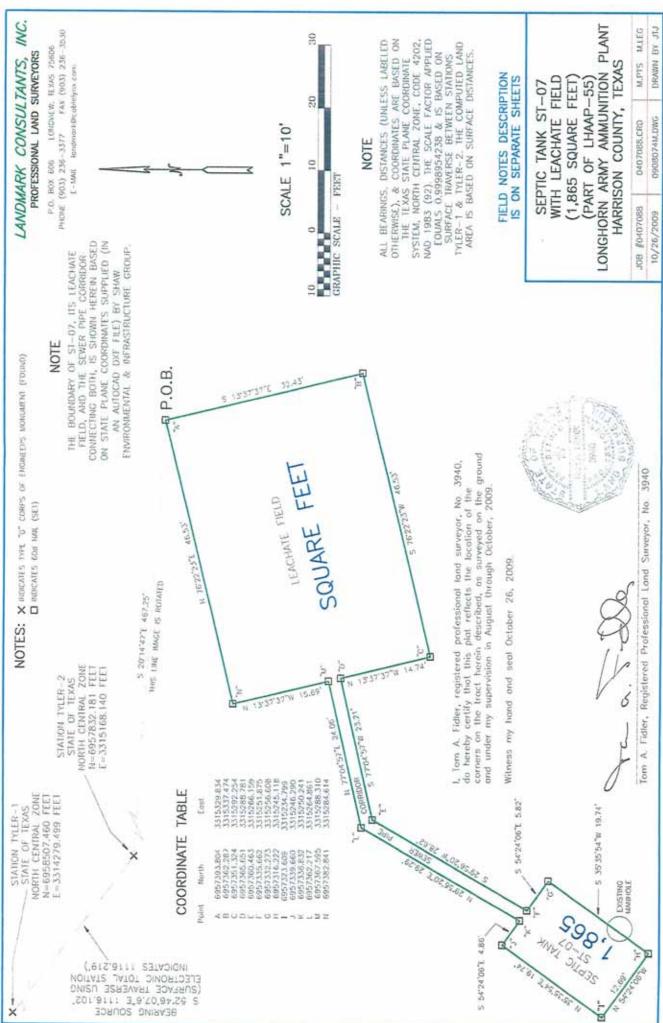
THENCE N 13deg37'37"W 15.69' along a W.B.L. of this tract to a 60d nail set for this tract's Northmost N.W.C.,

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.



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



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,

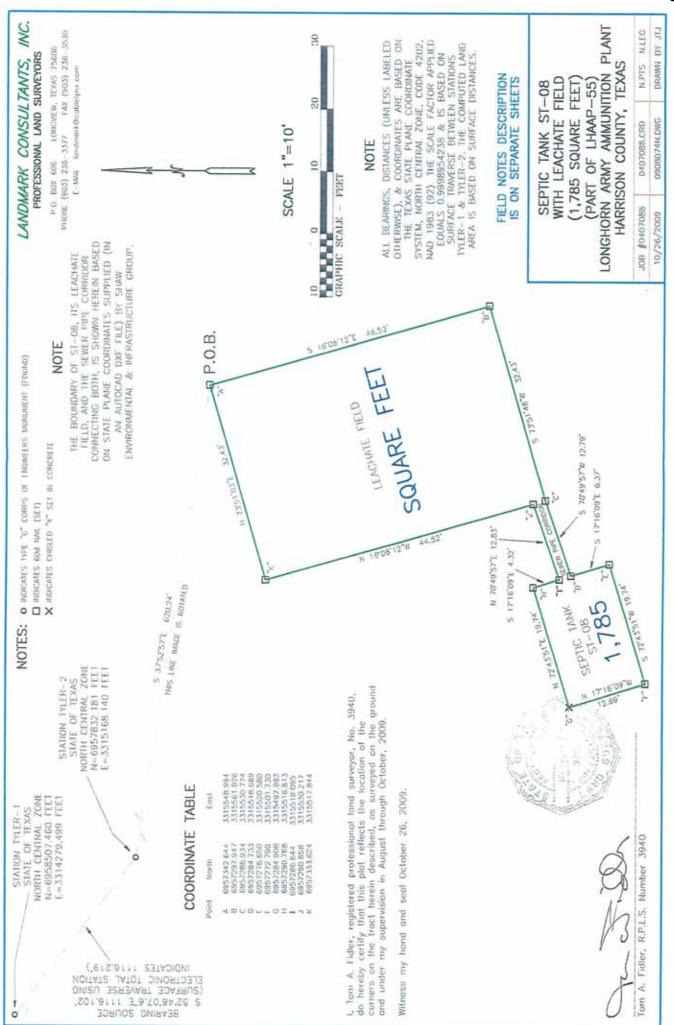
THENCE N 16deg08'12"W 44.52' along a W.B.L. of this tract to a 60d nail set for this tract's Northmost N.W.C.,

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.

tra of illes

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



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.,

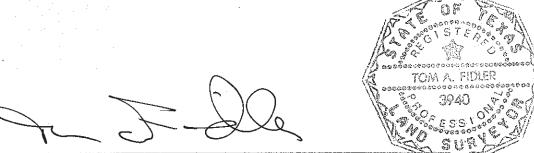
THENCE N 67deg40'46"E 15.42' along a N.B.L. of this tract to a 60d nail set for this tract's N.W. reentrant corner,

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,

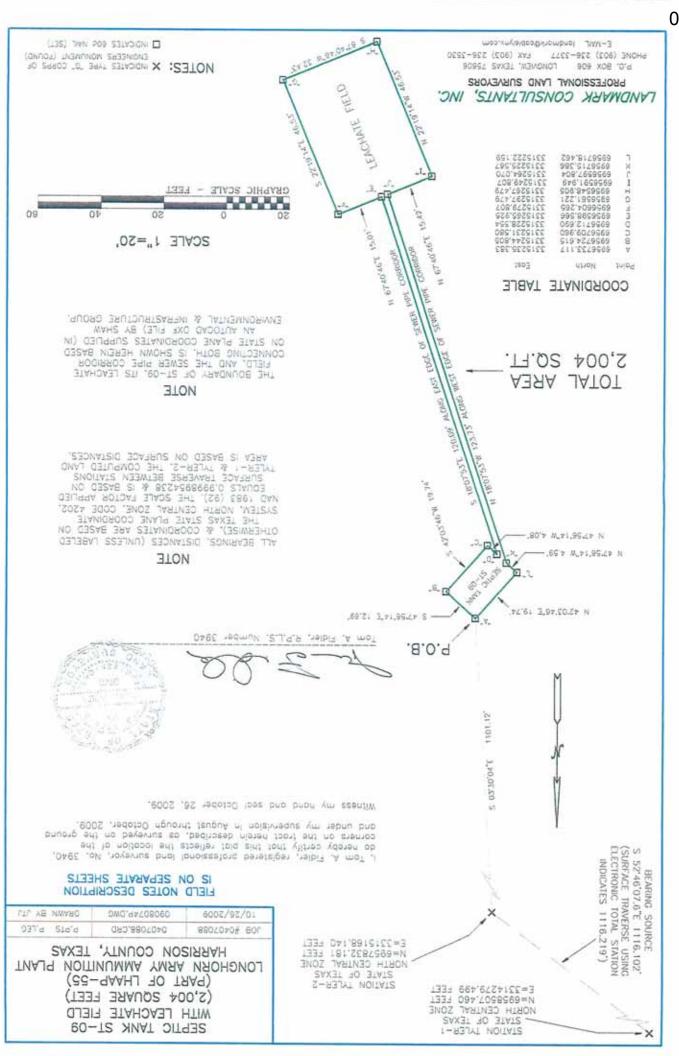
THENCE N 47deg56'14"W 4.59' along a S.W. B.L. of this tract to a 60d nail set for this tract's West corner,

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.



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



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 $81\deg 33'36"$ 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.,

THENCE S $81\deg04'54''$ 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.,

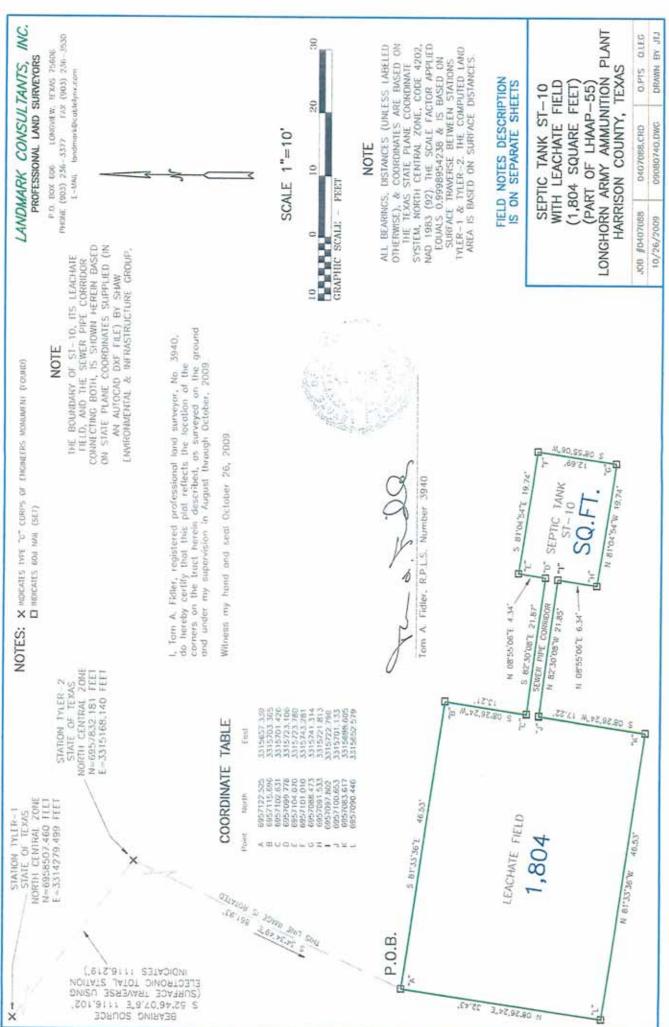
THENCE N 81deg33'36"W 46.53' along a S.B.L. of this tract to a 60d nail set for this tract's Westmost S.W.C.,

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.



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



LHAAP-35A(58), 58-1 LUCs FROM FINAL REMEDIAL DESIGN

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

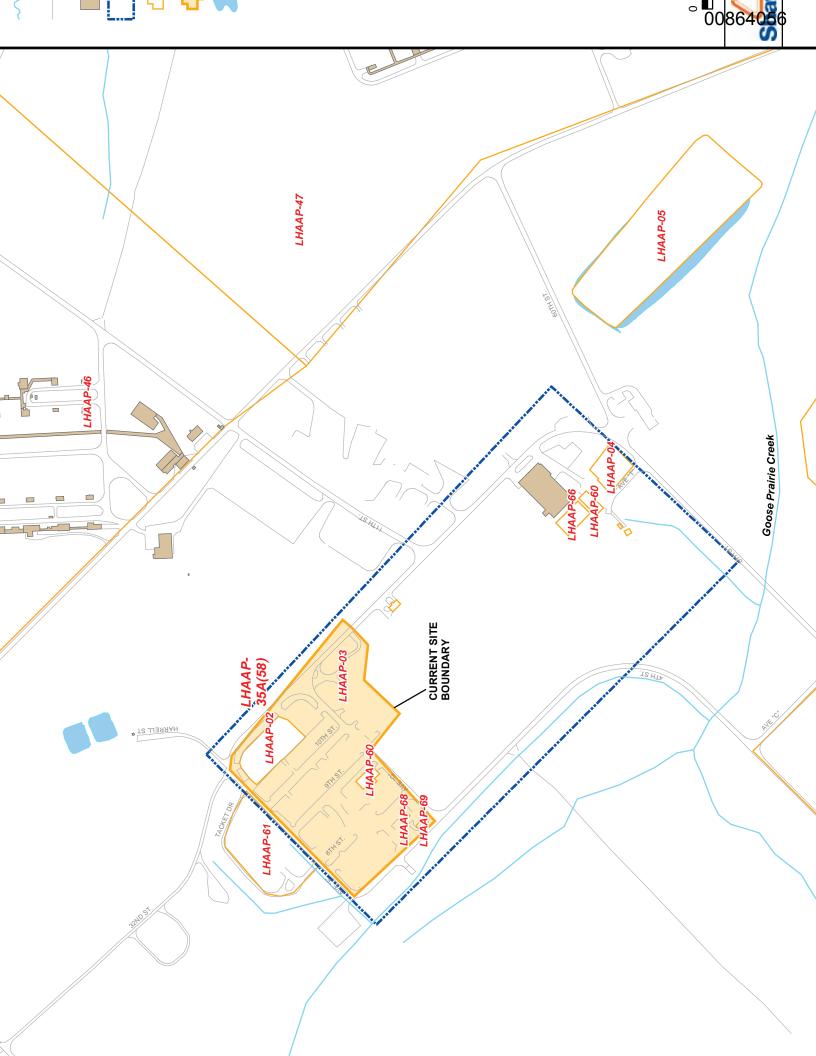
Contract No. W912QR-04-D-0027, Task Order No. DS02 Project No. 117591 Rev 0

September 2011



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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.
- 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 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.
- <u>Develop the LUC O&M Plan.</u> 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 reachieve 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.

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)

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:	
Amount: \$ 50.00	
By:, 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:



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:

Ι

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).

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

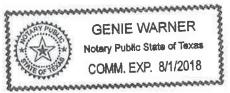
Longhorn AAP Site Manager

EXECUTED	this the	th day of	, 2015.
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BEFORE ME, on this the Q th day of February, 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 19 day of February, 2015.

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



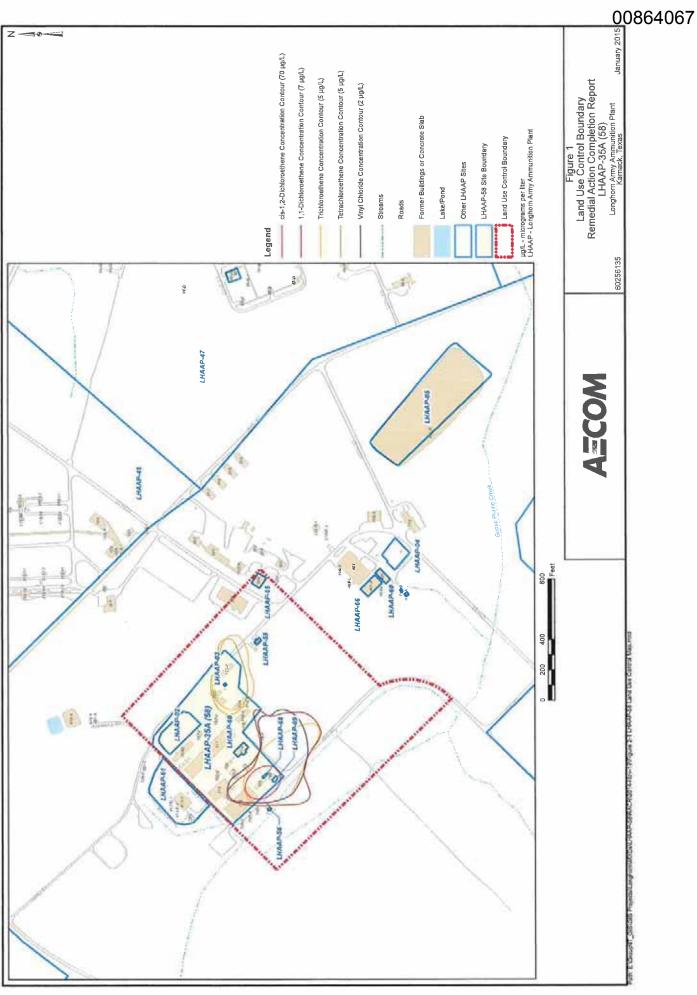


EXHIBIT A SURVEY PLAT The herein described tract of land is located in Harrison County, Texas, near the town of Karnack, "LHAAP-35A(58)" Land Use Control Area being 46.524 acres of land out of the Longhorn Ordance Works Reservation (also known as the Longhorn Army Ammunition Plant, Karnack, Texas), "LHAAP-35A(58)" 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,

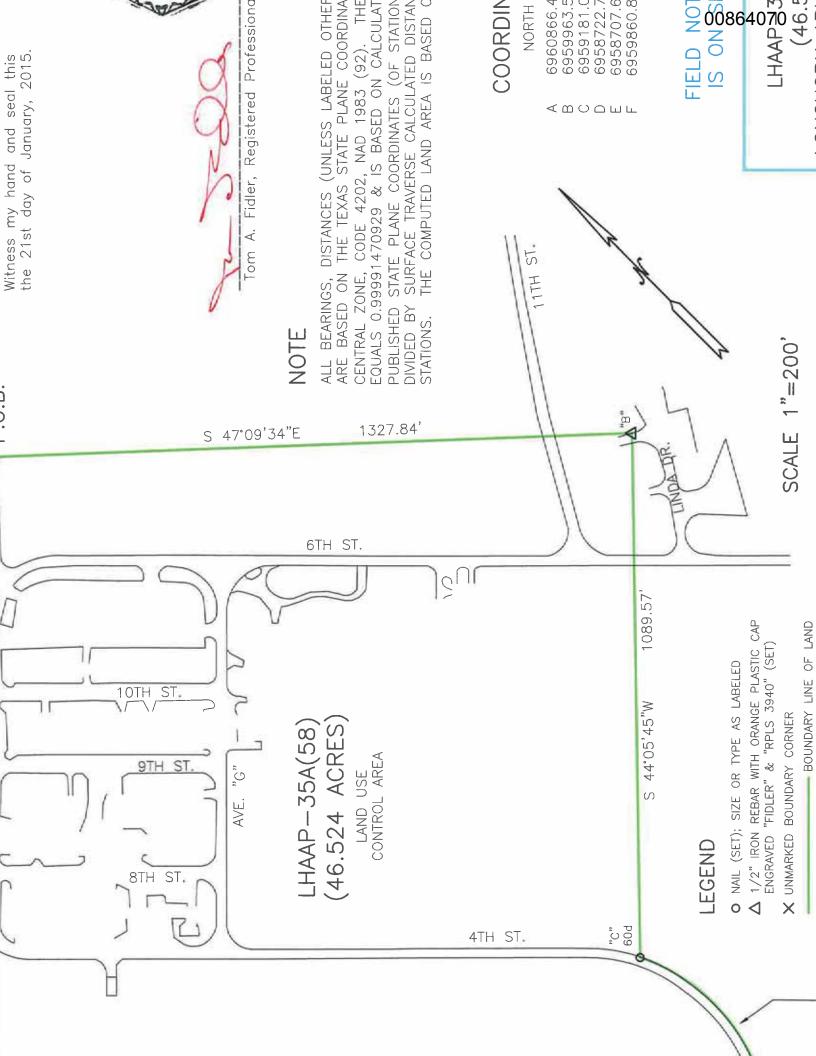
THENCE S 45deg14'57"W 21.48' along a S.E. B.L. of this tract to a point for this tract's Southmost corner, said point being N 17deg16'14"W 525.07' from the aforementioned "HMX-5" monument and S 44deg25'14"E 8.86' from a concrete nail set for reference near the centerline of the asphalt pavement of "4th Street",

THENCE N 44 deg 25' 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.





LHAAP-35A(58), 58-3 LAND USE CONTROL COMPLIANCE INSPECTION FORM

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 f	follows:
 Groundwater restriction – A restriction again effect until the levels of the COCs in groundwa unlimited exposure (UUUE). [Indicate whet required at LHAAP-35A (58)] 	ater and soil allow unrestricted use and
A summary of compliance with land use and restri	ction covenants is as follows:
• No use of groundwater, installation of new existing wells at LHAAP-35A (58).	groundwater wells, or tampering with
I, the undersigned, do document that the certificate the above information is true and correct to the best	-
Date:	
Name/Title:	
Signature:	
Annual compliance certification forms shall be co the previous calendar year.	mpleted no later than March 1 of each year for

LHAAP-59

NOTICE OF NONRESIDENTIAL LAND USE FOR LHAAP-59 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

2011-000003378

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

6 Pages

On:	03/24/2011 03:52 I	PM	
Document Nun			
	ber: 2011-000003	3378	
Receipt No:	1103745	_	
Amount:	\$ 32.00	=	
Ву:	Lauren Boyd	, Deputy	



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:



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.

Ш

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

Longhorn AAP Site Manager

EXECUTED this the 25 th day of January, 2010.

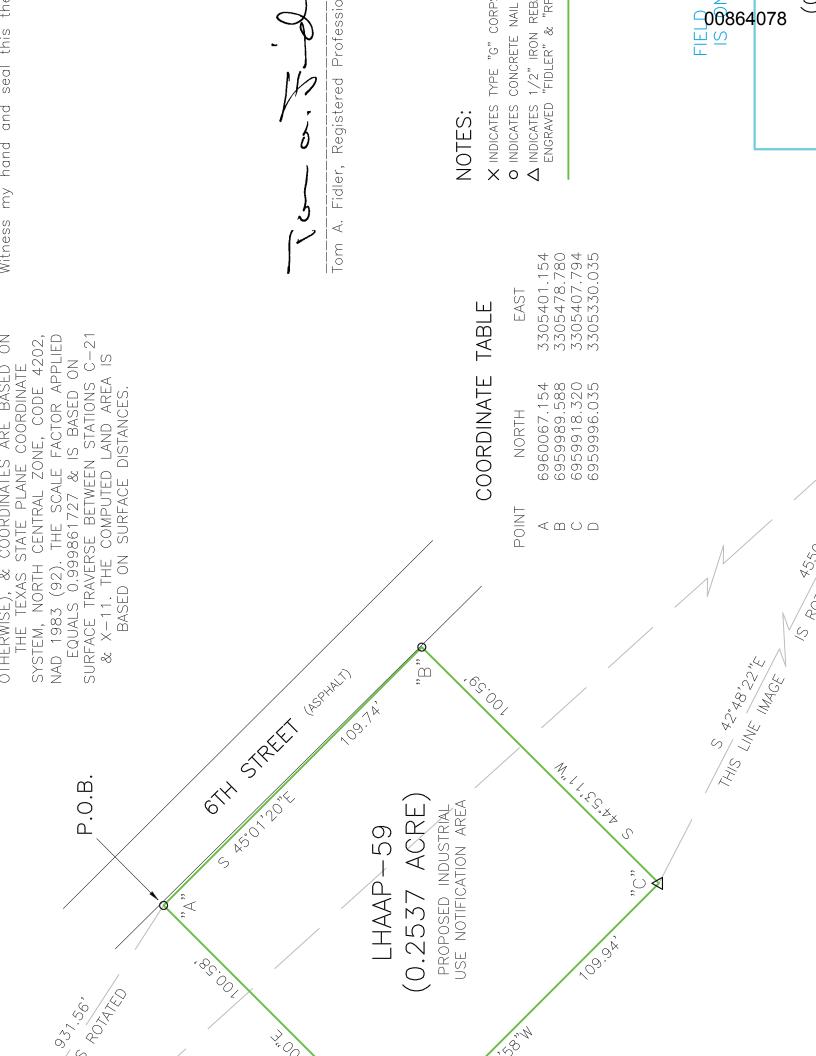
BEFORE ME, on this the 25 th day of \(\frac{1}{201}\), personally appeared Rose M. Zeiler, of United States Army, United States Department of Defense, known to me to be the person and agent of said agency whose name is subscribed to the foregoing instrument, and she acknowledged to me that she executed 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.

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, 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)

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: \$ <u>72.00</u>	
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.

0

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:

1

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.

П

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 multifamily residences; child care facilities; and mursing home or assisted living facilities; and any type of educational purpose for children/young adults in grades kindergarten through 12.

Ш

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

Assistant Chief of Staff for Installation Management

ATTN: DAIM-BDO (T. Lederle)

600 Army Pentagon

Washington D.C. 20310-0600

Longhorn AAP Site Manager

th day of / kirch 2010. EXECUTED this the

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



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,

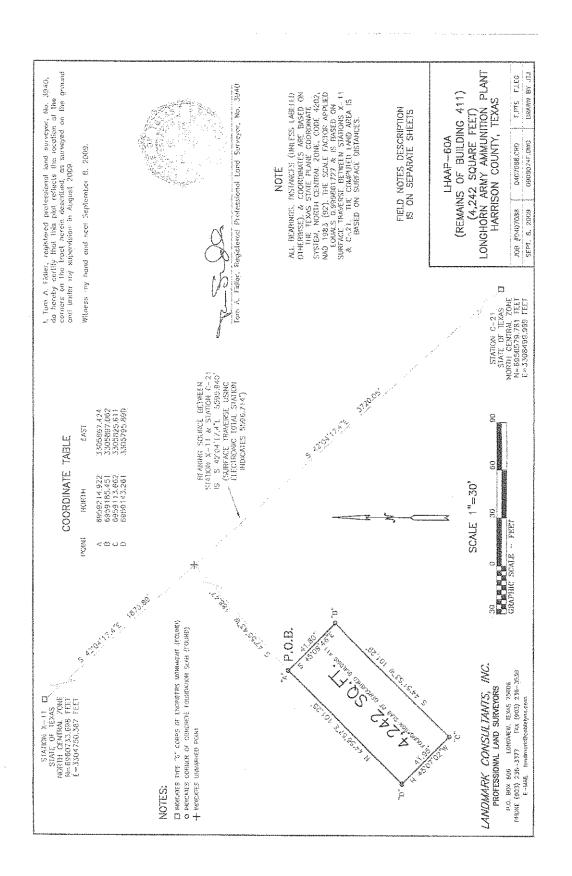
THENCE N 45deg07'02"W 41.95' along the Southwest B.L. of this tract to a C.C.F.S. found for this tract's Westmost corner,

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.

75 Da

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



"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.

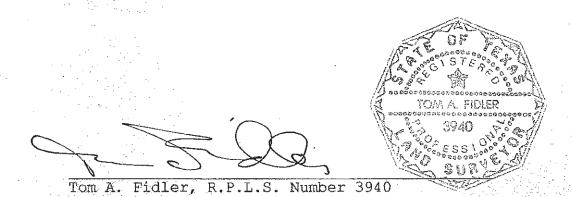
THENCE S 41deg54'33"E 8.55' along the Northeast B.L. of this tract to a C.E.F.E.W. found for this tract's Eastmost corner,

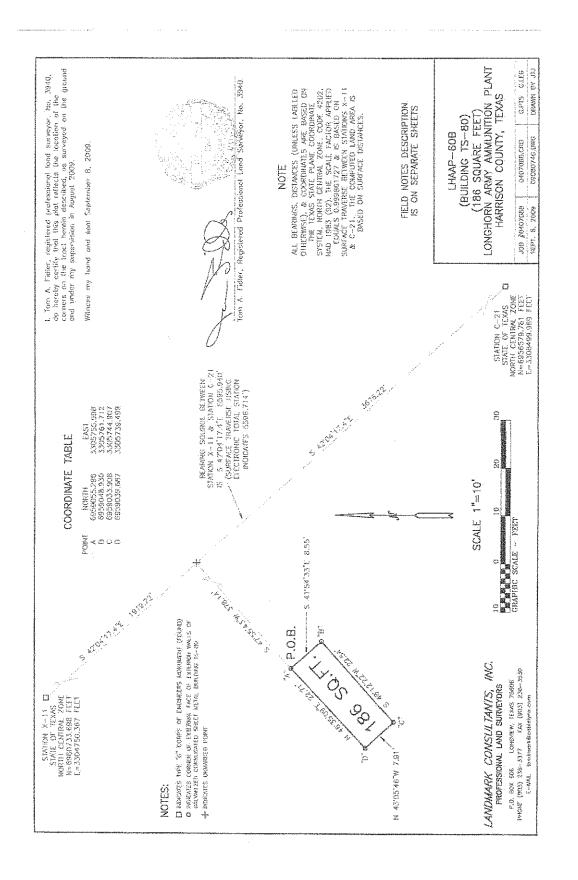
THENCE S 48deg12'22"W 22.54' along the Southeast B.L. of this tract to a C.E.F.E.W. found for this tract's Southmost corner,

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.





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,

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,

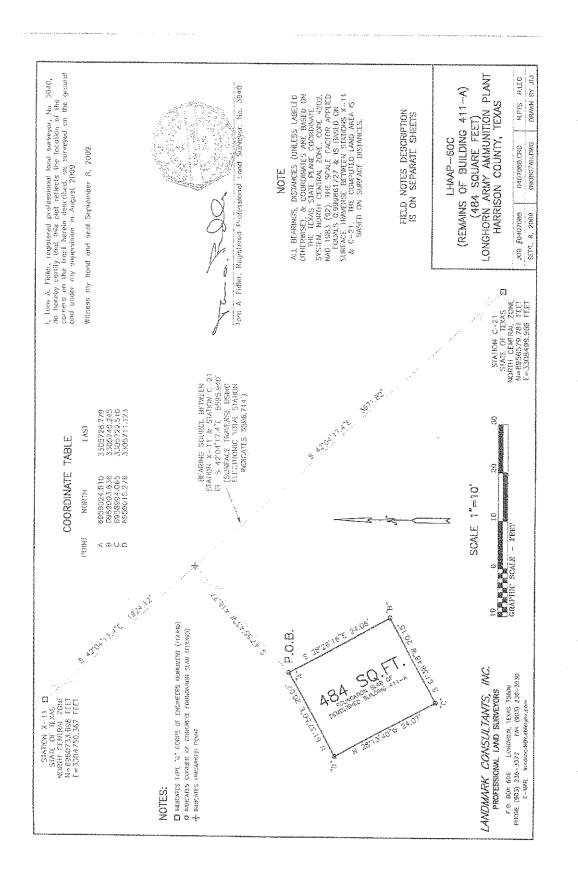
THENCE N 28deg13'40"W 24.07' along the Southwest B.L. of this tract to a C.C.F.S. found for this tract's Westmost corner,

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



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,

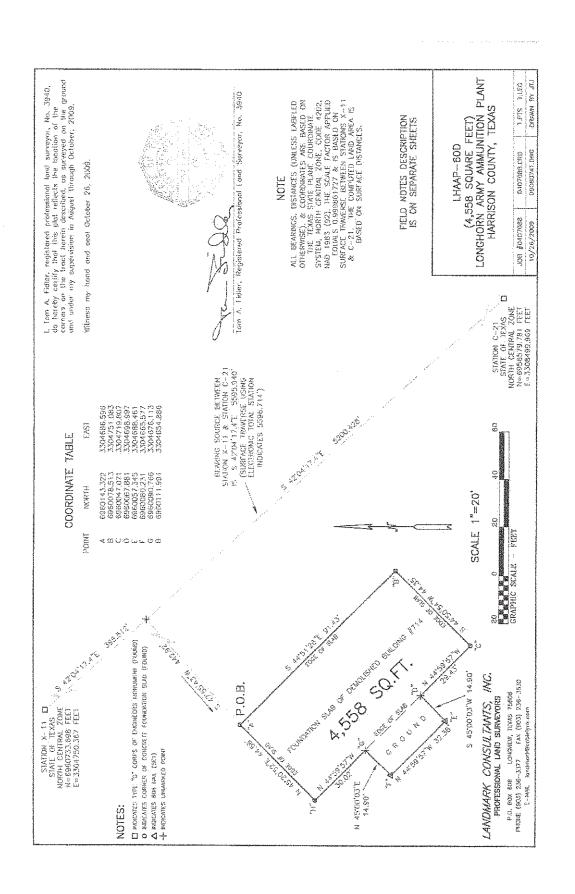
THENCE N 44deg59'57"W 30.02' along a Southwest B.L. of this tract, and generally along the Southwest edge of said concrete slab, to a C.C.F.S. found for this tract's Northmost West corner,

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

3940 V



LHAAP-64

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-64 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

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:, 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 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:

1

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 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.

Ш

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

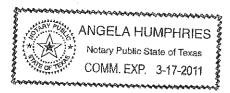
Rose M. Zeiler
Longhorn AAP Site Manager

EXECUTED this the 10th day of March, 2010.

BEFORE ME, on this the 10 th day of WWW, 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 Worch 2010.

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



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,

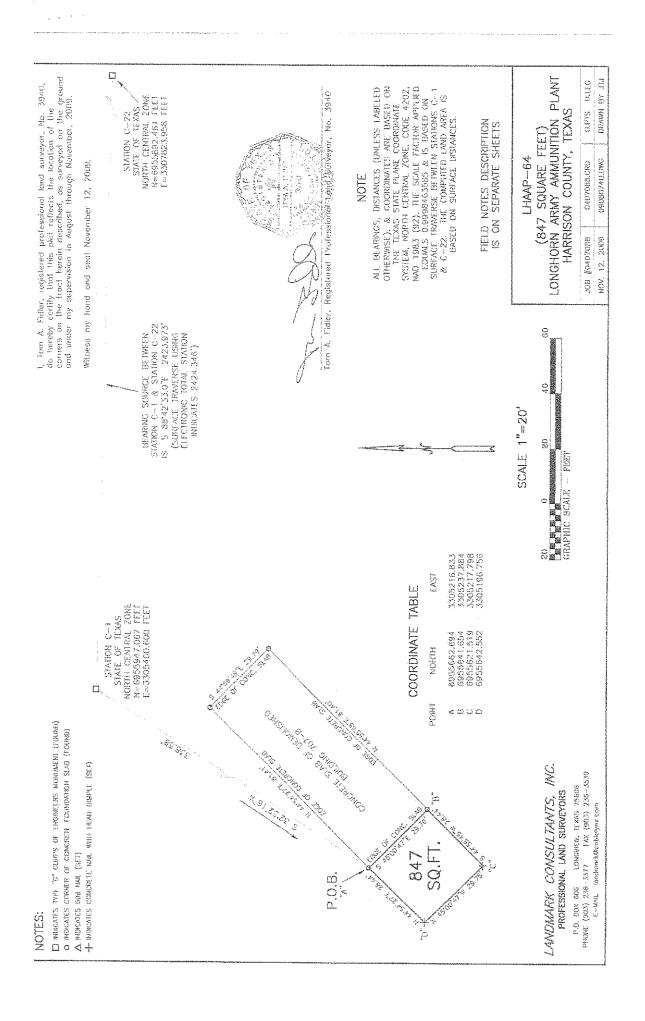
THENCE N 45deg00'47"W 29.75' along the S.W. B.L. of this tract to a concrete nail with head dimple set (in asphalt) for the West corner of this tract,

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.

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



LHAAP-66

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-66 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

2010-000005559

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

7 Pages

FILED AND RECORDED - OPR		R	CLERKS NOTES
On:	04/27/2010 04:08 PM		
Document N	umber: 2010-000005559		
Receipt No:	1006195		
Amount:	\$ 36.00		
By:	Ann Turner	, Deputy	
1	atsy Cox, County Clerk Iarrison 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 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.

П

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 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.

Ш

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 1000 th day of 1000, 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



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,

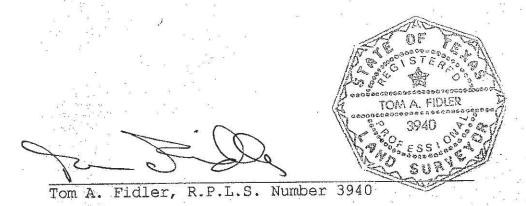
THENCE S 44deg46'19"W 65.93' along a chain link fence found for

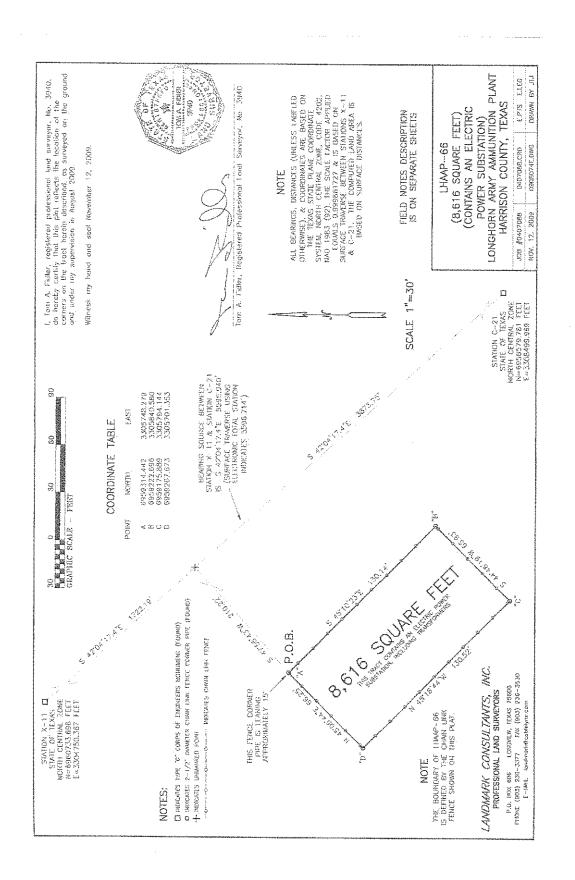
the Southeast B.L. of this tract to an F.C.P. found for this tract's Southmost corner,

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.





LHAAP-67, 67-1 LUCs FROM FINAL REMEDIAL DESIGN

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

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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

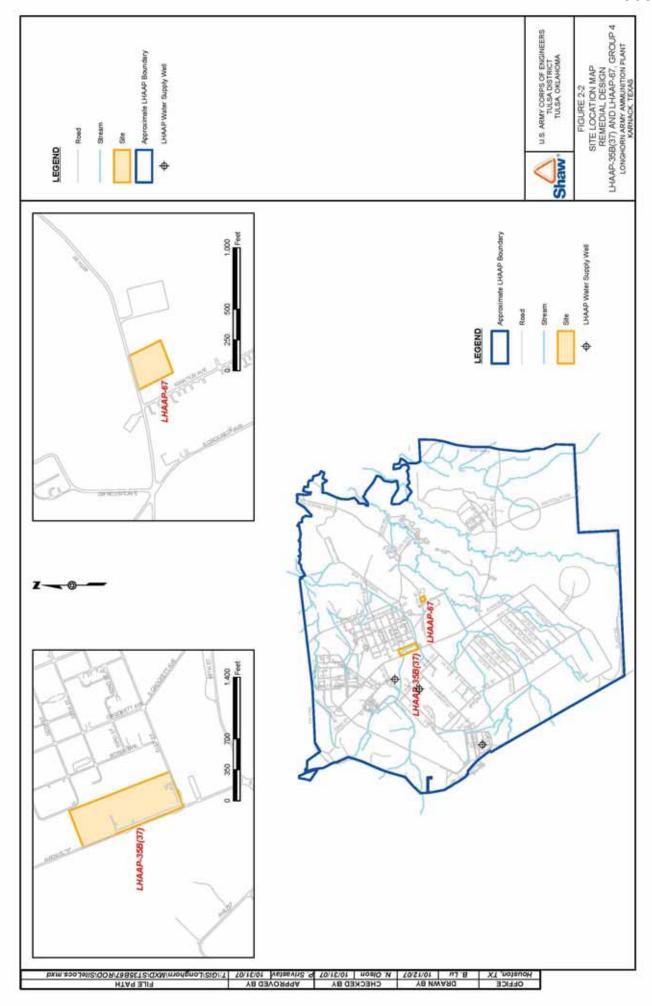
The Army shall not, without USEPA and TCEQ concurrence, make a significant modification to, or terminate a LUC, or make a land use change inconsistent with the LUC objectives and use assumptions of the selected remedy. Likewise, the Army shall seek prior USEPA and TCEQ concurrence before commencing actions 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



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)

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: <u>2014-000013308</u>	
Receipt No:	
Amount: \$ 50.00	
By: Pam Rockwell , 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:

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.

 Π

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 10 th day of 1000 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.

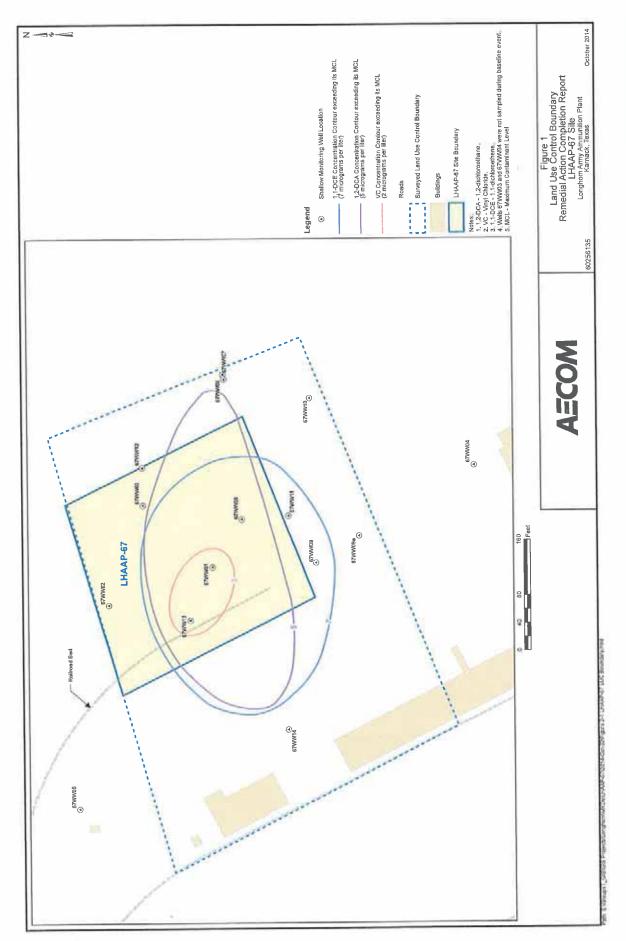
ANGELA HUMPHRIES
Notary Public State of Texas
COMM. EXP. 03-17-2015

Notary Public in and for the State of Texas,

County of Harrison

EXHIBIT A SURVEY PLAT

COUNTY CLERK'S MEMO PORTIONS OF THIS DOCUMENT NOT REPRODUCIBLE WHEN RECORDED



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,

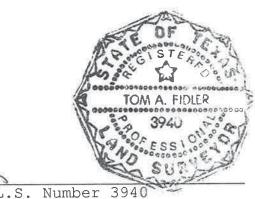
THENCE N 74 deg 08'33"E 654.97' along the N.B.L. of this tract to an I.R.O.P.C. set for this tract's N.E.C.,

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.,

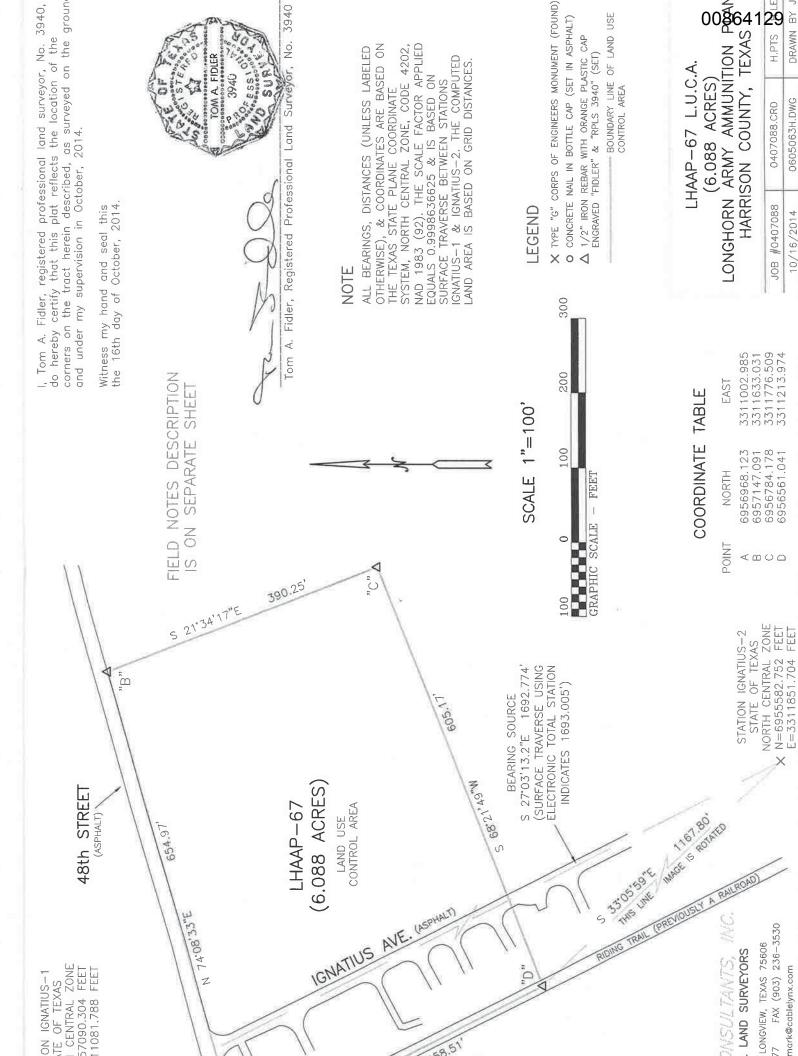
THENCE S 68deg21'49"W 605.17' along the S.B.L. of this tract to an I.R.O.P.C. set for this tract's S.W.C., from which monument "IGNATIUS-2" referenced above bears S 33deg05'59"E 1167.80',

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.



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

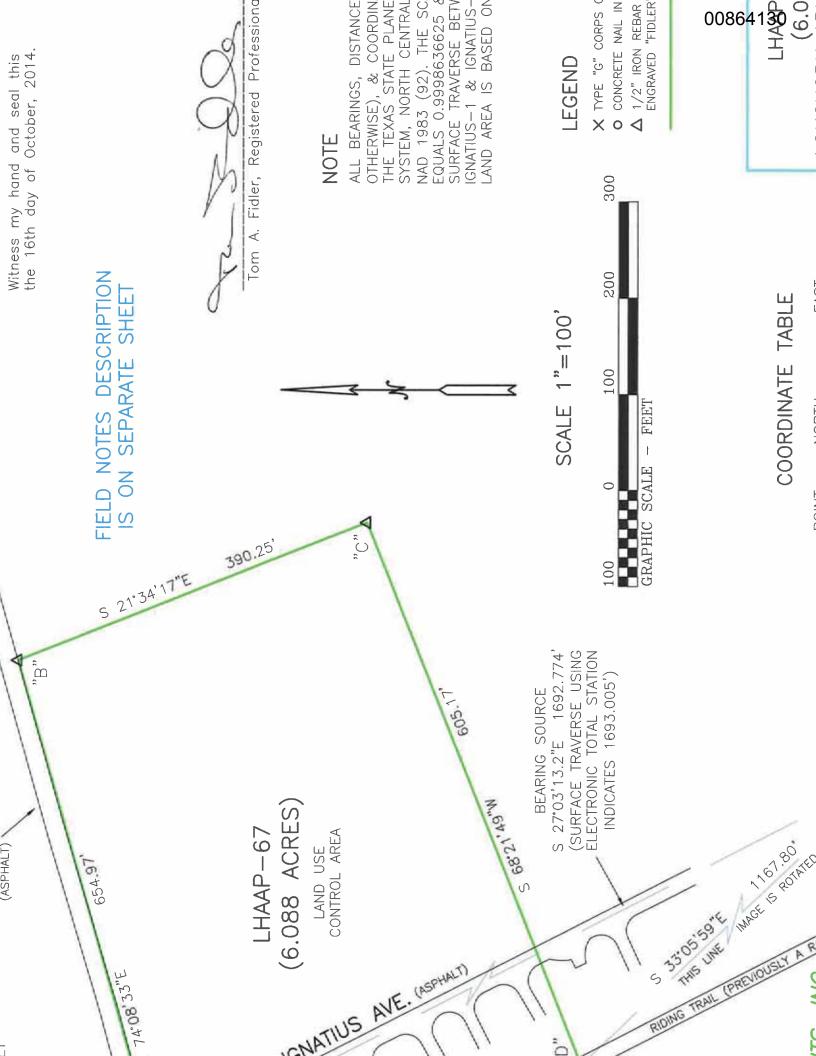


DRAWN BY J

0605063H.DWG

10/16/2014

mark@cablelynx.com



LHAAP-67, 67-3 LAND USE CONTROL COMPLIANCE INSPECTION FORM

Sample Annual Land Use Control Compliance Certification Documentation

	with the Remedial Design dated 8/1/11 for LHAAP-67, a certification of site was [indicate transferee] on
A summary of l	and use control mechanisms is as follows:
effect until t	r restriction - A restriction against use of groundwater will remain in the levels of the COCs in groundwater and soil allow unrestricted use and exposure (UUUE). [Indicate whether groundwater restrictions are still LHAAP-67]
A summary of o	compliance with land use and restriction covenants is as follows:
-	groundwater, installation of new groundwater wells, or tampering with s at LHAAP-67.
•	ed, do document that the certification was performed as indicated above, and that mation is true and correct to the best of my knowledge, information, and belief.
Date:	
Name/Title:	
Signature:	
-	ance certification forms shall be completed no later than March 1 of each year for
the previous cal	endar year.

LHAAP-68

NOTICE OF NONRESIDENTIAL LAND USE AT LHAAP-68 FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

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:, 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 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:

Ι

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.

 Π

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 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.

Ш

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 100 cm, 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 <u>lo</u> day of <u>Movch</u> 2010.

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

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,

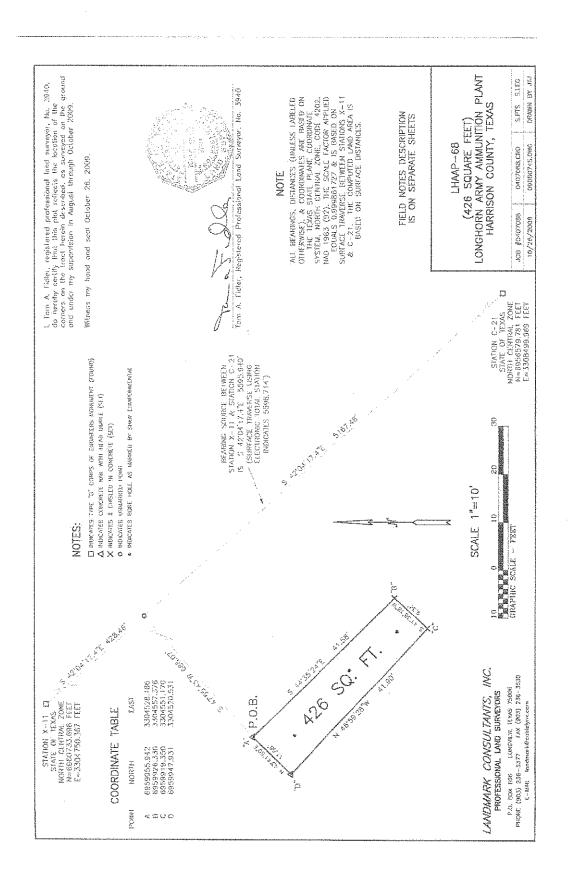
THENCE N 43deg41'50"E 11.08' along the Northwest B.L. of this

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.

Les Joseph

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



PISTOL RANGE

NOTICE OF NONRESIDENTIAL LAND USE AT PISTOL RANGE FILED IN PUBLIC RECORDS OF HARRISON COUNTY, TEXAS (INCLUDING SURVEY PLAT)

2012-000000705

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

6 Pages

FILE	ED AND RECORDED – OPR	CLERKS NOTES
On:	01/19/2012 10:41 AM	
Document N	umber: 2012-000000705	
Receipt No:	1200645	
Amount:	\$ 32.00	
Ву:	Ann Turner , Deputy	
	atsy Cox, County Clerk Iarrison 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

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:

Ι

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.

 Π

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.

Ш

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

Assistant Chief of Staff for Installation Management

ATTN: DAIM-ODB (T. Lederle)

600 Army Pentagon

Washington D.C. 20310-0600

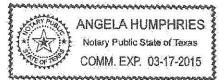
Rose M. Zeiler

Longhorn AAP Site Manager

EXECUTED this the 21 th day of July , 2011.

BEFORE ME, on this the 21 th day of 500 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 34 day of 2011.



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

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.,

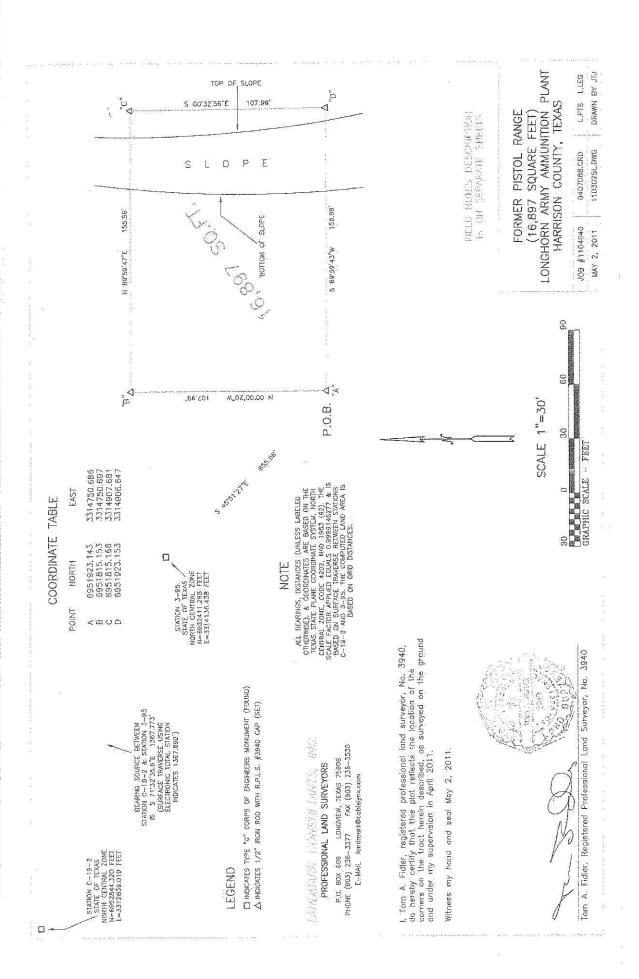
THENCE S 00deg32'56"E 107.99' along the E.B.L. of this tract to an I.R.C. set for this tract's S.E.C.,

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.

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



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

		Repairs/Action Taken			
		Corrective action or repairs required?			
	Prevent explosive safety risks	Verified no intrusive activities i.e. digging			
Inspection/Maintenance Activities	Prohibit residential development/use	Verified no residential development/use			
Inspection/N Acti	Maintain Land Use Controls	Signage visible from one sign to the next: i.e. grass mowed around signage			
	Maintain La	Signage maintained e.g. replace damaged or weathered signs to the full count of signs			
		Inspected by:			
		Date			

LHAAP-001-R-01 AND LHAAP-003-R-01, MMRP-2 LUCs FROM FINAL REMEDIAL DESIGN PENDING

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)

APPENDIX A GSA TRANSFER LETTERS



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 <u>03/07/2014</u>

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

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, Director

Real Property Utilization and Disposal

Division (7PZ)

Enclosures

Receipt acknowledged:

Name (Meste)

Title KEALLY OFTCOR

Date 3-3-2014

cc: Mr. Thomas E. Lederle Chief, ACSIM BRAC Division 600 Army Pentagon Washington D.C. 20310-0600

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,

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,

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,

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,

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,

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.

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, 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



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

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" 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, 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



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	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st	2 nd	3 rd	4 th	1 st
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	2 nd	3 rd	4 th	1 st	2 nd	3 rd	3 rd	4 th	2 nd	3 rd	4 th
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

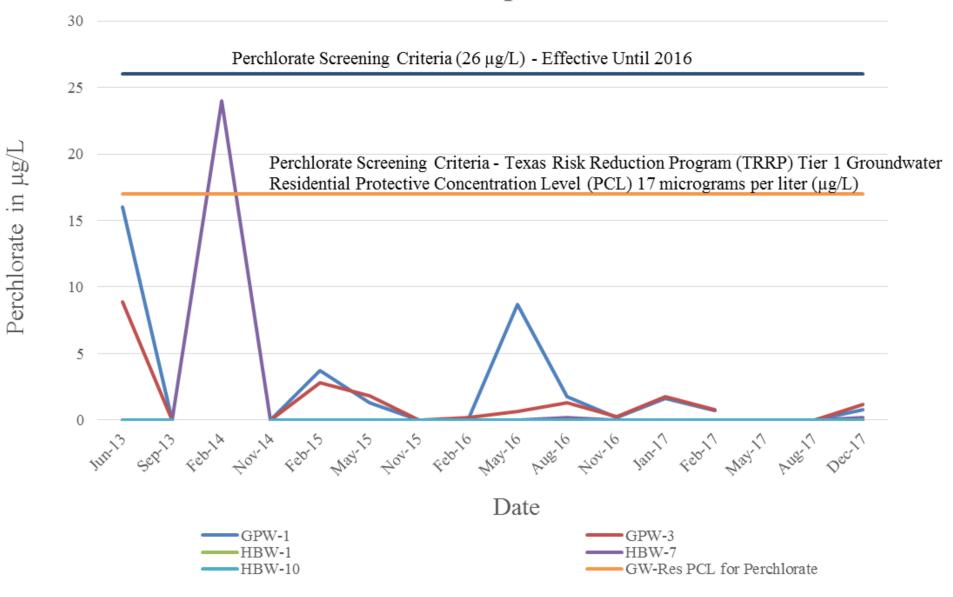
Quarter	1 st	2 nd	3 rd	4 th	2 nd	3 rd	3 rd	3 rd	4 th	1 st	2 nd
Creek Sample ID	Mar 2008	Jun 2008	Sep 2008	Dec 2008	May 2009	Jul 2009	Aug 2009	Sep 2009	Dec 2009	Mar 2010	Jun 2010
GPW-1	27	<0.5U	<0.5U	<0.22U	16	<4U	NS	<1.2U	3.7	1.3J	<0.6U
GPW-3	21.9	9.42	1.1	<0.22U	8.9	<4U	NS	<0.6U	2.8	1.8J	<0.6U
HBW-1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

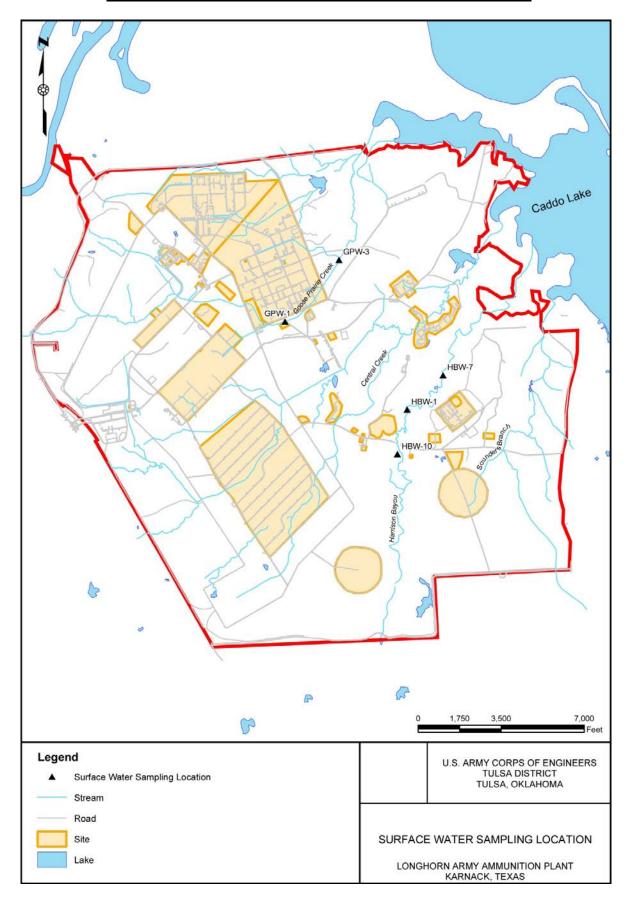
Quarter	2 nd	3 rd	4 th	1 st	2 nd	3 nd	4 th	1 st	2 nd	3 rd	4 th
Creek Sample ID	Jun 2013	Sept 2013	Dec 2013	Feb 2014	May 2014	Aug 2014	Nov 2014	Feb 2015	May 2015	Aug 2015	Nov 2015
GPW-1	dry	<0.2 U	dry	0.766	dry	dry	0.244 J	0.311 J	0.156J	dry	0.142 J
GPW-3	dry	<0.2 U	dry	1.15	dry	dry	0.276 J	0.344 J	dry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

Surface Water Samples - Perchlorate



Longhorn Army Ammuntion Plant Creek Sampling Locations



Attachment B

Quality Control Summary Report

QUALITY CONTROL SUMMARY REPORT SURFACE WATER LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

Prepared For:





U.S. Army Corps of Engineers

Prepared By:



AECOM Technical Services

November 2017

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Table 1: Field Sample Identification and Laboratory Identification

Table 2: Qualified Analytical Data Table 3: Completeness by Method

November 2017

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).

11 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 $(r^2) \ge 0.99$. 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 $\pm 15\%$ difference, then the compound is qualified J or UJ.

All CCVs were within the acceptance criteria.

14 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.

November 2017

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.

17 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.

November 2017

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.

QUALITY CONTROL SUMMARY REPORT SURFACE WATER LONGHORN ARMY AMMUNITION PLANT KARNACK, TEXAS

Prepared For:





U.S. Army Corps of Engineers

Prepared By:



1608 13th Avenue South, Suite 300 Birmingham, Alabama 35205 1-800-806-4001 • <u>www.bhate.com</u>

March 2018

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	1.7	Internal Standards	
		Field Precision	
		TA USABILITY SUMMARY	

List of Tables

Table 1: Field Sample Identification and Laboratory Identification

Table 2: Qualified Analytical Data Table 3: Completeness by Method

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).

11 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 $(r^2) \ge 0.99$.

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 <u>+</u>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.

14 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.

17 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	Χ
HBW10_122617	HS17121303-02	Х
HBW1_122617	HS17121303-03	Х
GPW1_122617	HS17121303-04	Х
GPW3_122617	HS17121303-05	Х

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.

Longhorn Army Ammunition Plant, Karnack, Texas

March 2018

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





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

Jeslie Bucisa

State of Origin: TX

Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX

QAPP: DOD Ver 4.1





Microbac Laboratories * Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 * T: (740) 373-4071 F: (740) 373-4835 * www.microbac.com



Discrepancy

1.0

Gun

Lab Report #: L17010917 **Lab Project #:** 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Resolution

J4616882827

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.

00114105

Coolers						
Cooler #	Temperature	Temperature	COC#	Airbill #	Temp Required?	

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				



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		



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;
F	R2	Sample identification cross-reference;
F	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).
F	R4	Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits.
F	R5	Test reports/summary forms for blank samples;
F	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.
F	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.
F	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.
F	R9	List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
F	R10	Other problems or anomalies.

Name (Printed)	Signature	Official Title (Printed)	Date
Eric Lawson	En C. Tum	Chemist III	2017-01-30 15:54:25



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		

Chain-of-custody (C-O-C) Did samples meet the laboratory's standard conditions of sample acceptability upon receipt? Were all departures from standard conditions described in an exception report? Sample and quality control (QC) identification Are all field sample ID numbers cross-referenced to the laboratory ID numbers? Are all laboratory ID numbers cross-referenced to the corresponding QC data? Test reports Were all samples prepared and analyzed within holding times? Other than those results < MQL, were all other raw values bracketed by calibration	X X X		
receipt? Were all departures from standard conditions described in an exception report? Sample and quality control (QC) identification Are all field sample ID numbers cross-referenced to the laboratory ID numbers? Are all laboratory ID numbers cross-referenced to the corresponding QC data? Test reports Were all samples prepared and analyzed within holding times?	X		
Sample and quality control (QC) identification Are all field sample ID numbers cross-referenced to the laboratory ID numbers? Are all laboratory ID numbers cross-referenced to the corresponding QC data? Test reports Were all samples prepared and analyzed within holding times?			
Are all field sample ID numbers cross-referenced to the laboratory ID numbers? Are all laboratory ID numbers cross-referenced to the corresponding QC data? Test reports Were all samples prepared and analyzed within holding times?	Х		
Are all laboratory ID numbers cross-referenced to the corresponding QC data? Test reports Were all samples prepared and analyzed within holding times?			
Test reports Were all samples prepared and analyzed within holding times?	X		
Were all samples prepared and analyzed within holding times?	Х		
Other than those results < MQL, were all other raw values bracketed by calibration	Х		
standards?	Х		
Were calculations checked by a peer or supervisor?	Х		
Were all analyte identifications checked by a peer or supervisor?	Х		
Were sample detection limits reported for all analytes not detected?	Х		
Were all results for soil and sediment samples reported on a dry weight basis?		Х	
Were % moisture (or solids) reported for all soil and sediment samples?		Х	
Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?		Х	
If required for the project, are TICs reported?		Х	
Surrogate recovery data			
Were surrogates added prior to extraction?		Х	
Were surrogate percent recoveries in all samples within the laboratory QC limits?		Х	
Test reports/summary forms for blank samples	Х		
Were appropriate type(s) of blanks analyzed?	Х		
Were blanks analyzed at the appropriate frequency?	Х		
Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	Х		
Were blank concentrations < MQL?	Х		
Laboratory control samples (LCS):			
Were all COCs included in the LCS?	Х		

RG-366/TRRP-13 May 2010



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?	Х		
Were LCSs analyzed at the required frequency?	Х		
Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	Х		
Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	Х		
Was the LCSD RPD within QC limits?		Х	
Matrix spike (MS) and matrix spike duplicate (MSD) data			
Were the project/method specified analytes included in the MS and MSD?	Х		
Were MS/MSD analyzed at the appropriate frequency?	Х		
Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	Х		
Were MS/MSD RPDs within laboratory QC limits?			
Analytical duplicate data			
Were appropriate analytical duplicates analyzed for each matrix?		Х	
Were analytical duplicates analyzed at the appropriate frequency?		Х	
Were RPDs or relative standard deviations within the laboratory QC limits?		Х	
Method quantitation limits (MQLs):			
Are the MQLs for each method analyte included in the laboratory data package?	Х		
Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	Х		
Are unadjusted MQLs and DCSs included in the laboratory data package?	Х		
Other problems/anomalies			
Are all known problems/anomalies/special conditions noted in this LRC and ER?	Х		
Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	Х		
Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X X		
Initial calibration (ICAL)			
Were response factors and/or relative response factors for each analyte within QC limits?	Х		
Were percent RSDs or correlation coefficient criteria met?	Х		

RG-366/TRRP-13 May 2010



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	X		
the curve?			
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?	Х		
Were percent differences for each analyte within the method-required QC limits?	Х		
Was the ICAL curve verified for each analyte?	Х		
Was the absolute value of the analyte concentration in the inorganic CCB < MDL?		Х	
Mass spectral tuning			
Was the appropriate compound for the method used for tuning?	Х		
Were ion abundance data within the method-required QC limits?	Х		
Internal standards (IS)			
Were IS area counts and retention times within the method-required QC limits?	Х		
Raw data (NELAC Section 5.5.10)			
Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	Х		
Were data associated with manual integrations flagged on the raw data?	Х		
Dual column confirmation			
Did dual column confirmation results meet the method-required QC?		Х	
Tentatively identified compounds (TICs)			
If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?		Х	
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?		Х	
Method detection limit (MDL) studies			
	1		

RG-366/TRRP-13 May 2010



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?	Х	
Is the MDL either adjusted or supported by the analysis of DCSs?	Х	
Proficiency test reports		
Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	Х	
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?	Х	
Is documentation of the analyst's competency up-to-date and on file?	Х	
Verification/validation documentation for methods (NELAC Chapter 5)		
Are all the methods used to generate the data documented, verified, and validated, where applicable?	Х	
Laboratory standard operating procedures (SOPs)		
Are laboratory SOPs current and on file for each method performed	Х	

- 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

RG-366/TRRP-13 May 2010



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		

There are no exceptions.

Microbac

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 concentrat	ion 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	
1	Estimated value : the analyte concentrate	tion was less than	the LOO					



Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Page 3 of 3 Generated at Jan 30, 2017 11:40

2.1 General Chromatography Data

2.1.1 LC/MS Data (6850)

2.1.1.1 Summary Data



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

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.								

Page 1 of 3 Generated at Jan 30, 2017 11:41

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

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.

Page 2 of 3 Generated at Jan 30, 2017 11:41



Lab Report #: L17010917

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Page 3 of 3 Generated at Jan 30, 2017 11:41

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):

Amount of soil extracted (g):

Final volume of extract (mL):

Percent solids (Pct wt.)

Concentration in soil (ug/kg):

0.20059

5.00

100

2.005938

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 (R2)		
Perchlorate		1.691	3.94	1.00000	

R = Correlation coefficient; 0.995 minimum
R² = Coefficient of determination; 0.99 minimum

INT_CAL - Modified 03/06/2008

PDF File ID: 5130660

Report generated 01/30/2017 09:23

Microbac

Microbac Laboratories Inc. INITIAL CALIBRATION DATA

00864219

Login Number: L17010917
Analytical Method: 6850

Instrument ID: LCMS1

Initial Calibration Date: 16-DEC-16 23:37

Column ID:F

	WG595346-02			WG595346-03			WG595346-04		
Analyte	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



Microbac Laboratories Inc. INITIAL CALIBRATION DATA

00864220

Login Number: L17010917
Analytical Method: 6850

Instrument ID: LCMS1

Initial Calibration Date: 16-DEC-16 23:37

Column ID:F

	WG595346-05			WG595346-06			WG595346-07		
Analyte	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



Microbac Laboratories Inc. INITIAL CALIBRATION DATA

00864221

Login Number: L17010917
Analytical Method: 6850

Instrument ID:LCMS1
Initial Calibration Date:16-DEC-16 23:37
Column ID:F

	WG595346-08				
Analyte	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
TCal Workgroup.WC595346	Cal ID. LCMS1 - 16-DEC-1	6

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

Microbac

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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

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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

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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

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Microbac Laboratories Inc.

Microbac ®

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

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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

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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

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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

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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

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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

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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	

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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	*

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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	

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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	

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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	

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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	

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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	

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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	*

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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	

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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	

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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	*

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3.0 Attachments

Microbac Laboratories Inc. Ohio Valley Division Analyst List January 30, 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 ADG - APRIL D. GREENE ADC - ANTHONY D. CANTER 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 BNB - Brandi N. Bentley
CAA - CASSIE A. AUGENSTEIN
CAS - Craig A. Smith BRG - BRENDA R. GREGORY CAF - CHERYL A. FLOWERS CAS - Craig A. Smith CEB - CHAD E. BARNES CLC - CHRYS L. CRAWFORD CLW - CHARISSA L. WINTERS CRW - CHRISTINA R. WILSON CLC - CHRYS L. CRAWFORD CJQ - Cameron J. Quick CLS - CARA L. STRICKLER CPD - CHAD P. DAVIS CV - Carl Volkman CSH - CHRIS S. HILL DAK - DEAN A. KETELSEN DCM - DAVID C. MERCKLE
DIH - DEANNA I. HESSON
DLP - DOROTHY L. PAYNE
DTG - DOMINIC T. GEHRET DEV - DAVID E. VANDENBERG DLB - DAVID L. BUMGARNER DSM - DAVID S. MOSSOR 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 JDS - JARED D. SMITH JLD - JESSICA L. DELONG JLL - JOHN L. LENT JMW - JEANA M. WHITE JTP - JOSHUA T. PEMBERTON JST - JOSHUA S. TAYLOR JWS - JACK W. SHEAVES KAK - KATHY A. KIRBY JWR - JOHN W. RICHARDS JYH - JI Y. HU KDD - Katelyn D. Daley KEB - KATIE E. BARNES KAT - KATHY A. TUCKER KDW - KATHRYN D. WELCH KKB - KERRI K. BUCK KRB - KAELY R. BECKER LJH - Lacey J. Hendershot KHR - KIM H. RHODES KRA - KATHY R. ALBERTSON KRP - KATHY R. PARSONS LKN - LINDA K. NEDEFF LLS - LARRY L. STEPHENS LSJ - LAURA S. JONES LSB - LESLIE S. BUCINA 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 PDM - PIERCE D. MORRIS NPH - Natalie P. Hart QX - QIN XU PIT - MICROBAC WARRENDALE RAH - ROY A. HALSTEAD REK - BOB E. KYER RLB - BOB BUCHANAN RNP - RICK N. PETTY SCB - SARAH C. BOGOLIN SAV - SARAH A. VANDENBERG 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

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Laboratory:	Microbac POC: Stephanie Mossburg	sburg		Project Manager:	ager:		ebra Ri	Debra Richmann					Ī	Mail to:	\lceil	Linda Raabe	ape		
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COOLER TEMP >6° C LOG

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DH LOT #HC693/24

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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

OVD HPLC02/HPLC-UV

Nitroglycerin Acetic acid Butyric acid Lactic acid Propionic acid Pyruvic acid

OVD MSS01/GC-MS

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

Page 84

L17010917 / Revision: 0 / 85 total pages

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)



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: sqordon@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

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4	Sample Receipt Information	
		Chain of Custody Forms
		Sample Receipt Confirmations
		WorkOrder Summary
	Sample	Delivery Group (SDG) Sheets
5	Data for Perchlorate	
	Required Da	ta / QAQC / Calibration Forms
	·	Supporting Raw Data / Logs

1702143 REV01

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 repreped, 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. Eq: RE1, RE2, RE3, etc.

Statement of Data Authenticity:

my Barnett

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.

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

- Aqueoús
- 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
Final Concentration =	On-column(ug/L or ug/Kg) * Expected Vol/Weight (mL or g) * Dilution
	Initial Vol/Weight (mL or g) * (Percent Solids/100) (if applicable)
Note - Expected Vol/	Weight value is found in "Final Vol" column of Preparation Batch Summary.

	GC/MS Extractables
Final Concentration =	On-column(ng/uL) * Final Vol (ml) * Dilution *(1000uL/mL)
-	Initial Vol/Weight (mL or g) * (Percent Solids/100) (if applicable)
=	ng/mL or ng/g
=	ug/L or ug/kg

	GC or LC Extractables
Final Concentration =	On-column(ng/mL) * Final Vol (mL) * Dilution
	Initial Vol/Weight (mL or g) * (Percent Solids/100) (if applicable)
= ng/mL or ng/g	
= ug/L or ug/kg	



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TBLOT

Distribution: White to Laboratory, Canary to Project Manager, Pink QA/QC Manager

00864279

Homogenize all composite samples prior to analysis

See Chain of Custody for ID's, date and time collected.

Microb Workorder N		Number of Samples	Analyses
1702086		. 5	Sub-CL04
		DV: 0.00 TO	DTAL: 21.64
	No. 1		

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

1702143 REV01

II. EMPIRICAL LABORATORIES COOLER RECEIPT FORM

00	er Received/Opened On: 2/17/17@0850	Wor	k-order#_170°0195
	Tracking # \640	(last 4 digits, FedEx)	
	Courier: FedEx		
		when opened: $1, 2 \circ C + correction factor (-0.1_)$	$=$ $\frac{1}{1}$ $^{\circ}C$
	If Item #2 temperature is 0°C or less, was th	ne representative sample or temp blank frozen?	YES NONA
	Were custody seals on outside of cooler?		YESNONA
	If yes, how many and where:	one (2) front	
	Were the seals intact, signed, and dated cor	rectly?	y68NONA
	Were custody papers inside cooler?		YESNONA
er	tify that I opened the cooler and answered q	uestions 1-6 (initial/date) DJR 2/1'	7/17
	Were custody seals on containers:	YES NO and Intact	YESNON
	Were these signed and dated correctly?		YESNONA
	Packing material used? Bubble-wrap Plas	stic bag Peanuts Vermiculite Foam Insert Pape	er Other None
	Cooling process:	Ice Ice-pack Ice (direct contact) Dry ice	Other None
).	Did all containers arrive in good condition ((unbroken)?	YES.,.NONA
١.	Were all container labels complete (#, date,	signed, pres., etc.)?	YES,NONA
2.	Did all container labels and tags agree with	custody papers?	YESNONA
3.	a. Were VOA vials received?		YES.(.NO.).NA
	b. Was there observable headspace present	in any VOA vial (>5mm-6mm)?	YESNONA
١.	Was there a Trip Blank in this cooler (custo If multiple coolers, sequence #	ody seals present/intact)? YESNONAComm	ents
cei	tify that I unloaded the cooler and answered	questions 7-14 (initial/date)	2/17/17
5.	a. On preserved bottles, did pH test strips s	uggest preservation reached the correct pH level?	YESNONA
	b. Did the bottle labels indicate that the cor	rect preservatives were used?	YESNO(NA)
6.	Was residual chlorine present for Cyanide	"Effluent" samples? If so, treated/documented?	YESNONA
7.	For 608 Pest/PCB samples, was pH <5 or >5	9? Was residual chlorine present? If either, adjuste	ed/documented? YESNONA
cei	tify that I checked for chlorine and pH as pe	er SOP and answered questions 15-17 (initial/date)	2/17/17
8.	Were custody papers properly filled out (in	k, signed, etc.)?	YESNONA
9.	Did you sign the custody papers in the appr	ropriate place?	YESNONA
).	Were correct containers used for the analys	sis requested? YESNONA If not, PM notified	YESNO (NA)
1.	Was sufficient amount of sample sent in each	ch container? (ESNONA If not, PM notified	? YESNONA
2.	Were there Non-Conformance issues at logi	in? YES. NONCR#	
	tify that I entered this project into LIMS and tify that I attached a unique LIMS number	d answered questions 18-22 (initial/date) label with matching sample name to each container	2/17/17 / 2/17/17 / 2/11
001	tify that I notified the laboratory of any shor	rt holding time or RUSH parameters (initial/date)	2/17/17

QS10_R23_20151202_CoolerReceiptForm.docx

Page 1 of 1

Printed: 2/20/2017 12:08:24PM



WORK ORDER

1702143 Client: Microbac Laboratories, Inc.-Ohio Valley Division **Project Manager:** Sonya Gordon Project: Longhorn **Project Number:** MIC_Perc **Invoice To:** Report To: Microbac Laboratories, Inc.-Ohio Valley Division Microbac Laboratories, Inc.-Ohio Valley Division Adriane Steed Stephanie Mossburg 158 Starlite Drive 158 Starlite Drive Marietta, OH 45750 Marietta, OH 45750 Phone: (740) 373-4071 Phone: (740) 373-4071 Fax: (740) 373-4835 Fax: (740) 373-4835 Date Due: Date Received: 02/17/2017 08:50 03/03/2017 16:00 (10 day TAT) Logged In By: Tiana L. Hutchings Received By: Tiana L. Hutchings 1.1°C Samples Received at: Custody seals on the o Yes Samples received on is Yes Any headspace in vials Custody seals intact? Trip blank received? All containers in good Proper packing materia Cyanide Effluent samp Did the containers mat Preserved containers a VOA vials received? 608 Pest/PCB sample: 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)

03/15/2017 13:07

03/15/2017 13:16

10

10

LCMS PERC 6850 Q5

LCMS PERC 6850 Q5

1702143-05 GPW 3 - 021517 [Water] Sampled 02/15/2017 13:16

(GMT-06:00) Central Time (US & Canada)

Sample Delivery Group Assignment Form

CLIENT: Microbac Laboratories, Inc.-Ohio Valley Division

PROJECT NAME: Longhorn Report Due: 3/3/2017 SDG #: 1702143 Client Sample Count: 5

QC LEVEL: Level IV

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	Χ
Client Sample	2/15/2017	2/17/2017	1702143-02	HBW 10 - 021517	Water	Χ
Client Sample	2/15/2017	2/17/2017	1702143-03	HBW 1 - 021517	Water	Χ
Client Sample	2/15/2017	2/17/2017	1702143-04	GPW 1 - 021517	Water	Χ
Client Sample	2/15/2017	2/17/2017	1702143-05	GPW 3 - 021517	Water	Χ

Forms For Perchlorates

Sample Extraction Data

Prep Method: PERC_6850_W-SW6850

		Nominal						
Lab Number [Field ID]	Batch	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

HBW 7 - 021517

Laboratory:	Empirical Laboratories, LLC	SDG:	<u>1702143</u>

Preparation:

Client: <u>Microbac Laboratories, Inc.-Ohio Vall</u> Project: <u>Longhorn</u>

Matrix: Water Laboratory ID: 1702143-01 File ID: PERC000015.D.Report.TXT

Sampled: <u>02/15/17 12:32</u> Prepared: <u>02/23/17 10:18</u> Analyzed: <u>02/23/17 17:49</u>

Batch: <u>7B23018</u> Sequence: <u>7B05408</u> Calibration: <u>6144001</u> Instrument: <u>LCMS1</u>

CAS NO.	COMPOUND	CONC. (ug/L)	DL	LOD	LOQ	Q
14797-73-0	Perchlorate		0.500	1.00	2.00	U

PERC 6850 W

Dilution:

1

Total Target Analytes Reported 1 Project Analytes: 1

Solids:

HBW 10 - 021517

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: <u>Microbac Laboratories, Inc.-Ohio Vall</u> Project: <u>Longhorn</u>

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: <u>PERC 6850 W</u> Dilution: <u>1</u>

Batch:	<u>7B23018</u>	Sequence:	<u>7B05408</u>	Calibration:	<u>614400</u>	<u>1</u>	Instrument:	LCMS1	
CAS NO.	COMPOUND			CONC. (ug/L)	DL	LOD	LOO	0	

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

HBW 1 - 021517

Laboratory:	Empirical Laboratories, LLC		SDG:	<u>1702143</u>	
Client:	Microbac Laboratories, In	cOhio Vall	Project:	<u>Longhorn</u>	
Matrix:	Water	Laboratory ID:	<u>1702143-03</u>	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: <u>PERC 6850 W</u> Dilution: <u>1</u>

Batch:	<u>7B23018</u>	Sequence:	<u>7B05408</u>	Calibration:	614400	1	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

GPW 1 - 021517

Laboratory:	Empirical Laboratories, LLC	SDG:	<u>1702143</u>
Client:	Microbac Laboratories, IncOhio Vall	Project:	Longhorn

Matrix: Water Laboratory ID: 1702143-04 File ID: PERC000018.D.Report.TXT

Sampled: <u>02/15/17 13:07</u> Prepared: <u>02/23/17 10:18</u> Analyzed: <u>02/23/17 18:46</u>

Solids: Preparation: <u>PERC 6850 W</u> Dilution: <u>1</u>

Batch:	<u>7B23018</u>	Sequence:	<u>7B05408</u>	Calibration:	614400	1	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

GPW 3 - 021517

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: <u>Microbac Laboratories, Inc.-Ohio Vall</u> Project: <u>Longhorn</u>

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: <u>PERC 6850 W</u> Dilution: <u>1</u>

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

Project:

Laboratory: <u>Empirical Laboratories, LLC</u>

SDG: <u>1702143</u>

Client: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u>

Matrix: <u>Water</u>
Batch: <u>7B23018</u>

Laboratory ID: <u>7B23018-BS1</u>

Longhorn

Preparation: <u>PERC_6850_W</u>

Initial/Final: 10 mL / 10 mL

	SPIKE ADDED	LCS CONCENTRATION	LCS %	QC LIMITS
ANALYTE	(ug/L)	(ug/L)	REC.	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

Blank

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Matrix: Laboratory ID: <u>7B23018-BLK1</u> File ID: <u>PERC000008.D.Report.TXT</u>

 Sampled:
 Prepared:
 Analyzed:
 02/23/17 15:37

Solids: Preparation: <u>PERC 6850 W</u> Dilution:

Batch:	<u>7B23018</u>	Sequence:	<u>7B05408</u>	Calibrat	ion: <u>6144</u>	<u>001</u>	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

LCS

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Client: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Matrix: Laboratory ID: <u>7B23018-BS1</u> File ID: <u>PERC000009.D.Report.TXT</u>

 Sampled:
 Prepared:
 Analyzed:
 02/23/17 15:56

Solids: Preparation: <u>PERC 6850 W</u> Dilution:

Batch:	<u>7B23018</u>	Sequence:	<u>7B05408</u>	Calibrat	ion: <u>614</u>	<u>4001</u>	Instrument:	LCMS1
CACNO	COMBOTIND			CONC (ug/L)	DI	LOD	1.00	

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** PERC000002.D.Report.TXT 05/21/16 Lab File ID: Injection Date: Instrument ID: LCMS1 Injection Time: 09:46

Sequence: <u>6E14115</u> Lab Sample ID: <u>6E14115-TUN1</u>

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, LLCSDG:1702143Client:Microbac Laboratories, Inc.-Ohio Valley DivisionProject:LonghornLab File ID:PERC000002.D.Report.TXTInjection Date:02/23/17

Instrument ID: <u>LCMS1</u> Injection Time: <u>13:45</u>

Sequence: <u>7B05408</u> Lab Sample ID: <u>7B05408-TUN1</u>

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 Division Project: Longhorn

Instrument ID: LCMS1 Calibration: 6144001

Sequence: <u>7B05408</u>

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, LLCSDG:1702143Client:Microbac Laboratories, Inc.-Ohio Valley DivisionProject:LonghornSequence:6E14115Instrument:LCMS1

Calibration: <u>6144001</u>

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, LLCSDG:1702143Client:Microbac Laboratories, Inc.-Ohio Valley DivisionProject:LonghornSequence:7B05408Instrument:LCMS1

Calibration: <u>6144001</u>

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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Sequence: <u>7B05408</u> Instrument: <u>LCMS1</u>

Calibration: <u>6144001</u>

Internal Standard	Response	RT	Response	Reference Area %	Area % Limits	Q
Calibration Check (7B05408-CCV1)		Lab File ID: PER	C000004.D.Repo	ort.TXT A	Analyzed: 02/23/17	14:22
Perchlorate-d18	2319060	9.261	2047316	113	50 - 150	
Low Cal Check (7B05408-LCV1)		Lab File ID: PER	C000005.D.Repo	ort.TXT A	Analyzed: 02/23/17	14:41
Perchlorate-d18	2338540	9.239	2047316	114	50 - 150	
Interference Check A (7B05408-IFA1)		Lab File ID: PER	C000006.D.Repo	ort.TXT A	Analyzed: 02/23/17	15:00
Perchlorate-d18	1429030	7.515	2047316	70	50 - 150	
Blank (7B23018-BLK1)		Lab File ID: PER	C000008.D.Repo	ort.TXT A	Analyzed: 02/23/17	15:37
Perchlorate-d18	2369140	9.315	2047316	116	50 - 150	
LCS (7B23018-BS1)		Lab File ID: PER	C000009.D.Repo	ort.TXT A	Analyzed: 02/23/17	15:56
Perchlorate-d18	2358890	9.331	2047316	115	50 - 150	
HBW 7 - 021517 (1702143-01)		Lab File ID: PER	C000015.D.Repo	ort.TXT A	Analyzed: 02/23/17	17:49
Perchlorate-d18	1845230	8.45	2047316	90	50 - 150	
HBW 10 - 021517 (1702143-02)		Lab File ID: PER	C000016.D.Repo	ort.TXT A	Analyzed: 02/23/17	18:08
Perchlorate-d18	1912960	8.559	2047316	93	50 - 150	
HBW 1 - 021517 (1702143-03)		Lab File ID: PER	C000017.D.Repo	ort.TXT A	Analyzed: 02/23/17	18:27
Perchlorate-d18	1933940	8.571	2047316	94	50 - 150	
GPW 1 - 021517 (1702143-04)		Lab File ID: PER	C000018.D.Repo	ort.TXT A	Analyzed: 02/23/17	18:46
Perchlorate-d18	2035500	8.984	2047316	99	50 - 150	
GPW 3 - 021517 (1702143-05)		Lab File ID: PER	C000019.D.Repo	ort.TXT A	Analyzed: 02/23/17	19:05
Perchlorate-d18	2073360	9.013	2047316	101	50 - 150	
Calibration Check (7B05408-CCV2)		Lab File ID: PER	C000022.D.Repo	ort.TXT A	Analyzed: 02/23/17	20:02
Perchlorate-d18	1850400	8.465	2047316	90	50 - 150	
Low Cal Check (7B05408-LCV2)		Lab File ID: PER	C000023.D.Repo	ort.TXT A	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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Calibration: 6144001 Instrument: LCMS1

Matrix: Solid Calibration Dates: 5/21/16 10:39 5/21/16 12:44

	L	evel 01	L	evel 02	L	evel 03	L	evel 04	Lo	evel 05	Lo	evel 06
Compound	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: <u>Solid</u> Calibration Dates: <u>5/21/16 10:39</u> <u>5/21/16 12:44</u>

	L	evel 07	L	evel 08	L	evel 09	L	evel 10	L	evel 11	L	evel 12
Compound	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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Calibration: 6144001 Instrument: LCMS1

Matrix: <u>Solid</u> Calibration Dates: <u>5/21/16 10:39</u> <u>5/21/16 12:44</u>

Compound	Mean RF	RF RSD	Slope/QR A	Intercept/QR B	QR C	LR r/QRCOD	LIMIT	Q	Тур
Perchlorate	0.8535529	9.160918					20		A
Perchlorate (101)							20		A
Perchlorate (85)	0.2921029	7.869005					20		A

INITIAL CALIBRATION STANDARDS

SW6850

Project:

Longhorn

Laboratory: Empirical Laboratories, LLC SDG: 1702143

Sequence: 6E14115 Instrument: LCMS1

Microbac Laboratories, Inc.-Ohio Valley Division

Calibration: 6144001

Client:

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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Instrument ID: <u>LCMS1</u> Calibration: <u>6144001</u>

Lab File ID: PERC000014.D.Report.TXT Calibration Date: 05/21/16 00:00

Sequence: <u>6E14115</u> Injection Date: <u>05/21/16</u>

Lab Sample ID: 6E14115-ICV1 Injection Time: 13:20

		CONC	. (ug/L)	RESI	PONSE FACTO	OR	% DIFF / DRIFT		
COMPOUND	TYPE	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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Instrument ID: <u>LCMS1</u> Calibration: <u>6144001</u>

Lab File ID: PERC000004.D.Report.TXT Calibration Date: 05/21/16 00:00

Sequence: <u>7B05408</u> Injection Date: <u>02/23/17</u>

Lab Sample ID: 7B05408-CCV1 Injection Time: 14:22

		CONC. (ug/L)		RESI	PONSE FACTO)R	% 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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

Instrument ID: <u>LCMS1</u> Calibration: <u>6144001</u>

Lab File ID: PERC000022.D.Report.TXT Calibration Date: 05/21/16 00:00

Sequence: <u>7B05408</u> Injection Date: <u>02/23/17</u>

Lab Sample ID: 7B05408-CCV2 Injection Time: 20:02

		CONC. (ug/L)		RESI	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: <u>Microbac Laboratories, Inc.-Ohio Valley Division</u> Project: <u>Longhorn</u>

				Days	Max		Days	Max	
	Date	Date	Date	to	Days to	Date	to	Days to	
Sample Name	Collected	Received	Prepared	Prep	Prep	Analyzed	Analysis	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	
•		

PREPARATION BENCH SHEET	7B23018	Empirical Laboratories, LLC	Instrument: LCMS1	Prepared using: GCLC - PERC_6850_W (No Surrogate)	inal ul ul ul Spike ID Source ID Spike Surrogate PH Comments (Sample; Analysis; Extraction)	10.00 NA	10.00	10.00 17A0609 20 NA				
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ِ ا				M _	ul Surroga							
н ѕнеет		es, LLC	[S1	ERC_6850_	ul Spike							20
TION BENC	7B23018	cal Laboratori	trument: LCM	ing: GCLC - P	Source ID							
PREPARA		Empiri	Ins	Prepared usi	Spike ID							17A0609
					Final (mL)	10.00	10.00	10.00	10.00	10.00	10.00	10.00
					Initial (mL)	10.00	10.00	10.00	10.00	10.00	10.00	10.00
					Prepared	02/23/2017	02/23/2017	02/23/2017	02/23/2017	02/23/2017	02/23/2017	02/23/2017
					Analysis	LCMS_PERC_6850_Q5						
					Cont	4	⋖	∢	∢	∢		
170	214	3 RI	≣V0	Matrix: Water	Lab Number	1702143-01	1702143-02	1702143-03	1702143-04	1702143-05	7B23018-BLK1	7B23018-BS1

Reagents Used:	
Standard	Description
1630607	Water HPLC GRADE

Se pl6609864312 5-23-16

SEQUENCE TABLE:

Elvert ID 16E0510

ILEOSID

Line : 1 Location : Vial 2

Sample Information :

Sample Name : Reagent Blank

Line : 2 Location : Vial 1

Sample Information :

Sample Name : 6E14115-TUN1 | DO444

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 \\00052\

Line : 6
Location : Vial 92

Sample Information :

Sample Name : 6E14115-CAL2 (1005)29

Line : 7

Location : Vial 93

Sample Information :

Sample Name : 6E14115-CAL3 16D0530

Line : 8

Location : Vial 94

Sample Information :

Sample Name : 6E14115-CAL4 (\$\cdot 0.053 \)

00864313 45-8-11

Line

: Vial 95 Location

Sample Information :

: 6E14115-CAL5 16D0532 Sample Name

Line : 10

Location : Vial 96

Sample Information :

Sample Name

: 11 Line

: Vial 97 Location

Sample Information :

: 6E14115-CAL7\\) 0534 Sample Name

Line : 12 Location : Vial 98

Sample Information :

: 6E14115-CAL8 \\ \(\)053\\ Sample Name

Line : 13 : Vial 2 Location

Sample Information :

Sample Name : Reagent Blank

Line : 14 : Vial 99 Location

Sample Information :

: 6E14115-ICV1 1600557 Sample Name

______ _______

: 15 Line : Vial 3 Location

Sample Information :

: 6E14115-CCV1 NOT USING Sample Name

: 16 Line : Vial 4 Location

Sample Information :

Sample Name : 6E14115-LCV1

: 17 Line Location : Vial 5

Sample Information :

: 6E14115-IFA1 Sample Name

0/67/

: 18 Line Location : Vial 2

Sample Information :

: Reagent Blank NoT USING Sample Name

: 19 Line : Vial 2 Location

Sample Information :

Sample Name : Reagent Blank

: 20 Line

: Vial 41 Location

Sample Information :

: 1605063-01@100 Sample Name

Line : 21

: Vial 42 Location

Sample Information :

: 1605063-02@100 Sample Name

Line Location : Vial 3

Sample Information :

: 6E14115-CCV2 Sample Name

Line : 23 Location : Vial 4

Sample Information :

Sample Name : 6E14115-LCV2

Line : 24 Location : Vial 5

Sample Information :

: 6E-IFA1 Sample Name

Line : 25 : Vial 2 Location

Sample Information :

: Reagent Blank Sample Name

: 26 Line Location : Vial 2 Sequence: C:\CHEM32\1\SEQUENCE\20160521.S

00864315 Ge 5-23-14

Sample Information :

Sample Name : Reagent Blank

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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: C:\CHEM32\1\SEQUENCE\20170223.S LCM5-1 \6850

: 7B23018-BS1

1702143 REV01

00**8**64546 2-24-17 IWA e*la*

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SEQUENCE TABLE: Cluent IDs: 1780519, 1780520
Line
Location
          : Vial 2
Sample Information :
Sample Name
         : Reagent Blank
Line
Location
         : Vial 1
Sample Information :
         : 7B05408-TUN1 17A0677
Sample Name
Line
         : 3
Location
         : Vial 2
Sample Information :
Sample Name
         : Reagent Blank
Line
Location
         : Vial 3
Sample Information :
Sample Name
         : 7B05408-CCV1 17 406 78
Line
         : 5
Location
         : Vial 4
Sample Information :
         : 7B05408-LCV1 17 40679
Sample Name
Line
Location
         : Vial 5
Sample Information :
Sample Name
         : 7B05408-IFA1 6F0477
Line
         : 7
Location
         : Vial 81
Sample Information :
Sample Name
         : Reagent Blank
Line
Location
         : Vial 6
Sample Information :
Sample Name
         : 7B23018-BLK1
Line
Location
         : Vial 7
Sample Information :
```

00864331 2-24-17

Line : 10 Line : 10 Location : Vial 8 Sample Information : Sample Name : 1702137-11 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 Location : Vial 12 Sample Information : Sample Name : 7B23018-MSD1 Line Location : Vial 13 Sample Information : Sample Name : 1702143-01 Line 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

008649182 Sequence: C:\CHEM32\1\SEQUENCE\20170223.S LC MS-(\6850 2-24-17 Location : Vial 17 that EM Sample Information : X Sample Name : 1702143-05 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 : : 7B05408-CCV2 17 A0678 Sample Name Line : 23 Location : Vial 4 Sample Information : : 7B05408-LCV2 17A0679 Sample Name Line Location : Vial 20 Sample Information : X Sample Name : 1702152-02 Line : 25 Location : Vial 21 Sample Information : Sample Name : 1702152-03@2 Line : 26 Location : Vial 22 Sample Information : X Sample Name : 1702152-04 Line : 27 Location : Vial 23 Sample Information : Sample Name : 1702154-01 Line : 28 Location : Vial 24 1702143 REVOT : 7623018 - M52

Sequence: C:\CHEM32\1\SEQUENCE\20170223.S LC MS-1 \ 6850

00864379² 2-24-17

Ilut EA Line : 29 Location : Vial 25 Sample Information : хl Sample Name : 7B23018-MSD2 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 : Vial 29 Location Sample Information : Sample Name : 1702154~05 Line 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 : 7B05408-LCV3 17 A0679 Sample Name

Sequence: C:\CHEM32\1\SEQUENCE\20170223.S \(\(LM5-l\)\6850

Location : Vial 5

Sample Information :

16F0477 Sample Name : 7B05408-IFA2

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 : Vial 35 Location

Sample Information :

Sample Name : 1702154-08

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

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Line : 47 Location : Vial 39

1702143 REVOTOrmation : 1702154-10

00B643211 2-24-17

Just Elly Line : 48 Location : Vial 40 Sample Information : χ ( Sample Name : 1702154-11 : 49 Line Location : Vial 41 Sample Information : Sample Name : 1702154-12 : 50 Line Location : Vial 42 Sample Information : Sample Name : 1702154-13 Line : 51 Location : Vial 43 Sample Information : Sample Name : 1702154-14 Line : 52 : Vial 3 Location Sample Information : 7B05408-CCV4 17 A0678 Sample Name Line : 53 Location : Vial 4 Sample Information : : 7B05408-LCV4 \7 A0679 Sample Name \_\_\_\_\_\_\_\_ 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.SL(M5-1\685)

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Location : Vial 47

Sample Information :

Sample Name : 1702128-11@2

Line : 58 : Vial 48 Location

Sample Information :

: 1702128-11@5 Sample Name

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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 : Vial 54 Location

Sample Information :

Sample Name : 1702137-07@2

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Line : 65 Location : Vial 55

Sample Information :

: 1702137-10@2 Sample Name

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Line : 66 : Vial 3 Location

1702793 REVOTOrmation: 71305408-CCV3 17A0678

Sequence: C:\CHEM32\1\SEQUENCE\20170223.S LCM5-1 \6860

Line : 67
Location • Vial 4

Location : Vial 4

Sample Information :

: 7B05408-LCV5 17A-0679 Sample Name

\_\_\_\_\_\_

: 68 Line : Vial 81 Location

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

1702143 REV01 54

#### 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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| Average IS area of curve: | 2047316     |             |             |         |             |           | · · · · · · · · · · · · · · · · · · · |         |

[Average IS area of curve:]

83/85 Ratio Critera 2.3-3.8 RRT Criteria 0.98-1.02 IS Recovery Criteria ± 50% of Avg IS of curve

CAL Date 04/25/16

1702143 REV01 55

#### **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     |             | -           | 2085020 |             | 9.707     |           | 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      |             | 2045940 |             | 9.729     |           |       |
| 6E14115-CAL5 | 1755730     |             | 3.121       | 2072140 |             | 9.719     |           | 0.998 |
| 6E14115-CAL6 | 3646000     |             |             | 2063840 |             | 9.702     |           | 0.998 |
| 6E14115-CAL7 | 7550470     | 2386510     |             | 2032520 |             | 9.725     |           |       |
| 6E14115-CAL8 | 19125900    | 6116300     |             | 1918010 |             | 9.705     |           | 0.999 |
| 6E14115-ICV1 | 1665970     | 536774      |             | 2022850 |             |           |           |       |
|              |             |             |             |         |             |           |           |       |
| 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 |             | 131431      | 2.702       | 2030230 |             |           |           | 0.995 |
| 7B05408-LCV4 |             | 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 |

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| 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

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**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 – Managing Director

Jeslie Buina

State of Origin: TX

Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX

QAPP: DOD Ver 4.1





Microbac Laboratories \* Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 \* T: (740) 373-4071 F: (740) 373-4835 \* www.microbac.com



Discrepancy

2.0

Gun

**Lab Project #:** L17051393 **Lab Project #:** 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Resolution

J4616881659

# 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.

00112534

12

| Coolers  |             |             |      |           |                |
|----------|-------------|-------------|------|-----------|----------------|
| Cooler # | Temperature | Temperature | COC# | Airbill # | Temp Required? |

| spection Chec |                                                            |        |
|---------------|------------------------------------------------------------|--------|
| #             | 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    |
|               |                                                            |        |

Were VOA samples free of headspace (less than 6mm)?

NA

**Lab Report #:** L17051393 **Lab Project #:** 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

| Camples 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 |  |  |  |  |



| 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

| R2 S  | Field chain-of-custody documentation;  Sample identification cross-reference;  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).  Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits. |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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).  Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC                                                                                        |
| r     | 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).  Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC                                                                                                                                                                                                |
| R4 9  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| R5 -  | Test reports/summary forms for blank samples;                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|       | 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.                                                                                                                                                                                                                                                                                                 |
| \ 6   | 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.                                                                                                           |
|       | 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.                                                                                                                                                                                                                                                               |
|       | 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    | En C. Tum | Chemist III              | 2017-05-30 19:40:27 |



| 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 |                        |             |

| Chain-of-custody (C-O-C)  Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?  Were all departures from standard conditions described in an exception report?  Sample and quality control (QC) identification  Are all field sample ID numbers cross-referenced to the laboratory ID numbers?  Are all laboratory ID numbers cross-referenced to the corresponding QC data?  Test reports  Were all samples prepared and analyzed within holding times?  Other than those results < MQL, were all other raw values bracketed by calibration | X<br>X<br>X |   |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---|--|
| receipt?  Were all departures from standard conditions described in an exception report?  Sample and quality control (QC) identification  Are all field sample ID numbers cross-referenced to the laboratory ID numbers?  Are all laboratory ID numbers cross-referenced to the corresponding QC data?  Test reports  Were all samples prepared and analyzed within holding times?                                                                                                                                                                                                  | X           |   |  |
| Sample and quality control (QC) identification  Are all field sample ID numbers cross-referenced to the laboratory ID numbers?  Are all laboratory ID numbers cross-referenced to the corresponding QC data?  Test reports  Were all samples prepared and analyzed within holding times?                                                                                                                                                                                                                                                                                            |             |   |  |
| Are all field sample ID numbers cross-referenced to the laboratory ID numbers?  Are all laboratory ID numbers cross-referenced to the corresponding QC data?  Test reports  Were all samples prepared and analyzed within holding times?                                                                                                                                                                                                                                                                                                                                            | Х           |   |  |
| Are all laboratory ID numbers cross-referenced to the corresponding QC data?  Test reports  Were all samples prepared and analyzed within holding times?                                                                                                                                                                                                                                                                                                                                                                                                                            |             |   |  |
| Test reports  Were all samples prepared and analyzed within holding times?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X           |   |  |
| Were all samples prepared and analyzed within holding times?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Х           |   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |   |  |
| Other than those results < MQL, were all other raw values bracketed by calibration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Х           |   |  |
| standards?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Х           |   |  |
| Were calculations checked by a peer or supervisor?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Х           |   |  |
| Were all analyte identifications checked by a peer or supervisor?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Х           |   |  |
| Were sample detection limits reported for all analytes not detected?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Х           |   |  |
| Were all results for soil and sediment samples reported on a dry weight basis?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |             | Х |  |
| Were % moisture (or solids) reported for all soil and sediment samples?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             | Х |  |
| Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             | Х |  |
| If required for the project, are TICs reported?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             | Х |  |
| Surrogate recovery data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |             |   |  |
| Were surrogates added prior to extraction?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |             | Х |  |
| Were surrogate percent recoveries in all samples within the laboratory QC limits?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             | Х |  |
| Test reports/summary forms for blank samples                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Х           |   |  |
| Were appropriate type(s) of blanks analyzed?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Х           |   |  |
| Were blanks analyzed at the appropriate frequency?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Х           |   |  |
| Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Х           |   |  |
| Were blank concentrations < MQL?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Х           |   |  |
| Laboratory control samples (LCS):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |   |  |
| Were all COCs included in the LCS?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Х           |   |  |

RG-366/TRRP-13 May 2010



| 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?                                                                            | Х |   |   |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|
| Were LCSs analyzed at the required frequency?                                                                                                                            | Х |   |   |   |
| Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?                                                                                                  | Х |   |   |   |
| Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?                                  | Х |   |   |   |
| Was the LCSD RPD within QC limits?                                                                                                                                       |   |   | Х |   |
| Matrix spike (MS) and matrix spike duplicate (MSD) data                                                                                                                  |   |   |   |   |
| Were the project/method specified analytes included in the MS and MSD?                                                                                                   | Х |   |   |   |
| Were MS/MSD analyzed at the appropriate frequency?                                                                                                                       | Х |   |   |   |
| Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?                                                                                                    |   | Х |   | 1 |
| Were MS/MSD RPDs within laboratory QC limits?                                                                                                                            | Х |   |   |   |
| Analytical duplicate data                                                                                                                                                |   |   |   |   |
| Were appropriate analytical duplicates analyzed for each matrix?                                                                                                         |   |   | Х |   |
| Were analytical duplicates analyzed at the appropriate frequency?                                                                                                        |   |   | Х |   |
| Were RPDs or relative standard deviations within the laboratory QC limits?                                                                                               |   |   | Х |   |
| Method quantitation limits (MQLs):                                                                                                                                       |   |   |   |   |
| Are the MQLs for each method analyte included in the laboratory data package?                                                                                            | Х |   |   |   |
| Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?                                                                                 | Х |   |   |   |
| Are unadjusted MQLs and DCSs included in the laboratory data package?                                                                                                    | Х |   |   |   |
| Other problems/anomalies                                                                                                                                                 |   |   |   |   |
| Are all known problems/anomalies/special conditions noted in this LRC and ER?                                                                                            | Х |   |   |   |
| Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?                                         | Х |   |   |   |
| Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package? | Х |   |   |   |
| Initial calibration (ICAL)                                                                                                                                               |   |   |   |   |
| Were response factors and/or relative response factors for each analyte within QC limits?                                                                                | Х |   |   |   |
| Were percent RSDs or correlation coefficient criteria met?                                                                                                               | Х |   |   |   |

RG-366/TRRP-13 May 2010



| 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?                           | Х |   |  |
|--------------------------------------------------------------------------------------------------------|---|---|--|
| 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?           | Х |   |  |
| Initial and continuing calibration verification (ICCV and CCV) and continuing calibration blank (CCB): |   |   |  |
| Was the CCV analyzed at the method-required frequency?                                                 | Х |   |  |
| Were percent differences for each analyte within the method-required QC limits?                        | Х |   |  |
| Was the ICAL curve verified for each analyte?                                                          | Х |   |  |
| Was the absolute value of the analyte concentration in the inorganic CCB < MDL?                        |   | Х |  |
| Mass spectral tuning                                                                                   |   |   |  |
| Was the appropriate compound for the method used for tuning?                                           | Х |   |  |
| Were ion abundance data within the method-required QC limits?                                          | Х |   |  |
| Internal standards (IS)                                                                                |   |   |  |
| Were IS area counts and retention times within the method-required QC limits?                          | Х |   |  |
| Raw data (NELAC Section 5.5.10)                                                                        |   |   |  |
| Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?                  | Х |   |  |
| Were data associated with manual integrations flagged on the raw data?                                 | Х |   |  |
| Dual column confirmation                                                                               |   |   |  |
| Did dual column confirmation results meet the method-required QC?                                      |   | Х |  |
| Tentatively identified compounds (TICs)                                                                |   |   |  |
| If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?              |   | Х |  |
| Interference Check Sample (ICS) results                                                                |   |   |  |
| Were percent recoveries within method QC limits?                                                       |   | Х |  |
| 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?  |   | Х |  |
| Method detection limit (MDL) studies                                                                   |   |   |  |

RG-366/TRRP-13 May 2010



| 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? | Х |  |
| Standards documentation                                                                                |   |  |
| Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?      | Х |  |
| Compound/analyte identification procedures                                                             |   |  |
| Are the procedures for compound/analyte identification documented?                                     | Х |  |
| Demonstration of analyst competency (DOC)                                                              |   |  |
| Was DOC conducted consistent with NELAC Chapter 5?                                                     | Х |  |
| Is documentation of the analyst's competency up-to-date and on file?                                   | Х |  |
| Verification/validation documentation for methods (NELAC Chapter 5)                                    |   |  |
| Are all the methods used to generate the data documented, verified, and validated, where applicable?   | Х |  |
| Laboratory standard operating procedures (SOPs)                                                        |   |  |
| Are laboratory SOPs current and on file for each method performed                                      | Х |  |

- 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

RG-366/TRRP-13 May 2010



| 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 |                        |             |

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.

RG-366/TRRP-13 May 2010

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.

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

LOD

0.200

DL

0.100

Units: ug/L

File ID: 1LM.LM39716

Sample Tag: 01

| Analyte     | CAS#       | Result | Qual | LOQ   |
|-------------|------------|--------|------|-------|
| Perchlorate | 14797-73-0 | 0.200  | U    | 0.400 |

U Analyte was not detected. The concentration is below the reported LOD.

Page 2 of 6

Generated at May 31, 2017 11:23

Page 11



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 | L |
|  |             |         |            |        |      |       | _     |       |   |

U Analyte was not detected. The concentration is below the reported LOD.



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

Sample Tag: 01

File ID: 1LM.LM39720

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. |         |            |        |      |       |       |       |

Page 4 of 6

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.

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Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Page 6 of 6

# 2.1 General Chromatography Data

# 2.1.1 LC/MS Data (6850)

# 2.1.1.1 Summary Data

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 Analytical Method: 6850 Prep Date: 05/26/2017 12:00

Matrix: Water Workgroup #: WG615781

Analyst: JWR

Cal Date: 04/24/2017 15:40 Run Date: 05/26/2017 17:26

Collect Date: 05/24/2017 13:33

Dilution: 1

Sample Tag: 01

Units: ug/L

File ID: 1LM.LM39708

|             | Analyte | CAS#              | Result   | Qual | LOQ   | LOD   | DL    |
|-------------|---------|-------------------|----------|------|-------|-------|-------|
| Perchlorate |         | 14797-73-0        | 0.155    | J    | 0.400 | 0.200 | 0.100 |
| J           |         | ion was less than | the LOQ. |      |       |       |       |

Page 1 of 6

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. |         |            |        |      |       |       |       |  |

Page 2 of 6

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

Sample Tag: 01

File ID: 1LM.LM39719

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. |         |            |        |      |       |       |       |  |

Page 3 of 6

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: 11 M | M20720

Sample Tag: 01

Units: ug/L

File ID: 1LM.LM39720

| 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.

Page 4 of 6

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

Workgroup #: WG615781

Cal Date: 04/24/2017 15:40

Collect Date: 05/24/2017 14:30

Analyst: JWR

Run Date: 05/26/2017 21:32

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.

Page 5 of 6



Lab Report #: L17051393

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Page 6 of 6

# 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):

Amount of soil extracted (g):

Final volume of extract (mL):

Percent solids (Pct wt.)

Concentration in soil (ug/kg):

0.20059

5.00

100

2.005938

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 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   |   |

Page 1 of 27

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   | * |

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Worknum: WG615781



Units: ug/L

 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

Analysis Date: 05/26/2017 20:54

| Analyte     | Res #1 | Res #2 | Ratio | Lower | Upper | Q |
|-------------|--------|--------|-------|-------|-------|---|
| PERCHLORATE | 14000  | 4310   | 3.25  | 2.3   | 3.8   |   |

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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   |   |

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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   |   |

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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   |   |

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 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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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Microbac Laboratories Inc.

Worknum: WG615781



Login #: L17051393 Prep Method: 6850 Instrument: LCMS1 Prep Date: 05/26/2017 12:00 Analyst: JWR

Anal Method: 6850

**Analysis Date:** 05/26/2017 14:54

Samplenum: WG615781-02

File ID: 1LM.LM39700 Matrix: Water Units: ug/L

| Analyte     | Res #1 | Res #2 | Ratio | Lower | Upper | Q |
|-------------|--------|--------|-------|-------|-------|---|
| PERCHLORATE | 0.000  | 925    | 0.000 | 2.3   | 3.8   | * |

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Microbac Laboratories Inc.



Units: ug/L

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

| Analyte     | Res #1 | Res #2 | Ratio | Lower | Upper | Q |
|-------------|--------|--------|-------|-------|-------|---|
| PERCHLORATE | 36900  | 11100  | 3.32  | 2.3   | 3.8   |   |

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Microbac Laboratories Inc.



 Login #:
 L17051393

 Instrument:
 LCMS1

 Analyst:
 JWR

Worknum: WG615781

Prep Method: 6850

**Prep Date:** 05/26/2017 12:00

Anal Method: 6850

**Analysis Date:** 05/26/2017 20:16

Samplenum: WG615781-05

File ID: 1LM.LM39717

Matrix: Water
Units: ug/L

 Analyte
 Res #1
 Res #2
 Ratio
 Lower
 Upper
 Q

 PERCHLORATE
 47600
 14900
 3.19
 2.3
 3.8

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   | * |

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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   |   |

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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   |   |

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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   | * |

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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   |   |

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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   | * |

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# 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 ADG - APRIL D. GREENE ADC - ANTHONY D. CANTER AWE - ANDREW W. ESSIG ALS - ADRIANE L. STEED AZH - AFTER HOURS BJO - BRIAN J. OGDEN BLG - BRENDA L. GREENWALT BNB - Brandi N. Bentley
BRG - BRENDA R. GREGORY CAS - Craig A. Smith CLC - CHRYS L. CRAWFORD CEB - CHAD E. BARNES CLS - CARA L. STRICKLER CPD - CHAD P. DAVIS CSH - CHRIS S. HILL CV - Carl Volkman DCM - DAVID C. MERCKLE
DIH - DEANNA I. HESSON
DLP - DOROTHY L. PAYNE
DTG - DOMINIC T. GEHRET
EPT - ETHAN P. TIDD DAK - DEAN A. KETELSEN DAK - DEAN A. KETELSEN
DEV - DAVID E. VANDENBERG
DIB - DAVID I. BUMGARNER DLB - DAVID L. BUMGARNER DSM - DAVID S. MOSSOR ECL - ERIC C. LAWSON FJB - FRANCES J. BOLDEN
JDH - JUSTIN D. HESSON
JKP - JACQUELINE K. PARSONS ERP - ERIN R. PORTER ERP - EKIN K. FORTELL HRF - HEATHER R. FAIRCHILD JDS - JARED D. SMITH JESSICA L. DELONG JST - JOSHUA S. TAYLOR

JTP - JOSHUA T. PEMBERTON JWR - JOHN W. RICHARDS

JWS - JACK W. SHEAVEG JWS - JACK W. SHEAVES JYH - JI Y. HU KAK - KATHY A. KIRBY KDD - Katelyn D. Daley KHR - KIM H. RHODES KEB - KATIE E. BARNES KRA - KATHY R. ALBERTSON
LJH - Lacey J. Hendershot
LSB - LESLIE S. BUCINA KKB - KERRI K. BUCK KRP - KATHY R. PARSONS LLS - LARRY L. STEPHENS LSJ - LAURA S. JONES MAP - MARLA A. PORTER MES - MARY E. SCHILLING MBK - MORGAN B. KNOWLTON MRT - MICHELLE R. TAYLOR PDM - PIERCE D. MORRIS MMB - MAREN M. BEERY OJE - OMOYEMWEN J. ENGLISH REK - BOB E. KYER RNP - RICK N. PETTY SCA - SUEELLEN C. ADAMS SCJ - SUE ELLEN C. JOHNSON PIT - MICROBAC WARRENDALE RLB - BOB BUCHANAN SAV - SARAH A. VANDENBERG SCB - SARAH C. BOGOLIN TB - TODD BOYLE

TMM - TAMMY M. MORRIS SDC - SHALYN D. CONLEY TMB - TIFFANY M. BAILEY VC - VICKI COLLIER WTD - WADE T. DELONG XXX - UNAVAILABLE OR SUBCONTRACT ZTB - ZACH T. BARNES

|                                 | AECOM                                                                  |        |             |                                       | Chain of Custody Record    | of CL     | ıstoc           | ly Re    | cord                                     |           |              |           |          | 202                | COC Number:                                                                      |                        |          | 1      |
|---------------------------------|------------------------------------------------------------------------|--------|-------------|---------------------------------------|----------------------------|-----------|-----------------|----------|------------------------------------------|-----------|--------------|-----------|----------|--------------------|----------------------------------------------------------------------------------|------------------------|----------|--------|
| Laboratory:                     | Microbac POC Stephanie Mossburg                                        | sburg  |             | Project Manager:                      | er:                        | EIS       | Elspeth Sharp   | arb      |                                          |           |              |           | Mail to: |                    | Linda Raabe                                                                      | abe                    |          |        |
| Address:                        | te Drive                                                               | >      |             | Phone/Fax Number:                     | mber:                      | 210       | 210-296-2000    | 000      |                                          |           |              |           | •        | 1                  | 112 East Pecan                                                                   |                        | STE. 400 |        |
|                                 | Marietta, OH 45750                                                     |        |             | Sampler (print):                      | ÷                          | လွ        | Scott Beesinger | inger    |                                          |           |              |           |          | 1                  | San Antonio, TX                                                                  | nio, TX 78             | 78205    |        |
| Phone:                          | 1-800-373-4071                                                         |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          | - 1                | 210-296-2                                                                        | 2000                   |          | T      |
| Client:                         | AECOM                                                                  |        |             | Signature:                            | U                          |           | A               |          | 1                                        |           |              |           | Fed Ex / | Fed Ex Airbill No: | <u></u>                                                                          |                        |          |        |
| Address:                        | 112 East Pecan Ste. 400                                                |        |             |                                       | Z<br>V                     | 3         | A               | 9<br>V   | 9                                        | ۲         |              |           |          |                    |                                                                                  |                        |          | 1      |
|                                 | San Antonio, TX 78205                                                  |        |             |                                       |                            |           |                 |          | <u>フ</u>                                 |           |              |           | Program: |                    |                                                                                  |                        |          |        |
| Turn Around Time:               | Time: STANDARD                                                         |        |             | 芸                                     |                            |           | -               |          |                                          |           |              | •         |          |                    |                                                                                  |                        |          |        |
| Project Name/Location:          |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        |          |        |
| Project Number:                 |                                                                        |        |             | ı                                     |                            |           |                 |          |                                          |           |              |           |          | ERPIN              | AS REQU                                                                          | ERPIMS REQUIRED FIELDS | FDS      |        |
| Site Name                       | Samp                                                                   | SBD    | SED         | Date                                  | Time                       | -dmo2     | XirjsM          | PERC!    |                                          |           |              |           | V CODE   | ooler ID           | LOT C                                                                            | LOT CONTROL NUMBERS    | UMBERS   | 5      |
|                                 |                                                                        |        |             |                                       |                            | +         |                 | $\dashv$ |                                          | -         |              |           | s        | •                  |                                                                                  |                        | +        | T      |
| K                               | HBW 7 - 052417                                                         |        |             | 5/24/17                               | 13:33                      | ×         | ≥               | 7        | ×                                        |           |              |           |          |                    |                                                                                  |                        |          |        |
| <del>9</del> ə                  | HBW 10 - 052417                                                        |        |             | 5/24/17                               | 13:47                      | ×         | ≯               | -        | ×                                        |           |              |           |          |                    |                                                                                  |                        |          |        |
| Cr                              | HBW 1 - 052417                                                         |        |             | 5/24/17                               | 14:00                      | ×         | ≯               | ~        | ×                                        |           |              |           |          |                    |                                                                                  |                        |          |        |
| əir                             | GPW 1 - 052417                                                         |        |             | 5/24/17                               | 14:17                      | ×         | ₹               | -        | ×                                        |           |              |           |          |                    |                                                                                  |                        |          |        |
| rai                             | GPW 3 - 052417                                                         |        |             | 5/24/17                               | 14:30                      | ×         | ≯               | _        | ×                                        |           |              |           |          |                    |                                                                                  |                        |          |        |
| 4 €                             |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        |          |        |
| 980                             |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    | į                                                                                |                        | _        |        |
| 905                             |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        |          |        |
| 8' (                            |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        |          |        |
| no                              |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    | ·                                                                                |                        | -        |        |
| οΛι                             |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        |          |        |
| 8:                              |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          | * **               |                                                                                  |                        |          |        |
| uos                             |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        | _        |        |
| ei1                             |                                                                        |        |             |                                       |                            |           |                 | _        | _                                        |           | _            | _         |          |                    |                                                                                  |                        |          |        |
| Har                             | Comments: STANDARD TAT                                                 | A L    |             |                                       |                            | 7 - S.    |                 |          | Microbac OVD                             | c OVD     | Microbac OVD | g         |          |                    |                                                                                  |                        |          |        |
| Relinquished by                 |                                                                        | Date 7 | Date J      | Time<br>()                            | Received by: (Signature)   | (Signat   | 1               |          | RECEIVEN: 00/20/20<br>By: BRENDA GREGORY | GREGO     |              | 3         | 22100    | 221000101297       |                                                                                  | hed by: (Signature)    | ure)     |        |
| (Signature)                     |                                                                        | 2/2    | ZY / / Date | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | Received for Laboratory by | r Laborat |                 |          | ~                                        | •         |              |           |          |                    | 1                                                                                |                        |          | Τ      |
| Relinquished by:<br>(Signature) | )                                                                      |        |             |                                       | (Signature)                |           |                 |          | Aranda Hadan                             | James     | אסינת        |           |          |                    |                                                                                  |                        |          | -00    |
| •Homogenize                     | <ul> <li>Homogenize all composite samples prior to analysis</li> </ul> | :<br>: |             |                                       |                            |           | Distrib         | ution: V | Vhite to La                              | iborator) | r, Canary I  | o Project | Manager, | Pink Q             | Distribution: White to Laboratory, Canary to Project Manager, Pink QAVQC Manager | ager                   |          | 864410 |
|                                 |                                                                        |        |             |                                       |                            |           |                 |          |                                          |           |              |           |          |                    |                                                                                  |                        |          | )      |

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# COOLER TEMP >6° C LOG

|                                       | Bottle 1        | Bottle 2 | Bottle 3     | Bottle 4 | Bottle 5   | Bottle ( |
|---------------------------------------|-----------------|----------|--------------|----------|------------|----------|
| SAMPLE ID                             | οС              | °C       | °C           | °C       | <u>°</u> c | °C _     |
| · · · · · · · · · · · · · · · · · · · |                 |          |              |          |            |          |
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|                                       |                 |          | 5/25)        |          |            |          |
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pH Lot #HC601354

| SAMPLE ID                              | Bottle 1 | Bottle 2 | Bottle 3 | Bottle 4 | Bottle 5    | Bottle 6    |
|----------------------------------------|----------|----------|----------|----------|-------------|-------------|
|                                        |          |          |          |          |             |             |
|                                        |          |          |          |          |             |             |
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|                                        |          |          |          |          |             |             |
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|                                        | -        |          |          |          |             |             |
|                                        |          |          |          | 222      |             | # 1888      |
|                                        |          |          |          |          | ERVATI      |             |
|                                        |          |          |          | EXC      | PTIONS      | 3           |
|                                        |          |          |          |          | NONE        |             |
|                                        |          |          |          |          | NOTED       | <u> </u>    |
|                                        |          |          |          | 0.60     | 5/25/17     |             |
|                                        |          |          |          |          | 1 1 1       |             |
| ······································ |          |          |          |          |             |             |
|                                        |          |          |          |          |             |             |

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**

#### OVD HPLC02/HPLC-UV

Nitroglycerin Acetic acid Butyric acid Lactic acid Propionic acid Pyruvic acid

#### OVD MSS01/GC-MS

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

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# **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)





**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

Jeslie Bucisa

State of Origin: TX

Accrediting Authority: Texas Commission on Environmental Quality ID:T104704252-07-TX

QAPP: DOD Ver 4.1





Microbac Laboratories \* Ohio Valley Division
158 Starlite Drive, Marietta, OH 45750 \* T: (740) 373-4071 F: (740) 373-4835 \* www.microbac.com



**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     |            |

| Coolers  |                    |             |      |                    |                |
|----------|--------------------|-------------|------|--------------------|----------------|
| Cooler # | Temperature<br>Gun | Temperature | COC# | Airbill #          | Temp Required? |
| 0018394  | I                  | 3.0         |      | 1ZW056F52210009828 | X              |

| Inspec | 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     |  |  |  |  |  |  |  |



**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 |



| 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

| R2 S  | Field chain-of-custody documentation;  Sample identification cross-reference;  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).  Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC limits. |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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).  Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC                                                                                        |
| r     | 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).  Surrogate recovery data including: (a) Calculated recovery (%R), and (b) the laboratory's surrogate QC                                                                                                                                                                                                |
| R4 9  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| R5 -  | Test reports/summary forms for blank samples;                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|       | 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.                                                                                                                                                                                                                                                                                                 |
| \ 6   | 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.                                                                                                           |
|       | 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.                                                                                                                                                                                                                                                               |
|       | 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    | En C. Tum | Chemist III              | 2017-09-11 19:37:22 |



| 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?                                   | Х   |    |    |    |     |
| Were all departures from standard conditions described in an exception report?                                                | Х   |    |    |    |     |
| Sample and quality control (QC) identification                                                                                | Х   |    |    |    |     |
| Are all field sample ID numbers cross-referenced to the laboratory ID numbers?                                                | Х   |    |    |    |     |
| Are all laboratory ID numbers cross-referenced to the corresponding QC data?                                                  | Х   |    |    |    |     |
| Test reports                                                                                                                  |     |    |    |    |     |
| Were all samples prepared and analyzed within holding times?                                                                  | Х   |    |    |    |     |
| Other than those results < MQL, were all other raw values bracketed by calibration standards?                                 | Х   |    |    |    |     |
| Were calculations checked by a peer or supervisor?                                                                            | Х   |    |    |    |     |
| Were all analyte identifications checked by a peer or supervisor?                                                             | Х   |    |    |    |     |
| Were sample detection limits reported for all analytes not detected?                                                          | Х   |    |    |    |     |
| Were all results for soil and sediment samples reported on a dry weight basis?                                                |     |    | Х  |    |     |
| Were % moisture (or solids) reported for all soil and sediment samples?                                                       |     |    | Х  |    |     |
| Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035?                           |     |    | Х  |    |     |
| If required for the project, are TICs reported?                                                                               |     |    | Х  |    |     |
| Surrogate recovery data                                                                                                       |     |    |    |    |     |
| Were surrogates added prior to extraction?                                                                                    |     |    | Х  |    |     |
| Were surrogate percent recoveries in all samples within the laboratory QC limits?                                             |     |    | Х  |    |     |
| Test reports/summary forms for blank samples                                                                                  | Х   |    |    |    |     |
| Were appropriate type(s) of blanks analyzed?                                                                                  | Х   |    |    |    |     |
| Were blanks analyzed at the appropriate frequency?                                                                            | Х   |    |    |    |     |
| Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures? | Х   |    |    |    |     |
| Were blank concentrations < MQL?                                                                                              | Х   |    |    |    |     |
| Laboratory control samples (LCS):                                                                                             |     |    |    |    |     |
| Were all COCs included in the LCS?                                                                                            | Х   |    |    |    |     |

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| 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 |                        |             |

| e LCSs analyzed at the required frequency?  e LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?  s the detectability check sample data document the laboratory's capability to cet the COCs at the MDL used to calculate the SDLs?  the LCSD RPD within QC limits?  fix spike (MS) and matrix spike duplicate (MSD) data  e the project/method specified analytes included in the MS and MSD?  e MS/MSD analyzed at the appropriate frequency?  e MS (and MSD, if applicable) %Rs within the laboratory QC limits?  e MS/MSD RPDs within laboratory QC limits?  ytical duplicate data  e appropriate analytical duplicates analyzed for each matrix?  e analytical duplicates analyzed at the appropriate frequency?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | X |   |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|--|
| s the detectability check sample data document the laboratory's capability to be the COCs at the MDL used to calculate the SDLs?  the LCSD RPD within QC limits?  ix spike (MS) and matrix spike duplicate (MSD) data  the project/method specified analytes included in the MS and MSD?  MS/MSD analyzed at the appropriate frequency?  MS (and MSD, if applicable) %Rs within the laboratory QC limits?  MS/MSD RPDs within laboratory QC limits?  Witcal duplicate data  appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Х |   |  |
| the LCSD RPD within QC limits?  Ix spike (MS) and matrix spike duplicate (MSD) data  It the project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project/method specified analytes included in the MS and MSD?  It was marked to project |   |   |  |
| ix spike (MS) and matrix spike duplicate (MSD) data the project/method specified analytes included in the MS and MSD? MS/MSD analyzed at the appropriate frequency? MS (and MSD, if applicable) %Rs within the laboratory QC limits? MS/MSD RPDs within laboratory QC limits? Witcal duplicate data Exampropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Х |   |  |
| e the project/method specified analytes included in the MS and MSD?  e MS/MSD analyzed at the appropriate frequency?  e MS (and MSD, if applicable) %Rs within the laboratory QC limits?  e MS/MSD RPDs within laboratory QC limits?  ytical duplicate data  e appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Х |   |  |
| e MS/MSD analyzed at the appropriate frequency?  e MS (and MSD, if applicable) %Rs within the laboratory QC limits?  e MS/MSD RPDs within laboratory QC limits?  ytical duplicate data  e appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   |   |  |
| e MS (and MSD, if applicable) %Rs within the laboratory QC limits?  e MS/MSD RPDs within laboratory QC limits?  ytical duplicate data  e appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   | Х |  |
| e MS/MSD RPDs within laboratory QC limits?  ytical duplicate data e appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   | Х |  |
| ytical duplicate data e appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |   | Х |  |
| e appropriate analytical duplicates analyzed for each matrix?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   | Х |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |   |  |
| analytical duplicates analyzed at the appropriate frequency?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |   | Х |  |
| , analytical adplicates analyzed at the appropriate frequency.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   | Х |  |
| RPDs or relative standard deviations within the laboratory QC limits?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |   | Х |  |
| od quantitation limits (MQLs):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |   |  |
| he MQLs for each method analyte included in the laboratory data package?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Х |   |  |
| ne MQLs correspond to the concentration of the lowest non-zero calibration dard?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Х |   |  |
| unadjusted MQLs and DCSs included in the laboratory data package?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Х |   |  |
| r problems/anomalies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |   |  |
| all known problems/anomalies/special conditions noted in this LRC and ER?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Х |   |  |
| applicable and available technology used to lower the SDL to minimize the ix interference effects on the sample results?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Х |   |  |
| e laboratory NELAC-accredited under the Texas Laboratory Accreditation ram for the analytes, matrices and methods associated with this laboratory data age?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Х |   |  |
| I calibration (ICAL)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |   |  |
| e response factors and/or relative response factors for each analyte within QC e?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |   |   |  |
| e percent RSDs or correlation coefficient criteria met?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X |   |  |

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| 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                    | X |   |  |
| the curve?                                                                                             |   |   |  |
| 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?                                                 | Х |   |  |
| Were percent differences for each analyte within the method-required QC limits?                        | Х |   |  |
| Was the ICAL curve verified for each analyte?                                                          | Х |   |  |
| Was the absolute value of the analyte concentration in the inorganic CCB < MDL?                        |   | Х |  |
| Mass spectral tuning                                                                                   |   |   |  |
| Was the appropriate compound for the method used for tuning?                                           | Х |   |  |
| Were ion abundance data within the method-required QC limits?                                          | Х |   |  |
| Internal standards (IS)                                                                                |   |   |  |
| Were IS area counts and retention times within the method-required QC limits?                          | Х |   |  |
| Raw data (NELAC Section 5.5.10)                                                                        |   |   |  |
| Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?                  | Х |   |  |
| Were data associated with manual integrations flagged on the raw data?                                 | Х |   |  |
| Dual column confirmation                                                                               |   |   |  |
| Did dual column confirmation results meet the method-required QC?                                      |   | Х |  |
| Tentatively identified compounds (TICs)                                                                |   |   |  |
| If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?              |   | Х |  |
| 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?  |   | Х |  |
| Method detection limit (MDL) studies                                                                   |   |   |  |
|                                                                                                        | 1 |   |  |

RG-366/TRRP-13 May 2010



| 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? | Х |  |
| Standards documentation                                                                                |   |  |
| Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?      | Х |  |
| Compound/analyte identification procedures                                                             |   |  |
| Are the procedures for compound/analyte identification documented?                                     | Х |  |
| Demonstration of analyst competency (DOC)                                                              |   |  |
| Was DOC conducted consistent with NELAC Chapter 5?                                                     | Х |  |
| Is documentation of the analyst's competency up-to-date and on file?                                   | Х |  |
| Verification/validation documentation for methods (NELAC Chapter 5)                                    |   |  |
| Are all the methods used to generate the data documented, verified, and validated, where applicable?   | Х |  |
| Laboratory standard operating procedures (SOPs)                                                        |   |  |
| Are laboratory SOPs current and on file for each method performed                                      | Х |  |

- 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

RG-366/TRRP-13 May 2010



#### 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 |                        |             |

There are no exceptions.

**Lab Report #:** L17090079

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Instrument: LCMS1

Lab Contact: Adriane Steed

Certificate of Analysis

Sample #: L17090079-01 PrePrep Method: N/A

 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 |  |
| reiciliotate | 14/3/-/3-0 | 0.111  | J    | 0.400 | 0.200 | 0.10  |  |

J Estimated value ; the analyte concentration was less than the LOQ.

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

Ruii Date. 09/06/2017 20:59

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           | U Analyte was not detected. The concentration is below the reported LOD. |            |        |      |       |       |       |  |

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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.



Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

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# 2.1 General Chromatography Data

# 2.1.1 LC/MS Data (6850)

# 2.1.1.1 Summary Data

Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Certificate of Analysis

**Sample** #: L17090079-01

**Client ID:** HBW 7 - 083117

Matrix: Water

Workgroup #: WG628979

Collect Date: 08/31/2017 13:08

Sample Tag: 01

PrePrep Method: N/A

Prep Method: 6850

Analytical Method: 6850

Analyst: JWR
Dilution: 1

Units: ug/L

Instrument: LCMS1

Prep Date: 09/08/2017 15:00
Cal Date: 09/08/2017 16:52

Run Date: 09/08/2017 20:40

File ID: 1LM.LM40503

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.

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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.

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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.

Page 3 of 4



Lab Report #: L17090079
Lab Project #: 2551.096

Project Name: Longhorn Army Ammunition

Lab Contact: Adriane Steed

Page 4 of 4

# 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 ion, Cx (ug/L): 0.200594

Analyte Concentration, Cx (ug/L): 0.20059

#### **Example Calculation - Soil:**

Analyte Concentration, Cx (ug/L):

Amount of soil extracted (g):

Final volume of extract (mL):

Percent solids (Pct wt.)

Concentration in soil (ug/kg):

0.20059

5.00

100

2.005938

# Microbac Laboratories Inc. Instrument Run Log

|               | Instrument:      | LCMS1          |                                                   | Dataset:           | 090817_J     | WR.TXT            | _                     |                 |
|---------------|------------------|----------------|---------------------------------------------------|--------------------|--------------|-------------------|-----------------------|-----------------|
|               | Analyst1:        | JWR            |                                                   | Analyst2:          | NA           |                   | _                     |                 |
|               | Method:          | 6850           |                                                   | SOP:               | HPLC06       |                   | Rev: <u>8</u>         |                 |
| Mair          | ntenance Log ID: |                |                                                   | Syringe I          | Filter Lot#: | 160109254         |                       |                 |
|               |                  |                |                                                   | E                  | luent ID#:   |                   |                       |                 |
| Workgroups:   |                  | Column 1 ID:   | KP-RPPX250                                        |                    | Columi       | n 2 ID: <u>NA</u> |                       |                 |
| 0 .           | Analytical WG62  | 28979 (waters) | )                                                 |                    |              |                   |                       |                 |
| Internal STD: | COA19471         |                | Surrogate STI                                     | D: <u>NA</u>       |              | Calibratio        | on STD <u>STD8023</u> | 32 (09/08/2017) |
| CCV STD:      | STD80232         |                | LCS STI                                           | D: <u>STD80234</u> |              | MS/MS[            | O STD: NA             |                 |
|               |                  |                | 7 : Alternate Sou<br>nn : RPPX 5um<br>K'Prime S/N |                    |              |                   |                       |                 |

| 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

| Sea. | Rerun Dil. | Reason | Analytes |
|------|------------|--------|----------|
|      |            |        |          |

Page: 1 Approved: 11-SEP-1

E-C. Zum



#### Microbac Laboratories Inc. Data Checklist

Date: 08-SEP-2017 Analyst: JWR Analyst: NA

Method: <u>6850</u> Instrument: LCMS1

Curve Workgroup: WG628977 Runlog ID: 84489

Analytical Workgroups: L17081653, L17090079

| ANIALVIICAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| ANALYTICAL Charles and Charles | NI A     |
| System Performance Check                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | NA<br>NA |
| DFTPP (GCMS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | NA<br>NA |
| Endrin/DDT breakdown (8081/GCMS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NA<br>NA |
| Pentachlorophenol/benzidine tailing (GCMS)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | NA<br>NA |
| Eluent check (IC)/system pressure (HPLC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | NA<br>NA |
| Window standard (FID)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | NA NA    |
| Initial Calibration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | X        |
| Average RF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | NA 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Х        |
| 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      |
| Timinary newtone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | JVVIC    |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | FCL      |
| beconing A veniewer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | EUL      |

Primary Reviewer: Secondary Reviewer: 11-SEP-2017 11-SEP-2017

John Richards En C. Zum

CHECKLIST1 - Modified 03/05/2008 Generated: SEP-11-2017 14:46:16

Microbac Laboratories Inc.

HOLDING TIMES EQUIVALENT TO AFCEE FORM 9

00864440

Analytical Method: 6850

Login Number: L17090079

AAB#: WG628979

| Client ID       | ID | Date<br>Collected | TCLP<br>Date | Time<br>Held | Max<br>Hold | ~ | Extract<br>Date | Time<br>Held | Max<br>Hold | Q | Run<br>Date | Time<br>Held | Max<br>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



Page 25

#### 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        | υ         |

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: <u>L1709007</u> | 79   |      | Analyst: <u>JWR</u> |     | Prep Method: 6850     |
|-----------|-------------------------|------|------|---------------------|-----|-----------------------|
| Instru    | ment 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  |       |       | %.DDD | %Rec RPD Limits Lmt |          |    |   |
|-------------|-------|-------|-------|-------|-------|-------|---------------------|----------|----|---|
| Analytes    | Known | Found | % REC | Known | Found | % REC | *RPD                | LIMIUS   | шс | Q |
| 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

Login Number:L17090079

Analytical Method:6850

ICAL Workgroup:WG628977

Instrument ID:<u>LCMS1</u>
Initial Calibration Date:<u>08-SEP-17 16:52</u>
Column ID:<u>F</u>

| Analyte     | AVG RF | % RSD | LINEAR (R) | QUAD (R2) |
|-------------|--------|-------|------------|-----------|
| Perchlorate | 1.469  | 6.88  | 1.00000    |           |

R = Correlation coefficient; 0.995 minimum
R<sup>2</sup> = Coefficient of determination; 0.99 minimum

INT\_CAL - Modified 03/06/2008

PDF File ID: 5470894

Report generated 09/11/2017 14:55

Microbac Laboratories Inc. INITIAL CALIBRATION DATA

00864445

Login Number: L17090079
Analytical Method: 6850

#### Instrument ID: LCMS1

Initial Calibration Date: 08-SEP-17 16:52

Column ID:F

|             | WG628977-02 |              |       | WG628977-03 |            |       | WG628977-04 |            |       |  |  |
|-------------|-------------|--------------|-------|-------------|------------|-------|-------------|------------|-------|--|--|
| Analyte     | CONC        | CONC RESP RF |       |             | 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



Microbac Laboratories Inc. INITIAL CALIBRATION DATA

00864446

Login Number: L17090079
Analytical Method: 6850

# Instrument ID:<u>LCMS1</u> Initial Calibration Date:<u>08-SEP-17 16:52</u>

-

Column ID:F

|             | WG628977-05 |              |       | WG628977-06 |            |       | WG628977-07 |            |       |
|-------------|-------------|--------------|-------|-------------|------------|-------|-------------|------------|-------|
| Analyte     | CONC        | 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



Microbac Laboratories Inc. INITIAL CALIBRATION DATA

00864447

Login Number: L17090079
Analytical Method: 6850

Instrument ID:LCMS1
Initial Calibration Date:08-SEP-17 16:52
Column ID:F

| _           | WG628977-08  |            |       |  |
|-------------|--------------|------------|-------|--|
| Analyte     | CONC RESP RE |            |       |  |
| 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: <u>L17090079</u> | 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           |
| TCal Workgroup.WG628977        | Cal TD: T.CMS1 - 08-SEP-1 | 7                      |

| Analyte     | Expected | Found | Units | RF   | %D   | UCL | Q |
|-------------|----------|-------|-------|------|------|-----|---|
| Perchlorate | 1.00     | 1.04  | ug/L  | 1.48 | 4.00 | 15  |   |

<sup>\*</sup> Exceeds %D Limit

ALT - Modified 09/06/2007 Version 1.5 PDF File ID: 5470895 Report generated 09/11/2017 14:55

## Microbac Laboratories Inc. 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:
 U

| Analytes    | MDL   | RDL   | Concentration | Qualifier |
|-------------|-------|-------|---------------|-----------|
| Perchlorate | 0.100 | 0.400 | 0.100         | υ         |

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



## Microbac Laboratories Inc. CONTINUING CALIBRATION BLANK (CCB)

 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:
 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         | υ         |

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: WG628984-02

 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
 Analyst: JWR

| Analyte     | Expected | Found | Found UNITS RF |      | %D   | UCL | Q |
|-------------|----------|-------|----------------|------|------|-----|---|
| Perchlorate | 1.00     | 1.07  | ug/L           | 1.52 | 7.00 | 15  |   |

<sup>\*</sup> Exceeds %D Criteria

CCV - Modified 03/05/2008 PDF File ID: 5470423 Report generated 09/11/2017 14:55



## Microbac Laboratories Inc. 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:
 LLM.LM40506
 Analyst:
 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:
 LCMS1
 Matrix:
 Water
 Units:
 U

| 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:
 LLM.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

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 - 018LP

Underline = Response outside limits

INTERNAL\_STD\_AVG\_ICAL - Modified 03/10/2010 PDF File ID: 5470427 Report generated 09/11/2017 14:55

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 - 018LP

<u>Underline</u> = 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   |   |

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#### **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   |   |

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#### **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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   | * |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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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   |   |

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# 3.0 Attachments

## Microbac Laboratories Inc. Ohio Valley Division Analyst List September 11, 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 ADG - APRIL D. GREENE ADC - ANTHONY D. CANTER

AWE - ANDREW W. ESSIG ALS - ADRIANE L. STEED 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 DLB - DAVID L. BUMGARNER DIH - DEANNA I. HESSON

DSM - DAVID S. MOSSOR DLP - DOROTHY L. PAYNE ECL - ERIC C. LAWSON DTG - DOMINIC T. GEHRET EPT - ETHAN P. TIDD ERP - ERIN R. PORTER

HRF - HEATHER R. FAIRCHILD FJB - FRANCES J. BOLDEN

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 KHR - KIM H. RHODES

KAR - KATHI A. KIRBI
KEB - KATIE E. BARNES
KKB - KERRI K. BUCK
KRP - KATHY R. PARSONS
LLS - LARRY L. STEPHENS
LSJ - LAURA S. JONES KRA - KATHY R. ALBERTSON
LJH - Lacey J. Hendershot
RUCINA

MBK - MORGAN B. KNOWLTON MAP - MARLA A. PORTER MMB - MAREN M. BEERY OJE - OMOYEMWEN J. ENGLISH MES - MARY E. SCHILLING

MRT - MICHELLE R. TAYLOR PDM - PIERCE D. MORRIS PIT - MICROBAC WARRENDALE

RLB - BOB BUCHANAN REK - BOB E. KYER

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

## Microbac Laboratories Inc. List of Valid Qualifiers September 11, 2017

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<br>B             | See the report narrative 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                                                                                                                                           |
| С                  | Confirmed by GC/MS                                                                                                                                                                                |
| CG                 | Confluent growth                                                                                                                                                                                  |
| CT1                | Cooler temperature at sample reciept exceeded regulatory limit.                                                                                                                                   |
| DL<br>E            | Surrogate or spike compound was diluted out. 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<br>H1,CT1       | Sample analysis performed past holding time. Sample analysis performed past holding time. The cooler temperature at receipt exceeded regulatory guidelines for reque                              |
| П1,С11<br>         | Semiquantitative result (out of instrument calibration range)                                                                                                                                     |
| j                  | Estimated concentration; sample matrix interference.                                                                                                                                              |
| Ĵ                  | 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<br>J,H1       | Estimated value; the analyte concentration was less than the LOQ. Sample analysis performed past holding time.  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<br>N             | Matrix effect; the concentration is an estimate due to matrix effect.  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<br>ND,H1,CT1 | Not detected; Sample analysis performed past holding time.  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<br>Q,H1          | One or more quality control criteria failed. See narrative.  One or more quality control criteria failed. Sample analyzed past holding time. See narrative.                                       |
| Q,FT<br>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<br>TIC          | Laboratory not licensed for this parameter                                                                                                                                                        |
| IIC                | Library Search Compound                                                                                                                                                                           |



## Microbac Laboratories Inc. List of Valid Qualifiers September 11, 2017

Qualkey: DOD

| INIC     | 100 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                                                                           |

Microbac <sup>®</sup>

|                                 | AMCOM                                                                  |                    |         |      |                   | Chain of Custody Record                    | Jo I     | Cust            | pdy      | Rec    | ord            |                                                  |               |          |         |          | ၁                  | COC Number:                                                                      |                         |         |        |
|---------------------------------|------------------------------------------------------------------------|--------------------|---------|------|-------------------|--------------------------------------------|----------|-----------------|----------|--------|----------------|--------------------------------------------------|---------------|----------|---------|----------|--------------------|----------------------------------------------------------------------------------|-------------------------|---------|--------|
| Laboratory:                     | Microbac POC: Stepha                                                   | Stephanie Mossburg | urg     |      | Project Manager:  | ager:                                      |          | Elspeth Sharp   | Shar     | ١      |                |                                                  |               |          |         | Mail to: |                    | Linda Raabe                                                                      | aabe                    |         |        |
| Address:                        | te Drive                                                               |                    |         |      | Phone/Fax Number: | Vumber:                                    |          | 210-296-2000    | 3-200(   |        |                |                                                  |               |          |         |          |                    | 112 Eas                                                                          | 112 East Pecan STE. 400 | STE. 4( | 0      |
|                                 | Marietta, OH 45750                                                     |                    |         |      | Sampler (print):  | int):                                      |          | Scott Beesinger | eesing   | Jer    |                |                                                  |               |          | ·       |          | 1.                 | San Ant                                                                          | San Antonio, TX 78205   | 78205   |        |
| Phone:                          | 1-800-3/3-40/ I                                                        |                    |         |      | 1                 |                                            |          |                 |          | Í      |                |                                                  |               |          |         |          |                    | 2 10-230                                                                         | 2002                    |         | Ī      |
| Client:                         | AECOM                                                                  |                    |         |      | Signature:        | <i>)</i>                                   |          |                 | (<br>    | ا      | _              |                                                  |               |          |         |          | Fed Ex Alroill No: | <b>.</b>                                                                         |                         |         |        |
| Address:                        | 112 East Pecan Ste. 400                                                |                    |         |      |                   | V                                          | 3        | 3               | K        | Á      | ?              |                                                  |               |          | 1       |          |                    |                                                                                  |                         |         |        |
|                                 | San Antonio, TX 78205                                                  |                    |         |      |                   |                                            |          |                 |          |        | J              |                                                  |               |          |         | Program: |                    |                                                                                  |                         |         |        |
| Turn Around Time:               | Time: STANDARD                                                         |                    |         |      | 芸                 |                                            |          |                 | SJƏI     | 3.     |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| Project Name/Location:          | Location: Longhorn                                                     |                    |         |      |                   |                                            |          |                 | nistne   | TAЯ    |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| Project Number:                 |                                                                        | 09AA               |         |      |                   |                                            |          |                 | of Co    | нго    |                |                                                  |               |          |         |          | ERPI               | AS REQ                                                                           | ERPIMS REQUIRED FIELDS  | ELDS    |        |
|                                 |                                                                        | į                  |         |      |                   |                                            | ₌di      |                 | nber     | EBC    |                |                                                  |               |          |         | 300      | dl 1               | ГОТ                                                                              | LOT CONTROL NUMBERS     | NUMBE   | SS     |
| Site Name                       | Sample ID/Location ID                                                  | <u>0</u>           | SBD     | SED  | Date              | Time                                       | moə      | en Đ<br>Việt M  |          | 4      |                |                                                  |               |          |         | SA C     | BlooD              | ABLOT                                                                            | EBLOT                   |         | TBLOT  |
| K                               | HBW 7 - 083117                                                         |                    |         |      | 8/31/17           | 13:08                                      |          | ×               | 1 1      | X      |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| 99                              | HBW 10 - 083117                                                        |                    |         |      | 8/31/17           | 13:18                                      |          | ×               | 1        | ×      |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| Cr                              | HBW 1 - 083117                                                         |                    |         |      | 8/31/17           | 13:27                                      |          | ×               | 1 1      | ×      |                |                                                  |               |          |         |          |                    | ·                                                                                |                         |         |        |
| əį.                             |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         | :        |                    |                                                                                  |                         |         |        |
| rai                             |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| d 6                             |                                                                        |                    |         |      |                   |                                            |          |                 | _        |        | <u> </u>       |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| 980                             |                                                                        |                    |         |      |                   |                                            |          |                 |          |        | <del> </del>   | <u> </u>                                         |               |          |         |          |                    |                                                                                  |                         |         |        |
| e                               |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| .8                              |                                                                        |                    |         |      |                   | :                                          |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         | -      |
| no                              |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| ολε                             |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| <br>8                           |                                                                        |                    | ·       |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| uo:                             |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         | _       |        |
| ei11                            |                                                                        |                    |         |      |                   |                                            |          | _               |          |        | $\dashv$       | $\dashv$                                         |               |          |         |          |                    | •                                                                                |                         |         |        |
| Наі                             | Comments: STANDARD TAT                                                 | DARD               | Ĭ       |      |                   |                                            |          |                 |          |        | roba           | Microbac OVD                                     | _             | i        |         |          |                    |                                                                                  |                         |         |        |
|                                 |                                                                        |                    | -       | Date | Time              | Received by: (Signature)                   | by: (Sig | nature)         |          |        | sived:<br>CARA | Received: 09/01/2017 14:51<br>By: CARA STRICKLER | 72017 1<br>ER | 4:51     |         | 22100    | 221000105442       |                                                                                  | ed by: (Signature)      | atture) |        |
| (Signature)                     | Look Krish                                                             | 2                  | 8131/17 | 111  | 1430              |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         |        |
| Relinquished by.<br>(Signature) | ) h                                                                    | <b>.</b>           |         | ate  | Time              | Received for Laboratory by:<br>(Signature) | for Lab  | oratory by      |          | ~      | マギロ            | DANA STRICKLER                                   | XION          | Ser      |         |          | -                  |                                                                                  |                         |         | 00     |
| -Homogenize                     | <ul> <li>Homogenize all composite samples prior to analysis</li> </ul> | analysis           |         |      |                   |                                            |          | Dis             | tributio | n: Whi | te to La       | aborator                                         | y, Cana       | ry to Pr | oject N | lanager, | Pink Q             | Distribution: White to Laboratory, Canary to Project Manager, Pink QAVQC Manager | nager                   |         | 864482 |
|                                 |                                                                        |                    |         |      |                   |                                            |          |                 |          |        |                |                                                  |               |          |         |          |                    |                                                                                  |                         |         | 2      |

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## COOLER TEMP >6° C LOG

| Cooler ID 5442 |          | coo      | LER TEMP >6° C | LOG      |          |          |
|----------------|----------|----------|----------------|----------|----------|----------|
|                | Bottle 1 | Bottle 2 | Bottle 3       | Bottle 4 | Bottle 5 | Bottle 6 |
| SAMPLE ID      | °C       | °C       | · °C           | °C       | °C       | °C       |
|                |          |          |                |          |          |          |
|                |          | ·····    |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          | ality          |          |          |          |
|                |          |          | , AO           |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          |                |          |          |          |
|                |          |          | <u> </u>       | <u> </u> | <u> </u> | <u> </u> |

рΗ **Exceptions** pH Lot # HC601354 **Bottle 6 Bottle 4** Bottle 5 SAMPLE ID Bottle 2 **Bottle 3 Bottle 1 PRESERVATIVE EXCEPTIONS** 

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

<u>Samplenum</u> <u>Container ID</u> <u>Products</u> <u>L17090079-01</u> 958917 PCT-S 6850

Bottle: 1

| Seq. | Purpose | From   | То  | Date/Time         | Accept | Relinquish | рН |
|------|---------|--------|-----|-------------------|--------|------------|----|
| 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        |    |

<u>Samplenum</u> <u>Container ID</u> <u>Products</u> <u>L17090079-02</u> 958918 PCT-S 6850

Bottle: 1

| Seq. | Purpose | From   | То  | Date/Time         | Accept | Relinquish | рН |
|------|---------|--------|-----|-------------------|--------|------------|----|
| 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        |    |

<u>Samplenum</u> <u>Container ID</u> <u>Products</u> <u>L17090079-03</u> 958919 PCT-S 6850

Bottle: 1

| Seq. | Purpose | From   | То  | Date/Time         | Accept | Relinquish | Hq |
|------|---------|--------|-----|-------------------|--------|------------|----|
| 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**

## OVD HPLC02/HPLC-UV

Nitroglycerin Acetic acid Butyric acid Lactic acid Propionic acid Pyruvic acid

## OVD MSS01/GC-MS

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)



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,

Generated By: Dayna.Fisher

Sonia West

Sonia West Project Manager



Client: Bhate Environmental Associates, Inc.

Project: LHAAP/Quarterly Surface Water SAMPLE SUMMARY

Work Order: HS17121303

| 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 |      |



Client: Bhate Environmental Associates, Inc. CASE NARRATIVE

Project: LHAAP/Quarterly Surface Water

Work Order: HS17121303

## **Work Order Comments**

• The analysis for Perchlorate was subcontracted to ALS Environmental in Salt Lake City, UT.



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<br>FACTOR | DATE<br>ANALYZED  |
|--------------------------------------------------|--------------|----|-----|-----|-------|--------------------|-------------------|
| SUBCONTRACT ANALYSIS -<br>PERCHLORATE (EPA 6850) | Method:NA    |    |     |     |       |                    | Analyst: SUB      |
| Subcontract Analysis                             | See Attached | 0  | 0   |     | NA    | 1                  | 12-Jan-2018 11:16 |



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<br>FACTOR | DATE<br>ANALYZED  |
|--------------------------------------------------|--------------|----|-----|-----|-------|--------------------|-------------------|
| SUBCONTRACT ANALYSIS -<br>PERCHLORATE (EPA 6850) | Method:NA    |    |     |     |       |                    | Analyst: SUB      |
| Subcontract Analysis                             | See Attached | 0  | 0   |     | NA    | 1                  | 12-Jan-2018 11:16 |



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<br>FACTOR | DATE<br>ANALYZED  |
|--------------------------------------------------|--------------|----|-----|-----|-------|--------------------|-------------------|
| SUBCONTRACT ANALYSIS -<br>PERCHLORATE (EPA 6850) | Method:NA    |    |     |     |       | Analyst: SUB       |                   |
| Subcontract Analysis                             | See Attached | 0  | 0   |     | NA    | 1                  | 12-Jan-2018 11:16 |



Client: Bhate Environmental Associates, Inc.

Project: LHAAP/Quarterly Surface Water

Sample ID: GPW1\_122617

Collection Date: 26-Dec-2017 13:25

**ANALYTICAL REPORT** 

WorkOrder:HS17121303 Lab ID:HS17121303-04

Matrix:Water

| ANALYSES                                         | RESULT QUAL  | DL | LOD | LOQ | UNITS | DILUTION<br>FACTOR | DATE<br>ANALYZED  |
|--------------------------------------------------|--------------|----|-----|-----|-------|--------------------|-------------------|
| SUBCONTRACT ANALYSIS -<br>PERCHLORATE (EPA 6850) | Method:NA    |    |     |     |       |                    | Analyst: SUB      |
| Subcontract Analysis                             | See Attached | 0  | 0   |     | NA    | 1                  | 12-Jan-2018 11:16 |



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<br>FACTOR | DATE<br>ANALYZED  |
|--------------------------------------------------|--------------|-----|-----|-----|-------|--------------------|-------------------|
| SUBCONTRACT ANALYSIS -<br>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 DATES REPORT

WorkOrder: HS17121303

| Sample ID     | Client Samp ID | Collection Date      | TCLP Date       | Prep Date             | Analysis Date     | DF |
|---------------|----------------|----------------------|-----------------|-----------------------|-------------------|----|
| Batch ID R308 | Test Nam       | e: SUBCONTRACT ANALY | 'SIS - PERCHLOF | RATE (EPA 6850) Matri | x: 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**

Client: Bhate Environmental Associates, Inc.

Project: LHAAP/Quarterly Surface Water

WorkOrder: HS17121303

QUALIFIERS, ACRONYMS, UNITS

Date: 12-Jan-18

| Qualifier | Description                                                               |
|-----------|---------------------------------------------------------------------------|
| *         | Value exceeds Regulatory Limit                                            |
| а         | Not accredited                                                            |
| В         | Analyte detected in the associated Method Blank above the Reporting Limit |
| E         | Value above quantitation range                                            |
| Н         | 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                                       |
| 0         | Sample amount is > 4 times amount spiked                                  |
| Р         | 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              |

Texas Risk Reduction Program



TRRP

Date: 12-Jan-18

# **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 Rec                                | eipt Checklist      |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------|----------------------------|-------------------------------------------|---------------------|
| Client Name:<br>Work Order:                                                                                                                      | Bhate En                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | vironmental<br>303                                               |                    |                                                                               | Time Received:<br>ived by: | <u>27-Dec-2017</u><br><u>PJM</u>          | <u>08:30</u>        |
| Checklist com                                                                                                                                    | pleted by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Cesar A. Lira eSignature                                         | 27-Dec-201<br>Date | Reviewed by:                                                                  | Sonia West<br>eSignature   |                                           | 28-Dec-2017<br>Date |
| Matrices:                                                                                                                                        | <u>WA</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <u>TER</u>                                                       |                    | Carrier name:                                                                 | FedEx Prior                | rity Overnight                            |                     |
| Custody seals Custody seals Chain of custo Chain of custo Chain of custo Samples in pro Sample conta TX1005 solids Sufficient sam All samples re | intact on slating intact on slating intact on slating intact on slating interest intact? It is received in the interest intact? It is received in the interest intact of the intact on slating interest intact on slating intact | when relinquished and rece<br>with sample labels?<br>ner/bottle? |                    | Yes V | No                         | Not Present<br>Not Present<br>Not Present |                     |
| Temperature(                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | neter(s):                                                        |                    | 4.9C/5.2C UC/C                                                                |                            |                                           | IR25                |
| Cooler(s)/Kit(s<br>Date/Time sar                                                                                                                 | •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | t to storage:                                                    |                    | 25709<br>12/27/2017 14:00                                                     |                            |                                           |                     |
|                                                                                                                                                  | vials have z                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ero headspace?                                                   |                    | Yes Yes Yes                                                                   | No No No                   | No VOA vials subn<br>N/A 📝<br>N/A 📝       | nitted              |
| Login Notes:                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                  |                    |                                                                               |                            |                                           |                     |
| Client Contact                                                                                                                                   | ed:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                  | Date Contacted:    |                                                                               | Person Cont                | acted:                                    |                     |
| Contacted By:                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                  | Regarding:         |                                                                               |                            |                                           |                     |
| Corrective Act                                                                                                                                   | ion:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                  |                    |                                                                               |                            |                                           |                     |



| bhate<br>Domenicona<br>Construction                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | where we want to                          |                           |                                         |         |                  |                                 |                    |              |                               | Page:                                                                                |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------------------|-----------------------------------------|---------|------------------|---------------------------------|--------------------|--------------|-------------------------------|--------------------------------------------------------------------------------------|
| 1608 13th Avenue Sou<br>Birmingham Alabama<br>Tel: 205-918-4000<br>Fax: 205-918-4050        | •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           | Cha                       | in of Cus                               | tod     | y and            | i Ana                           | aly                | tical        | Request                       | COC Number(1):                                                                       |
| Facility/Base I.D.:                                                                         | IAAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                           |                           | *************************************** |         |                  |                                 |                    |              | Sample Analysis Requested (5) | Quality Assurance Samples (6)                                                        |
| Project/Site Name: L Client Name:  Collected by: SCOtt  Field Sample ID (30 Characters Max) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Date Collected (dd-mmm-yyy)               | Time Collected (Military) | Sample Depth                            | SA Code | Sample<br>Number | Sample<br>Matrix <sup>(4)</sup> | nber of containers | Реесн 6 24те |                               | Ambient Blank Lot Equipment Blank Lot Control Control Number Control Number Number 8 |
| 18w7_122617                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 26 DEC 2017                               | (hhmm)                    | -                                       |         | (3)              | WG                              | Numbe              | 1/           |                               | HS17121303                                                                           |
| HBW/0_1226/7                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 26 DEC 2017                               | 1300                      | -                                       |         |                  | wG                              | i                  | X            |                               | Bhate Environmental Associates, Inc.  LHAAP/Quarterly Surface Water                  |
| HBW1_12417<br>GPW1_12 <b>4</b> 17<br>GPW3_122617                                            | MANUFACTURE AND THE STREET AND THE S | 26 DEC 2017<br>26 DEC 2017<br>26 DEC 2017 | 1325                      | -                                       |         |                  | wG<br>wG                        | 1                  | メメ           |                               |                                                                                      |

| COMMENTS: |  |
|-----------|--|
|           |  |

| Custody Transfers                  | Prior to Receipt by Laboratory |       |                        | Sampl                  | e Delivery Details | / Laboratory Receipt    |                   |                |
|------------------------------------|--------------------------------|-------|------------------------|------------------------|--------------------|-------------------------|-------------------|----------------|
| Relinquished By (Signed) Date Time | Received by (signed) Date Time | Deliv | vered Directly to Lab: |                        | Shippe             | d                       |                   | No.:           |
| 12/21/17 1430                      | 1. PM 12/27/17 08:30           | 11 C  |                        | _ Method of Ship       | oment:             |                         |                   |                |
| 2                                  | 2Temp                          |       |                        | Fed                    | Ex                 | Airbill                 | Number:           |                |
| 3                                  | 3                              | 4-1   |                        | _ Analytical Lab:      | ALS 10450          | Stancliff Rd, Suite 210 | Houston, TX 77099 | (281) 530-5656 |
|                                    | Cuoiser 25709 IRMUS CIFO.3     | ATTN  | N: SONIA WEST          | <u>L</u> ab Recipient: | Deliver            | y Date/Time:            |                   |                |

<sup>6.)</sup> 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



<sup>1.)</sup> Chain of Custody Number = date collected + custody number (e.g. 09-02-1999-01)

<sup>2.)</sup> 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)

<sup>3.)</sup> 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.)

<sup>4.)</sup> 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

<sup>5.)</sup> Sample Analysis Requested: Analytical method requested and number of containers provided for each.

ALS 10450 Stancliff Rd., Suite 210 Houston, Texas 77099 Tel. +1 281 530 5656 ALS Fax. +1 281 530 5887 CUSTODY SEAL

Date: 12 20117 Time: 1430

Name: 5 5 1 8665 | N 666 | Date: 10 27 117

25709

DEC 2 7 2017

TRK# 7376 9750 5229

WED - 27 DEC 10:30A PRIORITY OVERNIGHT

AB SGRA

25709

77099 TX-US IAH



FID 162785 26DEC17 GGGA 546C1/574C/0C8



# Sub Contract Raw Data

Bhate Environmental Associates, Inc.
Project: LHAAP/Quarterly Surface Water
ALS WO# HS17121303





# **Case Narrative**

Method: 6850 Client: ALS Laboratories (Houston, TX)

Analysis: Perchlorate Matrix: Water

**Analysis SOP:** LC-MS-CLO4 **ELMS Batch (HBN):** 2032 (206369)

**ALS WO ID(s):** 1736221; 1736222; 1800210

**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 <sup>18</sup>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.  $50\mu$ L 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 0.45 µm 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  $\mu$ g/L. Results were calculated in  $\mu$ g/L by the equation (A)x(B),

where: A = Analyte concentration from the standard curve ( $\mu g/L$ )

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





Sonia West

Suite 210

ALS Environmental 10450 Stancliff Rd.

Houston, TX 77099

#### **ANALYTICAL REPORT**

Report Date: January 12, 2018

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    |  |

ADDRESS 960 West LeVoy Drive, Salt Lake City, Utah, 84123 USA | PHONE +1 801 266 7700 | FAX +1 801 268 9992 ALS GROUP USA, CORP. An ALS Limited Company



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#### ANALYTICAL REPORT

Workorder: 34-1736221

Client: ALS Environmental

(Houston)

Project Manager: Kevin W. Griffiths

#### Analytical Results

Sampling Site: HS17121303 Sample ID: HBW7 122617 Collected: 12/26/2017 Lab ID: 1736221001

Media: 125 mL Nalgene Received: 12/28/2017

Sampling Parameter: NA Matrix: Water

Analysis Method - EPA 6850, DoD QSM Analysis: EPA 6850, DoD QSM Water Instrument ID: LCMS04 **Preparation:** Not Applicable Batch: ELMS/2032 (HBN: 206369) Percent Solid: NA Analyzed: 01/08/2018 09:55 Report Basis: Wet LOD (ug/L) LOQ (ug/L) **Dilution Analyte** Result (ug/L) DL (ug/L) Qual Perchlorate ND 2.0 4.0 U 1.0

Sample ID: HBW10\_122617 Sampling Site: HS17121303 Collected: 12/26/2017

Media: 125 mL Nalgene Received: 12/28/2017 Lab ID: 1736221002

Matrix: Water Sampling Parameter: NA

Analysis Method - EPA 6850, DoD QSM **Preparation:** Not Applicable

Instrument ID: LCMS04 Analysis: EPA 6850, DoD QSM Water Batch: ELMS/2032 (HBN: 206369) **Percent Solid: NA** Analyzed: 01/08/2018 10:52 **Report Basis: Wet Analyte Dilution** Qual Result (ug/L) DL (ug/L) LOD (ug/L) LOQ (ug/L) Perchlorate ND 1.0 4.0 U

Sample ID: HBW1 122617 Sampling Site: HS17121303 Collected: 12/26/2017 Media: 125 mL Nalgene Lab ID: 1736221003 Received: 12/28/2017

Sampling Parameter: NA Matrix: Water

ND

Analysis Method - EPA 6850, DoD QSM Analysis: EPA 6850, DoD QSM Water **Instrument ID: LCMS04 Preparation:** Not Applicable Batch: ELMS/2032 (HBN: 206369) **Percent Solid: NA** Analyzed: 01/08/2018 11:11 Report Basis: Wet **Analyte** Result (ug/L) DL (uq/L) LOD (ug/L) LOQ (uq/L) **Dilution** Qual Perchlorate 1.1 1.0 2.0 1

Sample ID: GPW1 122617 Sampling Site: HS17121303 Collected: 12/26/2017 Media: 125 mL Nalgene Received: 12/28/2017 Lab ID: 1736221004

Sampling Parameter: NA Matrix: Water 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

1.0

2.0

Perchlorate

2 of 5

4.0



#### **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 Analysis: EPA 6850, DoD QSM Water Instrument ID: LCMS04 Preparation: Not Applicable Batch: ELMS/2032 (HBN: 206369) Percent Solid: NA Analyzed: 01/08/2018 11:50 **Report Basis:** Wet LOQ (ug/L) **Dilution Analyte** Result (ug/L) LOD (ug/L) Qual DL (ug/L) ND 2.0 4.0 U Perchlorate 1.0

Report Authorization (/S/ is an electronic signature that complies with 21 CFR Part 11)

| Method            | Analyst          | Peer Review       |  |  |
|-------------------|------------------|-------------------|--|--|
| EDA 6950 DoD OSM  | /S/ Thomas Bosch | /S/ Stephen Brose |  |  |
| EPA 6850, DoD QSM | 01/11/2018 10:56 | 01/12/2018 07:59  |  |  |

#### **Laboratory Contact Information**

ALS Environmental Phone: (801) 266-7700

960 W Levoy Drive Email: alslt.lab@ALSGlobal.com

Salt Lake City, Utah 84123 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<br>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 Preparation: NA Analysis: EPA 6850

Basis: DoD QSM Batch: NA Batch: ELMS/2032 (HBN: 206369)

Prepared By: NA 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 MS: 582604 MSD: 582605

Analyzed: 01/08/2018 09:55 Analyzed: 01/08/2018 10:14 Analyzed: 01/08/2018 10:33

Dilution: 1 Dilution: 1 Dilution: 1 Units: ug/L Units: ug/L Units: ug/L

**Analyte** Result Result Target % Rec **QC Limits** Result % Rec **RPD QC Limits** 4.81 78.8 0.0 Perchlorate ND 96.1 123.8 4.79 95.9 0.221 20.0

#### **Continuing Calibration Verification**

CCV: 582599 CCV: 582606 CCV: 582608

Analyzed: 01/08/2018 08:17 Analyzed: 01/08/2018 13:08 Analyzed: 01/08/2018 16:40

 Units: ug/L
 Units: ug/L
 Units: ug/L

 Criteria: ± 15%
 Criteria: ± 15%
 Criteria: ± 15%

% Rec. % Rec. **Analyte** Result **Target** % Rec. Result **Target** Result **Target** Perchlorate 25.0 26.3 25.0 105 26.2 105 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 LODV: 582607 LODV: 582609
Analyzed: 01/08/2018 08:36 Analyzed: 01/08/2018 13:27 Analyzed: 01/08/2

Criteria: ± 50% Criteria: ± 50% Criteria: ± 50% Result % Rec. Result % Rec. Result % Rec. Analyte **Target Target Target** 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 | /S/ Stephen Brose |
| 01/11/2018 10:56 | 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



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:

Phone:

Company: ALS Houston

**Contact:** Accounts Payable

Address: 10450 Stancliff Rd, Ste 210

+1 281 530 5656

Reference: HS17121303

TSR: Danielle Winnings

LAB SAMPLE ID CLIENT SAMPLE ID **MATRIX** COLLECT DATE **ANALYSIS REQUESTED** DUE DATE Water 26 Dec 2017 12:45 HS17121303-01 x HBW7\_122617 1. 11 Jan 2018 SUB\_Perch-6850 26 Dec 2017 13:00 HS17121303-02 ~ HBW10\_122617 Water 2. SUB Perch-6850 11 Jan 2018 HS17121303-03 HBW1\_122617 Water 26 Dec 2017 13:12 3. SUB Perch-6850 11 Jan 2018 26 Dec 2017 13:25 HS17121303-04 GPW1 122617 Water 4. SUB Perch-6850 11 Jan 2018 HS17121303-05 GPW3 122617 26 Dec 2017 13:36 Water 5. 11 Jan 2018 SUB\_Perch-6850

**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** 

| 2/                      |                | COC ID: 8    | 3303 |
|-------------------------|----------------|--------------|------|
| Relinquished By:        | Date/Time:     | Den 27, 2017 | 1800 |
| Received By: Washington | Date/Time:     | 2/20/200     | 9:55 |
| Cooler ID(s):           | Temperature(s) |              |      |
|                         |                |              |      |



|                           | ALS-                                            | SALT LA     | KE CTTY-E<br>ONTAINER                                              | ELATED IN<br>INFORMAT   | FORMATION CHI | CKLIST (F                                                          | 11 In or Ci                   | rcle)                                                         |                                                   |
|---------------------------|-------------------------------------------------|-------------|--------------------------------------------------------------------|-------------------------|---------------|--------------------------------------------------------------------|-------------------------------|---------------------------------------------------------------|---------------------------------------------------|
| Laure Trans-              | 10 . C                                          | 11          | ston                                                               |                         |               | Task/Site:                                                         |                               | 12121                                                         |                                                   |
| ient Name<br>ate/Time o   | · · · · · · · · · · · · · · · · · · ·           |             | 12017                                                              | 9:55                    | . •           | of Coolers I                                                       | Received:                     | 1                                                             |                                                   |
|                           |                                                 |             | ble/Unacce                                                         |                         |               | ature Contro                                                       |                               | Fesent/Not Include                                            | d                                                 |
| ondition of<br>ooler Cust |                                                 | Present     | Absent/NA<br>roken/NA                                              |                         | Locatio       | atmo Conno.<br>n Temp Take<br>temperatures                         | n:                            | Control/Between Sa                                            |                                                   |
| ontainer C                | ustody Seals:                                   | Present     | /Absont/NA                                                         |                         | project       | specific guid                                                      | elines?                       | Ýðs/No/NA                                                     |                                                   |
| e Present:                | ı                                               | (es/No      | troken/NA<br>/NA<br>Melted/NA                                      |                         | VOAH          | leadspace Pro                                                      | esent?                        | Yes/No/AA                                                     |                                                   |
| H-Check                   | Metals                                          |             | No/NA                                                              | Total Phenol            |               | Yes/No/NA                                                          | _NO3/N0                       |                                                               | es/No/NA                                          |
| enformed:                 | Cyznide<br>Sulfide<br>Ammonia                   | Yes/        | No/NA<br>No/NA<br>No/NA                                            | TPH-418.1<br>COD<br>TKN |               | Yes/No/NA<br>Yes/No/NA<br>Yes/No/NA                                | Oil & G<br>Total Pl<br>TOC Pr | osphorous Y                                                   | es/No/NA<br>es/No/NA<br>es/No/NA                  |
| Cooler<br>Received        | ALS Cooler No.                                  | Temp.       | Cooler<br>Received                                                 | ALS Cool                | er No.        | Temp.                                                              | Cooler<br>Received            | ALSL Cooler No.                                               | Temp.                                             |
| 1.                        | C17-8138                                        | 2 %         | 4                                                                  | C17-                    |               | °C                                                                 | 7                             | C17-                                                          | °C                                                |
| 2                         | · C17-                                          | °C          | 5                                                                  | C17-                    | ·             | <u>°c </u>                                                         | 8                             | C17-                                                          | <u> °C</u>                                        |
| 3                         | C17-                                            | °C          | 6                                                                  | C17-                    |               | . ℃                                                                | 9                             | C17-                                                          | -℃                                                |
| ☐ Missin                  | Conditions<br>g Paperwork<br>g/Incorrect Bottle | ☐ Bro       | ssing Sampl<br>sken/Leakin<br>orrect Bolil<br>oler Temper<br>Range | g Samples<br>e Type     | □ pH<br>□ Res | orrect Preserv<br>Criteria Not I<br>idual Chlorir<br>ad Space in B | Met<br>ne Present             | ☐ Insufficient San Volume ☐ Chain of Custor Problems ☐ Other: |                                                   |
| Briefly I                 | DESCRIBE THE PROD                               | BLEM AND    | THE ACTIO                                                          | n T <u>ake</u> n:       |               |                                                                    |                               |                                                               | -                                                 |
| E-mailed                  | to Client? Yes                                  | ]           | No□.                                                               |                         |               |                                                                    |                               |                                                               |                                                   |
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3525 82.21 16:00

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ORIGIN ID:SGRA (201) 590-5656 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

**KEVIN GRIFFITHS ALS ENVIRONMENTAL** 960 W. LEVOY DRIVE

# SALT LAKE CITY UT 84123 (801) 266-7700 REF: HS17121303/1224-SW



FedEx Express



TRN# 7376 9751 3525

THU - 28 DEC 3:00P STANDARD OVERNIGHT

AX BTFA

84123 SLC UT - US





ALSCOCV3.1

# ALS Environmental CHAIN-OF-CUSTODY

| (ALS)                               |                                         |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| Client: ALS Environmental (Houston) | nmental (Houston)                       |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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                                                                                                                                                                                                                                       | 1/12/2018    | 1/12/2018                                        | 1/12/2018                  | 1/12/2018     | 1/12/2018      | 1/12/2018     | 1/12/2018     | 1/12/2018          | 1/12/2018        | 1/12/2018     | 1/12/2018                      | 1/12/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| Expire<br>Date  |                                        |                                | nodern vinne erne den dia vela melle dia konstitution en |                                | editory (in 1 total annual refer to advace or                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1/23/2018    | of Stiffer of a distriction of each mark to epi- |                            | 1/23/2018     | 1/23/2018      | 1/23/2018     | 1/23/2018     | 1/17/2018          | 1/17/2018        | 1/17/2018     |                                | and the control of th | 1/17/2018         | 1/17/2018     | 1/18/2018     | 1/18/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1/18/2018          | 1/24/2018            |                                |                                |
| Ngr             | 5311                                   | 5311                           | 5311                                                     | 5311                           | 5311                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Procedure       | E685041C3Q                             | E6850.D3Q                      | E6850D3Q                                                 | E6850Q413Q                     | E6850Q413Q                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | E6850Q41.3   | E6850Q413Q                                       | E6850Q413Q                 | E6850Q41.3    | E6850Q41.3     | E6850Q41.3    | E6850Q41.3    | E6850Q41.3         | E6850Q41.3       | E6850Q41.3    | E685041C3Q                     | E6850D3Q                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | E6850Q41.3        | E6850Q41.3    | E6850Q41.3    | E6850Q41.3                                                                                                                                                                                                                                                                                                                                                                                                                          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| Mx Container    | ************************************** |                                |                                                          |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1736221001-A |                                                  |                            | 1736221002-A  | 1736221003-A   | 1736221004-A  | 1736221005-A  | 1736222001-A       | 1736222002-A     | 1736222003-A  |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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|                 | 3                                      | က                              | 3                                                        | က                              | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | LE 3         | က                                                | က                          | LE 3          | Е<br>3         | LE 3          | е<br>Э        | CE 3               | <u>Е</u> 3       | E 3           | က                              | က                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <u>ب</u>           | E 3                  | ო                              | က                              |
| Type            | CCV                                    | LODV                           | SOI                                                      | LMB                            | TCS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | SAMPLE       | MS                                               | MSD                        | SAMPLE        | SAMPLE         | SAMPLE        | SAMPLE        | SAMPLE             | SAMPLE           | SAMPLE        | CCV                            | LODV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | SAMPLE            | SAMPLE        | SAMPLE        | SAMPLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SAMPLE             | SAMPLE               | CC                             | LODV                           |
| Dust<br>Weight  |                                        |                                |                                                          |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| Prep<br>Final   |                                        |                                |                                                          |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| Prep<br>Initial | -                                      |                                |                                                          |                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| Sample ID       | CCV for HBN 206369 [ELMS/2032]         | LODY for HBN 206369 [ELMS/2032 | ICS for HBN 206369 [ELMS/2032]                           | LMB for HBN 206369 [ELMS/2032] | LCS for HBN 206369 [ELMS/2032]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | HBW7_122617  | HBW7_122617(1736221001MS)                        | HBW7_122617(1736221001MSD) | HBW10_122617  | HBW1_122617    | GPW1_122617   | GPW3_122617   | 18CPTMW04SW_122017 | 18CPTMW04_122017 | MW2_122017    | CCV for HBN 206369 [ELMS/2032] | LODV for HBN 206369 [ELMS/2032                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 18CPTMWISW_122017 | MW5_122017    | MW3_122017    | 18CPTMW08SW_122117                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18CPTMW08DW_122117 | LH18/24-SP650_122717 | CCV for HBN 206369 [ELMS/2032] | LODV for HBN 206369 [ELMS/2032 |
| Pos Lab ID      | 1 582599                               | 2 582600                       | 3 582601                                                 | 4 582602                       | 5 582603                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 6 1736221001 | 7 582604                                         | 8 582605                   | 95 1736221002 | 10년 1736221003 | 11 1736221004 | 12 1736221005 | 13 1736222001      | 14 1736222002    | 15 1736222003 | 16 582606                      | 17 582607                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 18 1736222004     | 19 1736222005 | 20 1736222006 | 21 1736222007                                                                                                                                                                                                                                                                                                                                                                                                                       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**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: 1.0\mug/L Reported LOD: 2.0\mug/L Reported LOQ: 4.0\mug/L

#### SAMPLE PREPARATION/ANALYSIS:

<u>Water:</u> Samples were prepared by <u>TNB</u>. 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).

<u>STANDARDS:</u> Internal Standard Spiking Solution <u>Horizon# 38780.</u> Dilutions of Working Standard Solution ID <u>32373</u> 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:  $5.0\mu$ L of QC Solution Horizon ID  $\underline{36749}$  was used for LCS  $\underline{582603}$ ; Target =  $5.0\mu$ g/L. ASTM type II water was used for LMB  $\underline{582602}$ .

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 dilutions. 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#





# Working Standard - CLO4 WRK

| CLO4 W    | /RK           |                                | Descrip    | tion - 68 | 50 WKG Sto    | d 100.ug/L |
|-----------|---------------|--------------------------------|------------|-----------|---------------|------------|
| Standard: | 36735         | Created By: T. Bosch           |            |           | Amount: 10 r  | nL         |
| MFG:      | ALS/SLC       | Create Date: 05/10/2017        |            |           | Expires: 05/1 | 0/2018     |
| MFG Lot:  | TNB: 05/10/17 | Lab Lot: CLO4 WRK              |            |           | Usable: Yes   |            |
| Part ID:  |               |                                |            |           |               |            |
| Pos.      | Analyte       | Name                           |            | 4 3 - 4   | Concent       | ration     |
| 1         | 14797-73-0    | Perchlorate                    |            |           |               | 0.1 ug/mL  |
| Composi   | tion          |                                |            |           |               |            |
| 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 |





# Constituent

# Stock Standard - CLO4 STOCK

| MFG Lot: | 36733<br>AccuStandard<br>216095148<br>IC-PER-10X-1 | Created By: T. Bosch Create Date: 5/10/2017 Lab Lot: CLO4 STOCK | Expi | unt: 100 mL<br>ires: 10/4/2018<br>able: Yes |
|----------|----------------------------------------------------|-----------------------------------------------------------------|------|---------------------------------------------|
| Pos.     | Analyte                                            | Name                                                            |      | Concentration.                              |
| 1        | 14797-73-0                                         | Perchlorate                                                     |      | 1000 ug/m                                   |





#### Constituent

# Solvent Standard - ASTM H2O

| Standard: 109  MFG: DCL In House  MFG Lot:  Part ID: | Created By: ALS Support (Lims) Create Date: 10/6/2005 Lab Lot: LAB 109 | Amount: 1000 L<br>Expires: 11/7/2025<br>Usable: Yes |
|------------------------------------------------------|------------------------------------------------------------------------|-----------------------------------------------------|
| Pos. Analyte                                         | Name                                                                   | Concentration                                       |





#### Constituent

# Working Standard - CLO4 INT

| CLO4 II   | JT.           | De                           | scription - 6850 | Interm | dt AccStd     | 10.ug/mL   |
|-----------|---------------|------------------------------|------------------|--------|---------------|------------|
| Standard: | 36734         | Created By: T. Bosch         |                  | A.     | mount 10 m    | ıL.        |
| MFG:      | ALS/SLC       | Create Date: 05/10/2017      |                  | E      | ixpires: 05/1 | 0/2018     |
| MFG Lot:  | TNB: 05/10/17 | Lab Lot: CLO4 INT            |                  | Į      | Usable: Yes   |            |
| Part ID:  |               |                              |                  |        |               |            |
| Pos.      | Analyte       | Name                         |                  |        | Concenti      | ration     |
| 1         | 14797-73-0    | Perchlorate                  |                  |        |               | 10 ug/mL   |
| Composi   | tion          |                              |                  |        | real and      |            |
| Standard  | Standard ID   | Description                  | Lab Lot ID       | V      | olume         | 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 |



05/11/2018

0.1 mL

CLO4 QC INT 10.ug/mL



109

36749

#### STANDARD REPORT

# Working Standard - CLO4 QC WRK

ASTM H2O

CLO4 QC INT

CLO4 QC WRK

Description - 6850 QC WKG STD 100ug/L Amount: 10 mL Created By: T. Bosch Standard: 36750 Create Date: 05/11/2017 Expires: 05/11/2018 MFG: ALS/SLC Lab Lot: CLO4 QC WRK 100.ug/L Usable: Yes MFG Lot: TNB: 05/11/17 Part ID: Concentration Name Pos. Analyte 100 ug/L 14797-73-0 Perchlorate Composition Volume Expires Lab Lot ID Standard Standard ID Description LAB 109 9.9 mL 11/07/2025

ASTM Type II Water

6850 QC Intrmdt Std-QC 10ug/mL





# Constituent

# Working Standard - CLO4 QC INT

| CLO4 G   | G INT                               | Des                                                              | cription - 6850 QC Inti | mdt Std-Q0                                   | 10ug/mL    |
|----------|-------------------------------------|------------------------------------------------------------------|-------------------------|----------------------------------------------|------------|
| ,        | 36749<br>ALS/SLC<br>TNB: 05/11/2017 | Created By: T. Bosch Create Date: 05/11/2017 Lab Lot: CLO4 QC II | NT 10.ug/mL             | Amount: 10 r<br>Expires: 05/1<br>Usable: Yes | 1/2018     |
| Pos.     | Analyte                             | Name                                                             | <u> </u>                | Concent                                      | ration     |
| 1        | 14797-73-0                          | Perchlorate                                                      |                         |                                              | 10 ug/mL   |
| Composi  | ition                               |                                                                  |                         |                                              |            |
| 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 |





# Constituent

# Solvent Standard - ASTM H2O

| Pos. Analyte      | Name                           | Concentration      |  |
|-------------------|--------------------------------|--------------------|--|
| Part ID:          |                                |                    |  |
| MFG Lot:          | Lab Lot: LAB 109 Usable: Yes   |                    |  |
| MFG: DCL In House | Create Date: 10/6/2005         | Expires: 11/7/2025 |  |
| Standard: 109     | Created By: ALS Support (Lims) | Amount: 1000 L     |  |





# Constituent

# Stock Standard - CLO4 QCSTOCK

| Pos.                  | Analyte 14797-73-0 | Name Perchlorate       | 1000 ug/m          |
|-----------------------|--------------------|------------------------|--------------------|
| Part ID:              | ICC-013            | In-                    | Concentration      |
| MFG: Ultra Scientific |                    | Lab Lot: CLO4 QC STOCK | Usable: Yes        |
|                       |                    | Create Date: 5/11/2017 | Expires: 3/31/2020 |
| Standard: 36748       |                    | Created By: T. Bosch   | Amount: 100 mL     |





# Working Standard - CLO4ISTDWRK

| CLO4IS   | TDWRK                                                     | Des                                                                                              | cription - Perchlorate      | e ISTD Wrk   | 1,000 ug/L |  |
|----------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------|--------------|------------|--|
| MFG Lot  | : 38780<br>: ALS/SLC<br>: TNB: 10/09/17<br>: Not Provided | Created By: Thomas Boso<br>Create Date: 10/09/2017 0<br>Verified By: Thomas Boso<br>Verify Date: | 1:10PM Expires<br>th Usable | : 10/09/2018 | RK         |  |
| Pos.     | Analyte                                                   | Name                                                                                             |                             | Concent      | ration     |  |
| 1        | 14797-73-0-8385                                           | Perchlorate 83:85 Ratio                                                                          |                             |              | 1000 ug/L  |  |
| 2        | 14797-73-0-89                                             | Perchlorate 89                                                                                   |                             |              | 1000 ug/L  |  |
| Compos   | ition                                                     |                                                                                                  |                             |              |            |  |
| Standard | Standard ID                                               | Description                                                                                      | Lab Lot ID                  | Volume       | Expires    |  |
| 23118    | CLO4ISTDSTK                                               | Perchlorate ISTD Stock                                                                           | CLO4ISTDSTK                 | 0.1 mL       | 02/27/2024 |  |





# Constituent

# Stock Standard - CLO4ISTDSTK

| CL04IS   | TDSTK             | Descr                                                                                                                       | ription - Perchl                                             | orate ISTD Stock |
|----------|-------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------------------|
| MFG Lot: | Cambridge Isotope | Created By: Thomas Bosch<br>Create Date: 04/04/2014 03:04PM<br>Verified By: Thomas Bosch<br>Verify Date: 02/05/2009 12:02AM | Amount: 1 ml<br>Expires: 02/2<br>Usable: Yes<br>Lab Lot: CLC | 7/2024           |
| 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        |





# Certificate of Analysis



#### ISO Guide 34 Reference Material

Product Number: ICC-013

CP-0860

Lot Issue Date:

29-Feb 2016

Expiration Date:

31-Mar 2020

Product Name:

Lot Number:

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

 $1001 \pm 5 \,\mu g/mL$ 

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.

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.

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.









# 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

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.

Daniel J. Lamendola Director of QAVRA







125 Market Street New Haven, CT 06513 USA



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 (CIO<sub>4</sub>)

SRM: Ind. Std. Lot: 216095148 Matrix: Water

Hazards: Refer to SDS for complete safety information

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



Signal Word: Warning

Prepared SRM# Component Concentration (µg/mL) 1000 Ind. Std. CIO Perchlorate

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 ! 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. Meigan O'Leny

Meigan O'Leary, Inorganic QC Manager

For use in routine laboratory analysis.



Page 1 of 1



### Cambridge Isotope Laboratories, Inc.

## Certificate of Analysis

Quality Standards:

ISO Guide 34 . ISO/IEC 17025 . ISO 13485 . cGMP

Product Name:

(Isotopic Label & Enrichment Specification)

PERCHLORIC ACID, SODIUM SALT (1804, 90%+) 100 UG/ML IN WATER

Lot Number:

SDDG-013

Catalog Number:

OLM-7310-S

Product Information

Chemical Purity Specification:

Labeled CAS Number:

Unlabeled CAS Number:

MW\*:

Chemical Formula:

Storage: Stability:

NaC1\*O4

>98%

NA7601-89-0

130.4

Store at room temperature away from light and moisture. 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 of erwise 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.

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

 $102 \mu g/mL$ 

Chemical Purity of Neat Material(s)

98%

LC/MS for Concentration

 $109.4 \pm 2.8 \,\mu \text{g/mL} \,(k=2)$ 



<sup>\*</sup> For isotopically labeled compounds, MW listed is for the fully enriched product.



**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                                                                                                                                                     | Perchlorate                                                                                                                                                               | Perchlorate                                                                                                                                                                                       |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #*                                    | _<br>                                                                                                                                         | <del></del>                                                                                                       |                                                                    |                                                                                                         |                                                                                  | Area<br> -                                                                                                                                                      | RT<br>                                                                                                                                                                    | 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                                                                                | 0.0000                                                                                                                                                          | 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                                                                                                                                 |                                                                                                                   | 1                                                                  | Sample                                                                                                  | 19                                                                               | 1.37562e6                                                                                                                                                       | 12.336                                                                                                                                                                    | 3.13188e4                                                                                                                                                                                         |
| *                                     | 1736222006 1K                                                                                                                                 |                                                                                                                   | 1                                                                  | Sample                                                                                                  | 20                                                                               | 6.15407e5                                                                                                                                                       | 12.349                                                                                                                                                                    | 1.46859e4                                                                                                                                                                                         |
| *                                     | 1736222007 10X                                                                                                                                | Vial 89                                                                                                           | 1                                                                  | Sample                                                                                                  | 21                                                                               | 9.38833e5                                                                                                                                                       | 12.207                                                                                                                                                                    | 218.62778                                                                                                                                                                                         |
| *                                     | 1736222008 1K                                                                                                                                 |                                                                                                                   | 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                                                                                                                                                                                          |
|                                       |                                                                                                                                               |                                                                                                                   |                                                                    |                                                                                                         |                                                                                  | f.                                                                                                                                                              |                                                                                                                                                                           |                                                                                                                                                                                                   |
|                                       | Sample                                                                                                                                        | Location                                                                                                          | Ini                                                                | SampleType                                                                                              | Run                                                                              | CLO4-85                                                                                                                                                         | CLO4-85                                                                                                                                                                   | CLO4-85                                                                                                                                                                                           |
| #*                                    | Jamp - J                                                                                                                                      |                                                                                                                   |                                                                    |                                                                                                         |                                                                                  | Area                                                                                                                                                            | RT                                                                                                                                                                        | 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                                                                               |                                                                                                                                                                 |                                                                                                                                                                           |                                                                                                                                                                                                   |
| *                                     | 1736221005                                                                                                                                    |                                                                                                                   |                                                                    |                                                                                                         |                                                                                  | 0.00000                                                                                                                                                         | 0.000                                                                                                                                                                     | 0.00000                                                                                                                                                                                           |
| *                                     |                                                                                                                                               | Vial 82                                                                                                           | 1                                                                  | Sample                                                                                                  | 12                                                                               | 0.00000                                                                                                                                                         | 0.000                                                                                                                                                                     | 0.00000                                                                                                                                                                                           |
| *                                     | 1736222001                                                                                                                                    | Vial 83                                                                                                           | 1                                                                  | Sample<br>Sample                                                                                        | 12<br>13                                                                         | 0.00000<br>0.00000                                                                                                                                              | 0.000<br>0.000<br>0.000                                                                                                                                                   | 0.00000                                                                                                                                                                                           |
|                                       | 1736222002 100                                                                                                                                | Vial 83<br>Vial 84                                                                                                | 1<br>1                                                             | Sample<br>Sample<br>Sample                                                                              | 12<br>13<br>14                                                                   | 0.00000<br>0.00000<br>8.44845e4                                                                                                                                 | 0.000<br>0.000<br>0.000<br>12.321                                                                                                                                         | 0.00000<br>0.00000<br>607.51704                                                                                                                                                                   |
| *                                     | 1736222002 100<br>1736222003 10X                                                                                                              | Vial 83<br>Vial 84<br>Vial 85                                                                                     | 1<br>1<br>1                                                        | Sample<br>Sample<br>Sample<br>Sample                                                                    | 12<br>13<br>14<br>15                                                             | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5                                                                                                                    | 0.000<br>0.000<br>0.000<br>12.321<br>12.203                                                                                                                               | 0.00000<br>0.00000<br>607.51704<br>158.99673                                                                                                                                                      |
| *                                     | 1736222002 100<br>1736222003 10X<br>582606 CCV@25                                                                                             | Vial 83<br>Vial 84<br>Vial 85<br>Vial 71                                                                          | 1<br>1<br>1                                                        | Sample<br>Sample<br>Sample<br>Sample<br>Control                                                         | 12<br>13<br>14<br>15<br>16                                                       | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5                                                                                                       | 0.000<br>0.000<br>0.000<br>12.321<br>12.203<br>12.433                                                                                                                     | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282                                                                                                                                          |
| * *                                   | 1736222002 100<br>1736222003 10X<br>582606 CCV@25<br>582607 LODV@1.                                                                           | Vial 83<br>Vial 84<br>Vial 85<br>Vial 71<br>Vial 72                                                               | 1<br>1<br>1<br>1                                                   | Sample<br>Sample<br>Sample<br>Sample<br>Control<br>Control                                              | 12<br>13<br>14<br>15<br>16                                                       | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4                                                                                          | 0.000<br>0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260                                                                                                           | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1                                                                                                                            |
| *                                     | 1736222002 100<br>1736222003 10X<br>582606 CCV@25<br>582607 LODV@1.<br>1736222004                                                             | Vial 83<br>Vial 84<br>Vial 85<br>Vial 71<br>Vial 72<br>Vial 86                                                    | 1<br>1<br>1<br>1<br>1                                              | Sample Sample Sample Sample Control Control Sample                                                      | 12<br>13<br>14<br>15<br>16<br>17                                                 | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000                                                                               | 0.000<br>0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000                                                                                                  | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000                                                                                                                 |
| *<br>*<br>*                           | 1736222002 100<br>1736222003 10X<br>582606 CCV@25<br>582607 LODV@1.<br>1736222004<br>1736222005 1K                                            | Vial 83<br>Vial 84<br>Vial 85<br>Vial 71<br>Vial 72<br>Vial 86<br>Vial 87                                         | 1<br>1<br>1<br>1<br>1<br>1                                         | Sample Sample Sample Sample Control Control Sample Sample                                               | 12<br>13<br>14<br>15<br>16<br>17<br>18                                           | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5                                                                  | 0.000<br>0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354                                                                                        | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4                                                                                                    |
| *<br>*<br>*<br>*                      | 1736222002 100<br>1736222003 10X<br>582606 CCV@25<br>582607 LODV@1.<br>1736222004<br>1736222005 1K<br>1736222006 1K                           | Vial 83<br>Vial 84<br>Vial 85<br>Vial 71<br>Vial 72<br>Vial 86<br>Vial 87<br>Vial 88                              | 1<br>1<br>1<br>1<br>1<br>1                                         | Sample Sample Sample Sample Control Control Sample Sample                                               | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20                               | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5                                                     | 0.000<br>0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362                                                                              | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4                                                                                       |
| *<br>*<br>*<br>*                      | 1736222002 100<br>1736222003 10X<br>582606 CCV@25<br>582607 LODV@1.<br>1736222004<br>1736222005 1K<br>1736222006 1K                           | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89                                           | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                               | Sample Sample Sample Sample Control Control Sample Sample Sample                                        | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21                         | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5                                        | 0.000<br>0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220                                                                    | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160                                                                          |
| * * * * * *                           | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1. 1736222004 1736222005 1K 1736222006 1K 1736222007 10X 1736222008 1K                | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90                                   | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                               | Sample Sample Sample Sample Control Control Sample Sample Sample Sample                                 | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22                   | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5<br>4.16880e5                           | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373                                                                   | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4                                                             |
| * * * * * * * * * * * * * * * * * * * | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1. 1736222004 1736222005 1K 1736222006 1K 1736222007 10X 1736222008 1K 1800210001     | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92                           | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                          | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Sample                          | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25             | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5<br>4.16880e5<br>1.87732e4              | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373<br>11.977                                                         | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643                                                  |
| * * * * * * * * * *                   | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1. 1736222004 1736222006 1K 1736222007 10X 1736222008 1K 1800210001 582609 LODV@1.    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92 Vial 72                   | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                     | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Sample Control                  | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25<br>26       | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5<br>4.16880e5<br>1.87732e4<br>1.60463e4 | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270                                               | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089                                       |
| * * * * * * * * * * * * * * * * * * * | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1. 1736222005 1K 1736222006 1K 1736222007 10X 1736222008 1K 1800210001 582609 LODV@1. | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92                           | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                          | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Sample                          | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25             | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5<br>4.16880e5<br>1.87732e4              | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373<br>11.977                                                         | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643                                                  |
| * * * * * * * * * *                   | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1. 1736222004 1736222006 1K 1736222007 10X 1736222008 1K 1800210001 582609 LODV@1.    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92 Vial 72                   | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                     | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Sample Control                  | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25<br>26       | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5<br>4.16880e5<br>1.87732e4<br>1.60463e4 | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270<br>12.425                                     | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089                                       |
| * * * * * * * * * *                   | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1.                                                                                    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92 Vial 71                   | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                     | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Sample Control                  | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25<br>26<br>27 | 0.00000<br>0.00000<br>8.44845e4<br>2.19018e5<br>3.67172e5<br>1.52559e4<br>0.00000<br>4.14786e5<br>1.97524e5<br>2.99209e5<br>4.16880e5<br>1.87732e4<br>1.60463e4 | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270                                               | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089                                       |
| * * * * * * * * * *                   | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1.                                                                                    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92 Vial 72 Vial 71 Location  | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Control Control Control         | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25<br>26<br>27 | 0.00000 0.00000 8.44845e4 2.19018e5 3.67172e5 1.52559e4 0.00000 4.14786e5 1.97524e5 2.99209e5 4.16880e5 1.87732e4 1.60463e4 3.65901e5  CLO4-89-ISTD Area        | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270<br>12.425                                     | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089<br>26.03858                           |
| * * * * * * * * * * * * * * * * * * * | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1.                                                                                    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92 Vial 72 Vial 71  Location | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Control Control Control         | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25<br>26<br>27 | 0.00000 0.00000 8.44845e4 2.19018e5 3.67172e5 1.52559e4 0.00000 4.14786e5 1.97524e5 2.99209e5 4.16880e5 1.87732e4 1.60463e4 3.65901e5  CLO4-89-ISTD Area        | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270<br>12.425<br>CLO4-89-ISTD<br>RT     | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089<br>26.03858<br>CLO4-89-ISTD<br>Amount |
| * * * * * * * * * * * * * * * * * * * | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1.                                                                                    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 89 Vial 90 Vial 92 Vial 72 Vial 71  Location         | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Control Control Control Control | 12 13 14 15 16 17 18 19 20 21 22 25 26 27  Run  1                                | 0.00000 0.00000 8.44845e4 2.19018e5 3.67172e5 1.52559e4 0.00000 4.14786e5 1.97524e5 2.99209e5 4.16880e5 1.87732e4 1.60463e4 3.65901e5  CLO4-89-ISTD Area        | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270<br>12.425<br>CLO4-89-ISTD<br>RT<br> | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089<br>26.03858<br>CLO4-89-ISTD<br>Amount |
| * * * * * * * * * * * * * * * * * * * | 1736222002 100 1736222003 10X 582606 CCV@25 582607 LODV@1.                                                                                    | Vial 83 Vial 84 Vial 85 Vial 71 Vial 72 Vial 86 Vial 87 Vial 88 Vial 89 Vial 90 Vial 92 Vial 72 Vial 71  Location | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1                | Sample Sample Sample Sample Control Control Sample Sample Sample Sample Control Control Control         | 12<br>13<br>14<br>15<br>16<br>17<br>18<br>19<br>20<br>21<br>22<br>25<br>26<br>27 | 0.00000 0.00000 8.44845e4 2.19018e5 3.67172e5 1.52559e4 0.00000 4.14786e5 1.97524e5 2.99209e5 4.16880e5 1.87732e4 1.60463e4 3.65901e5  CLO4-89-ISTD Area        | 0.000<br>0.000<br>12.321<br>12.203<br>12.433<br>12.260<br>0.000<br>12.354<br>12.362<br>12.362<br>12.220<br>12.373<br>11.977<br>12.270<br>12.425<br>CLO4-89-ISTD<br>RT     | 0.00000<br>0.00000<br>607.51704<br>158.99673<br>25.75282<br>9.63602e-1<br>0.00000<br>3.02457e4<br>1.46723e4<br>219.55160<br>2.98845e4<br>1.62643<br>1.01089<br>26.03858<br>CLO4-89-ISTD<br>Amount |

|     | Sample             | Location        | Inj | SampleType | Run | CLO4-89-ISTD | CLO4-89-ISTD | CLO4-89-ISTD |
|-----|--------------------|-----------------|-----|------------|-----|--------------|--------------|--------------|
| #*  | -                  |                 | _   |            |     | Area         | RT           | 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      |
| *   | 173622200 <b>1</b> | 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 7 <b>1</b> | 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 | SampleNam | ne<br>====== | Method   | Inj<br>=== | 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  | 173622100 | )1           | CLO4-DOD | 1          | Sample     |           |          |
| 7    | Vial 77  | 582604    | 362211S      | CLO4-DOD | 1          | Sample     |           |          |
| 8    | Vial 78  | 582605    | 362211D      | CLQ4-DOD | 1          | Sample :   |           |          |
| 9    | Vial 79  | 173622100 | 02           | CLO4-DOD | 1          | Sample     |           |          |
| 10   | Vial 80  | 173622100 | )3           | CLO4-DOD | 1          | Sample     |           | 4        |
| 11   | Vial 81  | 173622100 | )4           | CLO4-DOD | 1          | Sample     |           |          |
| 12   | Vial 82  | 173622100 | )5           | CLO4-DOD | 1          | Sample     |           |          |
| 13   | Vial 83  | 173622200 | 01           | CLO4-DOD | 1          | Sample     |           |          |
| 14   | Vial 84  | 173622200 | 100          | CLO4-DOD | 1          | Sample     |           |          |
| 15   | Vial 85  | 173622200 | 03 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  | 173622200 | )4           | CLO4-DOD | 1          | Sample     |           |          |
| 19   | Vial 87  | 173622200 | )5 1K        | CLO4-DOD | 1          | Sample     |           |          |
| 20   | Vial 88  | 173622200 | )6 1K        | CLO4-DOD | 1          | Sample     |           |          |
| 21   | Vial 89  | 173622200 | 07 10X       | CLO4-DOD | 1          | Sample     |           |          |
| 22   | Vial 90  | 173622200 | 08 1K        | CLO4-DOD | 1          | Sample     |           |          |
| 23   | Vial 91  | 180021000 | 01 10X       | CLO4-DOD | 1          | Sample     |           |          |
| 24   | Vial 71  | 582608    | CCV@25       | CLO4-DOD | 1          | Ctrl Samp  |           |          |
| 25   | Vial 92  | 180021000 | 01 .         | CLO4-DOD | 1          | Sample     |           |          |
| 26   | Vial 72  | 582609    | LODV@1.      | CLO4-DOD | 1          | Ctrl Samp  |           |          |
| 27   | Wial 71  | 582608    | CCVA25       | CLO4-DOD | 1          | Ctrl Samp  |           |          |



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND01.D

Sample Name: 582599

Injection Date:

1/08/2018 08:17:41

Seq Line:

\_\_\_\_\_\_\_

Sample Name: Acq Operator: 582599 TNB

CCV@25

Location: Inj. No.: Inj. Vol.: Vial 71 1  $25 \mu 1$ 

Acq. Method:

CLO4-DOD,M

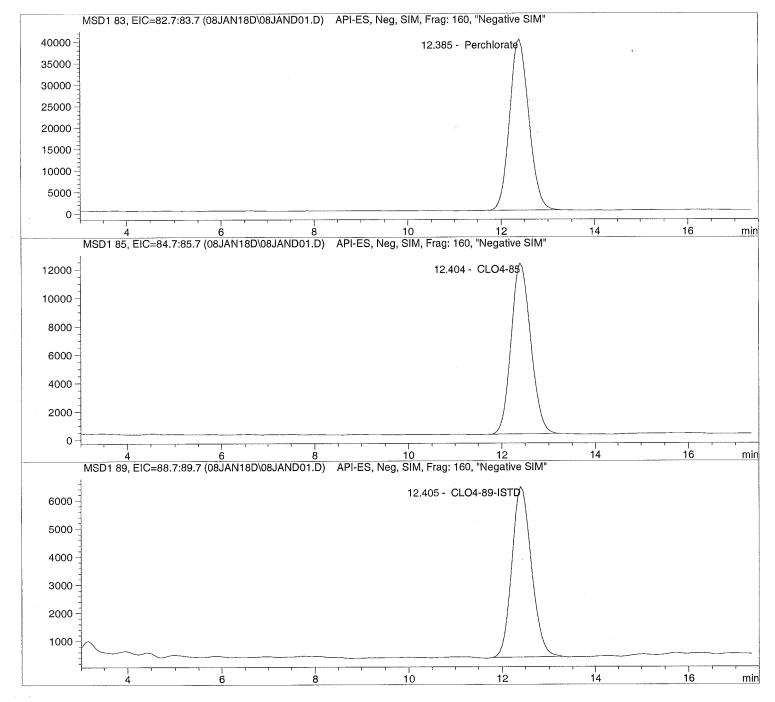
C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND01.D Sample Name: 582599 CCV@25

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Sample Name:

Injection Date: 1/08/2018 08:17:41 582599 CCV@25

Seq Line: Location:

Acq Operator:

TNB

Vial 71

Inj. No.: Inj. Vol.:

 $25 \mu 1$ 

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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Sample Information

Sorted By:

Signal

Calib. Data Modified:

Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

25.000

\_\_\_\_\_\_

LCMS Results

\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area      | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|-----------|-----------------------|------------------|
| 12.385      | BBA  | 1145492.5 | 26.3378               | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.404      | PBA  | 352643.5 | 25.7658               | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount [ug/sample] | Compound<br>Name |  |
|-------------|------|----------|--------------------|------------------|--|
| 12.405      | PBA  | 177130.7 | 5.0000             | CLO4-89-ISTD     |  |

Sample Name: 582600 Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D 

Injection Date:

1/08/2018 08:36:51 582600 LODV@1.

Seq Line: Location:

Vial 72

Sample Name: Acq Operator:

TNB

Inj. No.: Inj. Vol.:

 $25 \mu 1$ 

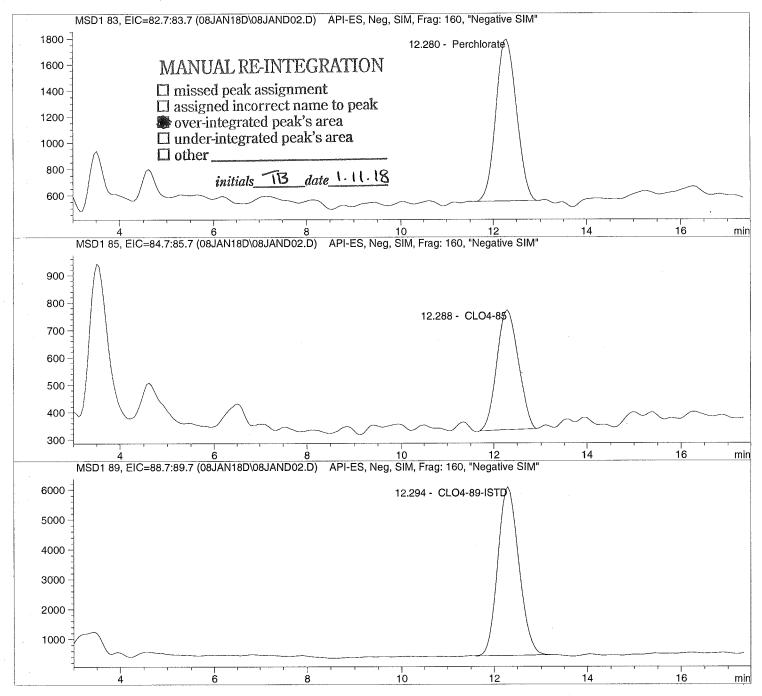
Acq. Method: Analysis Method: CLO4-DOD.M

C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



LODV@1. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D Sample Name: 582600 \_\_\_\_\_\_\_

Injection Date: 1/08/2018 08:36:51

Seg Line: Location:

Sample Name: Acq Operator: 582600 LODV@1. TNB

Inj. No.: Inj. Vol.: Vial 72

 $25 \mu l$ 

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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Sample Information

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

1.000

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LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type    | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|---------|---------|-----------------------|------------------|
| 12.280      | <br> MM | 37680.5 | 1.0156                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT [min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|----------|------|---------|-----------------------|------------------|
| 12.288 E | PBA  | 13990.1 | 0.9402                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount [ug/sample] | Compound<br>Name |
|-------------|------|----------|--------------------|------------------|
| 12.294      | BBA  | 175472.0 | 5.0000             | CLO4-89-ISTD     |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND03.D

Sample Name: 582601 ICS@1.

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Injection Date:

1/08/2018 08:56:03 582601 ICS@1. Seq Line: Location:

Vial 73

Sample Name: Acq Operator:

TNB

12001 ICSG

Inj. No.: Inj. Vol.:  $\begin{array}{c} 1 \\ 25 \mu 1 \end{array}$ 

Acq. Method:

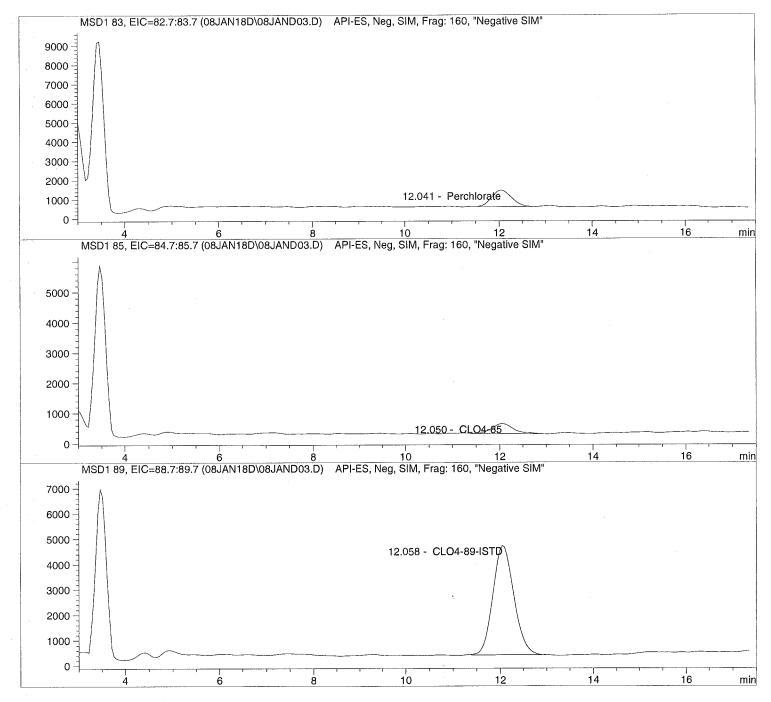
CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Sample Name: 582601 ICS@1. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND03.D \_\_\_\_\_\_

Injection Date: 1/08/2018 08:56:03

Seq Line: Location: Vial 73

Sample Name: Acq Operator: 582601 ICS@1. TNB

Inj. No.: Inj. Vol.:

 $25 \mu 1$ 

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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Sample Information

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Sorted By:

Signal

Calib. Data Modified:

Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

1.000

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LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.041      | PBA  | 24937.1 | 0.8803                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.050      | PBA  | 10313.9 | 0.8959                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.058      | BBA  | 134582.5 | 5.0000                | CLO4-89-ISTD     |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND04.D

Sample Name: 582602

Injection Date:

1/08/2018 09:15:17 Seq Line:

Sample Name:

582602 LMB Location:

Vial 74

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

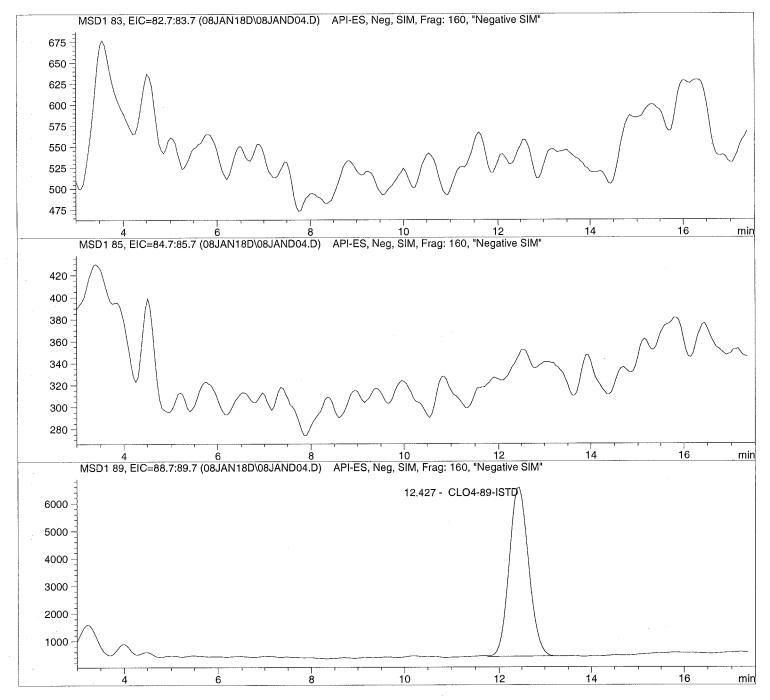
CLO4-DOD.M

C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND04.D

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Injection Date: 1/08/2018 09:15:17

Seq Line: Location:

Sample Name: Acq Operator:

582602 LMB

Inj. No.: Inj. Vol.: Vial 74  $25 \mu 1$ 

Sample Name: 582602 LMB

Acq. Method:

CLO4-DOD.M

TNB

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

Sample Information

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Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type | Area | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|------|-----------------------|------------------|
| 0.000       |      | 0.0  | 0.0000                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| R7 | 1 - 2 L | Area | Amount<br>[ug/sample] | Compound<br>Name |
|----|---------|------|-----------------------|------------------|
| 0. | 000     | 0.0  | 0.0000                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.427      | BBA  | 182149.0 | 5.0000                | CLO4-89-ISTD     |  |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND05.D

Sample Name: 582603

Injection Date:

1/08/2018 09:34:27

Seq Line:

Inj. Vol.:

Vial 75

Sample Name: Acq Operator:

582603 TNB

)3 LCS@5.

Location: Inj. No.:

 $\begin{array}{c} \text{Vial} & 75 \\ 1 \\ 25 & \mu 1 \end{array}$ 

Acq. Method:

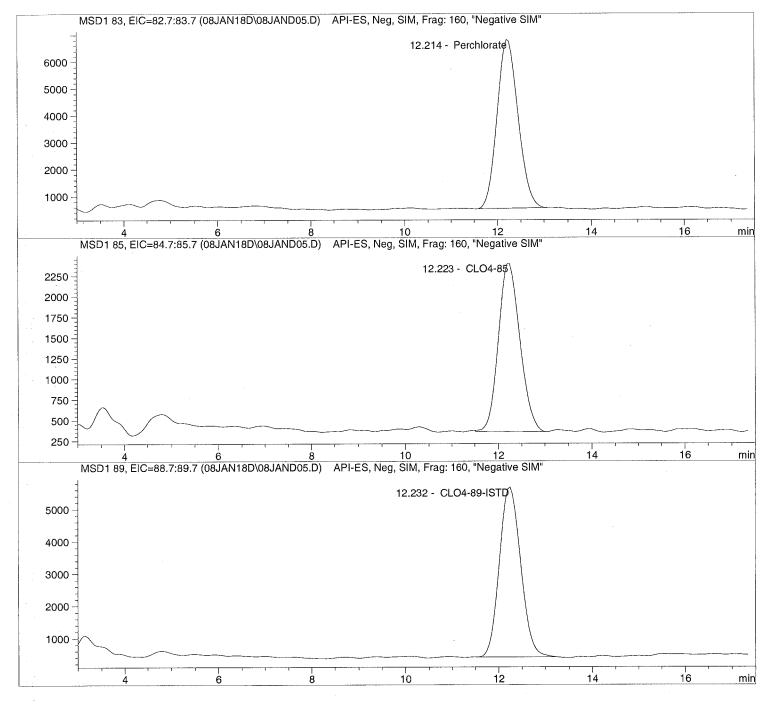
CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Sample Name: 582603 LCS@5. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND05.D

Injection Date: Sample Name:

1/08/2018 09:34:27 582603 LCS@5.

Seg Line: Location: Vial 75

Acq Operator:

TNB

Inj. No.: Inj. Vol.: 25 μl

Acq. Method:

Last Changed:

CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

12/20/2017 08:11:26

Perchlorate analysis

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Sample Information

\_\_\_\_\_\_

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

5.000

LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.214      | PBA  | 194972.6 | 5.2991                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Type | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.223      | BBA  | 65076.3 | 5.3019                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.232      | BBA  | 166837.8 | 5.0000                | CLO4-89-ISTD     |  |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND06.D

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Injection Date:

1/08/2018 09:55:06 1736221001 Seq Line: Location: 6 Vial 76

Sample Name:
Acq Operator:

TNB

Inj. No.: Inj. Vol.:  $\begin{array}{c} 1 \\ 25 \ \mu 1 \end{array}$ 

Sample Name: 1736221001

Acq. Method:

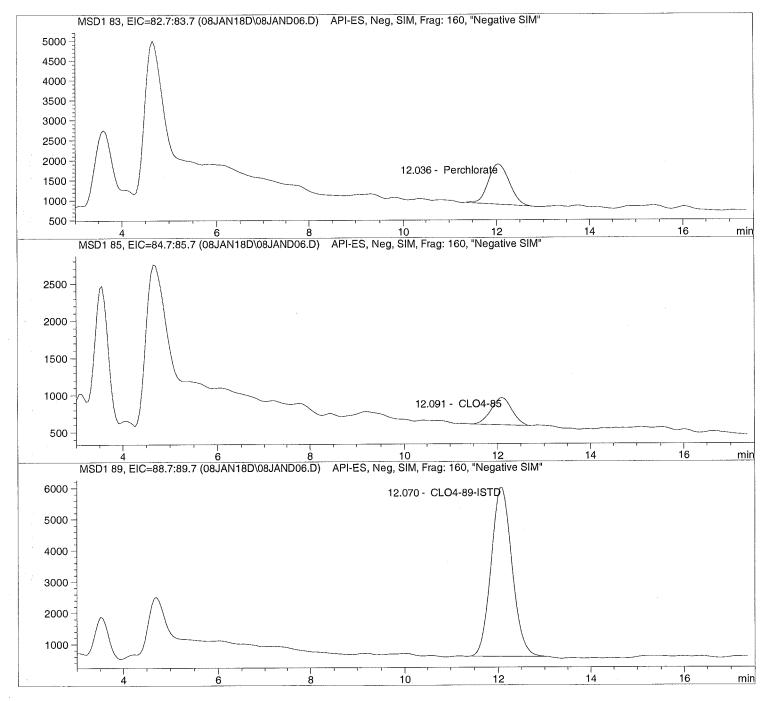
CLO4-DOD.M

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

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Injection Date: 1/08/2018 09:55:06

Seq Line: Location:

Sample Name: Acq Operator: 1736221001 TNB

Inj. No.: Inj. Vol.: Vial 76 1  $25 \mu 1$ 

Sample Name: 1736221001

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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Sample Information

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

0.000

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LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type | Area    | Amount [ug/sample] | Compound<br>Name |  |
|-------------|------|---------|--------------------|------------------|--|
| 12.036      | PBA  | 31087.2 | 0.8880             | Perchlorate      |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT     | Туре | Area    | Amount      | Compound |
|--------|------|---------|-------------|----------|
| [min]  |      |         | [ug/sample] | Name     |
| 12.091 | PBA  | 11237.5 | 0.7663      | CLO4-85  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT [min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|----------|------|----------|-----------------------|------------------|
| 12.070   | BBA  | 166279.1 | 5.0000                | CLO4-89-ISTD     |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND07.D

Sample Name: 582604 

Injection Date:

1/08/2018 10:14:18

Seq Line: Location:

Vial 77

Sample Name: Acq Operator:

TNB

582604 362211S

Inj. No.: Inj. Vol.:  $25 \mu 1$ 

Acq. Method:

CLO4-DOD.M

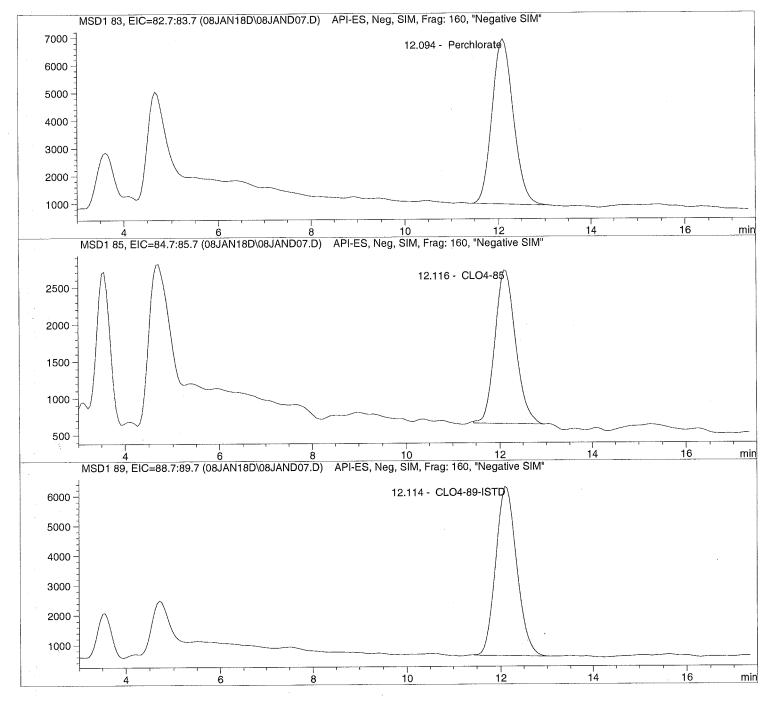
C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND07.D Sample Name: 582604

362211S \_\_\_\_\_\_

Injection Date: 1/08/2018 10:14:18 Sample Name: Acq Operator:

582604 362211S

Seg Line: Location: Inj. No.:

Inj. Vol.:

Vial 77

1

 $25~\mu$ l

Acq. Method:

TNB

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

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LCMS Results

\_\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.094      | PBA  | 188371.2 | 4.8052                | <br> Perchlorate |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Type | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.116      | BBA  | 64174.7 | 4.8851                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.114      | BBA  | 178297.8 | 5.0000                | CLO4-89-ISTD     |  |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND08.D

Sample Name: 582605 \_\_\_\_\_\_

Injection Date: Sample Name:

1/08/2018 10:33:30 582605

Seq Line: Location: Vial 78

Acq Operator:

TNB

362211D

Inj. No.: Inj. Vol.:

1  $25 \mu l$ 

Acq. Method:

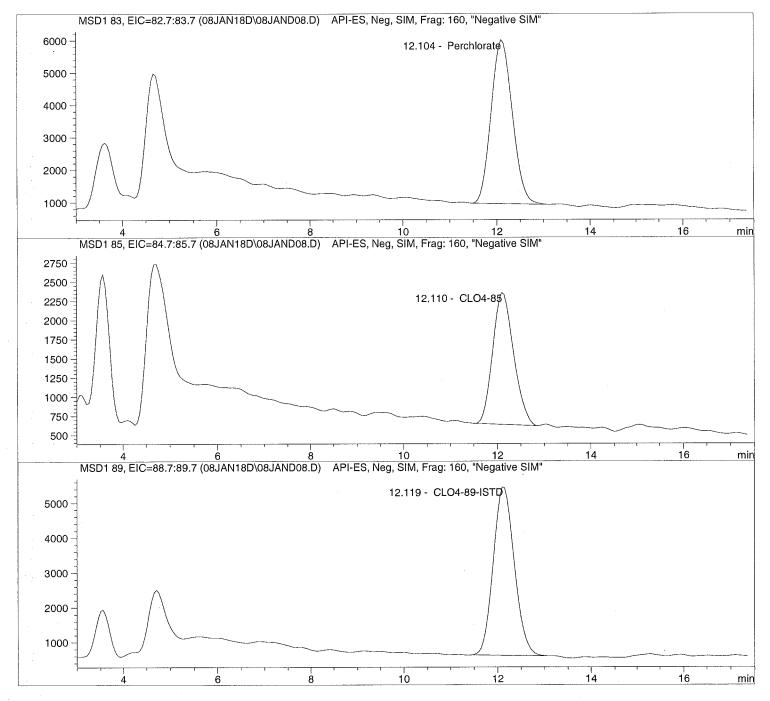
CLO4-DOD.M

 $C: \HPCHEM\1\METHODS\CLO4-DPR.M$ Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



362211D Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND08.D Sample Name: 582605

Sample Name: Acq Operator:

Injection Date: 1/08/2018 10:33:30 582605 362211D

Seg Line: Location:

8 Vial 78

TNB

Inj. No.: Inj. Vol.:

 $25 \mu l$ 

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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Sample Information

\_\_\_\_\_\_

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

0.000

LCMS Results

\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT [min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|----------|------|----------|-----------------------|------------------|
| 12.104   | PBA  | 158239.9 | 4.7946                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.110      | PBA  | 52994.0 | 4.7892                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.119      | PBA  | 150118.3 | 5.0000                | CLO4-89-ISTD     |  |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND09.D

Sample Name: 1736221002 

Injection Date:

1/08/2018 10:52:41 1736221002

Seq Line: Location: Vial 79

Sample Name: Acq Operator:

TNB

Inj. No.: Inj. Vol.:

 $25 \mu l$ 

Acq. Method:

CLO4-DOD.M

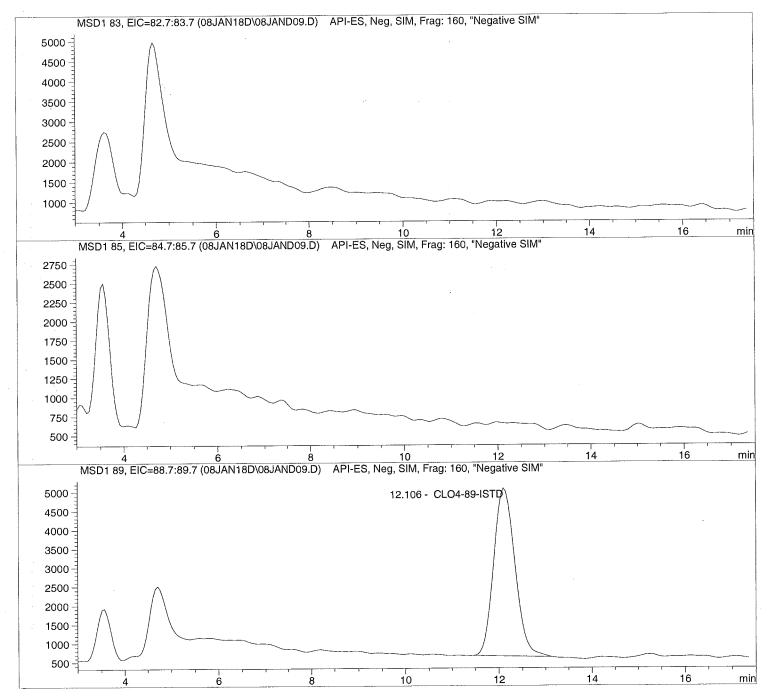
C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

\_\_\_\_\_\_



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND09.D

Injection Date: 1/08/2018 10:52:41

Seq Line:

Sample Name: Acq Operator:

1736221002

Location:

Vial 79

Sample Name: 1736221002

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

LCMS Results

\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|------|-----------------------|------------------|
| 0.000       |      | 0.0  | 0.0000                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

|   | RT<br>[min] | Type | Area | Amount<br>[ug/sample] | Compound<br>Name |  |
|---|-------------|------|------|-----------------------|------------------|--|
| - | 0.000       |      | 0.0  | 0.0000                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре            | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|-----------------|----------|-----------------------|------------------|--|
| 12.106      | <b></b><br> BBA | 139148.3 | 5.0000                | CLO4-89-ISTD     |  |

\_\_\_\_\_

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D

Sample Name: 1736221003 \_\_\_\_\_\_

Injection Date: Sample Name:

1/08/2018 11:11:49 1736221003

Seq Line: Location:

10 Vial 80

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu l$ 

Acq. Method:

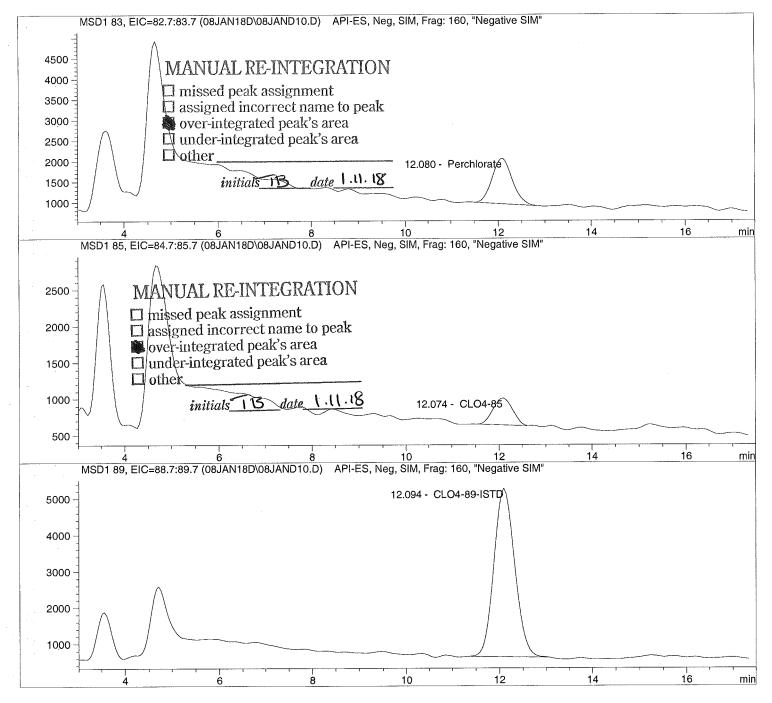
CLO4-DOD.M

C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D

\_\_\_\_\_\_

Injection Date: 1/08/2018 11:11:49

Seg Line: Location: 10

Sample Name: Acq Operator:

1736221003

Inj. No.:

Vial 80 1

Sample Name: 1736221003

TNB

Inj. Vol.:

25  $\mu$ l

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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Sample Information

\_\_\_\_\_\_

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

0.000

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LCMS Results

\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре     | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|----------|---------|-----------------------|------------------|
| 12.080      | <br>  MM | 32769.4 | 1.0925                | <br> Perchlorate |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.074      | MM   | 10469.1 | 0.8576                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.094      | BBA  | 141559.2 | 5.0000                | CLO4-89-ISTD     |  |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND11.D

Sample Name: 1736221004 \_\_\_\_\_\_

Injection Date:

1/08/2018 11:31:01

Seq Line: Location:

11 Vial 81

Sample Name: Acq Operator: 1736221004 TNB

Inj. No.: Inj. Vol.:

1  $25 \mu l$ 

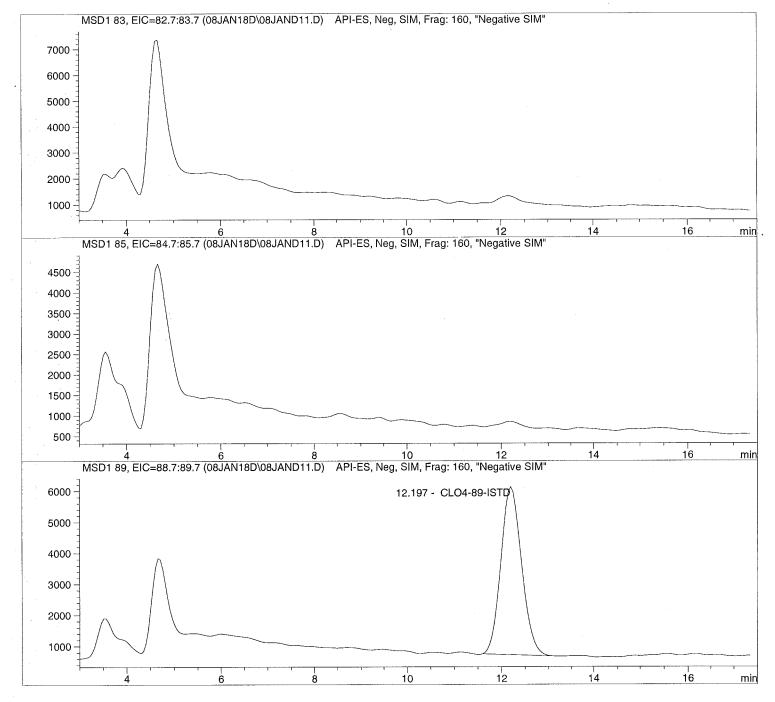
Acq. Method: Analysis Method: CLO4-DOD.M

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: Location: 11

Sample Name: Acq Operator:

1736221004

TNB

Inj. No.: Inj. Vol.: Vial 81 1  $25 \mu l$ 

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|------|-----------------------|------------------|
| 0.000       |      | 0.0  | 0.0000                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT [min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|----------|------|------|-----------------------|------------------|
| 0.000    |      | 0.0  | 0.0000                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.197      | PBA  | 163910.3 | 5.0000                | CLO4-89-ISTD     |  |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND12.D

Sample Name: 1736221005 

Injection Date:

1/08/2018 11:50:08

Seq Line: Location:

12 Vial 82

Sample Name: Acq Operator: 1736221005 TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

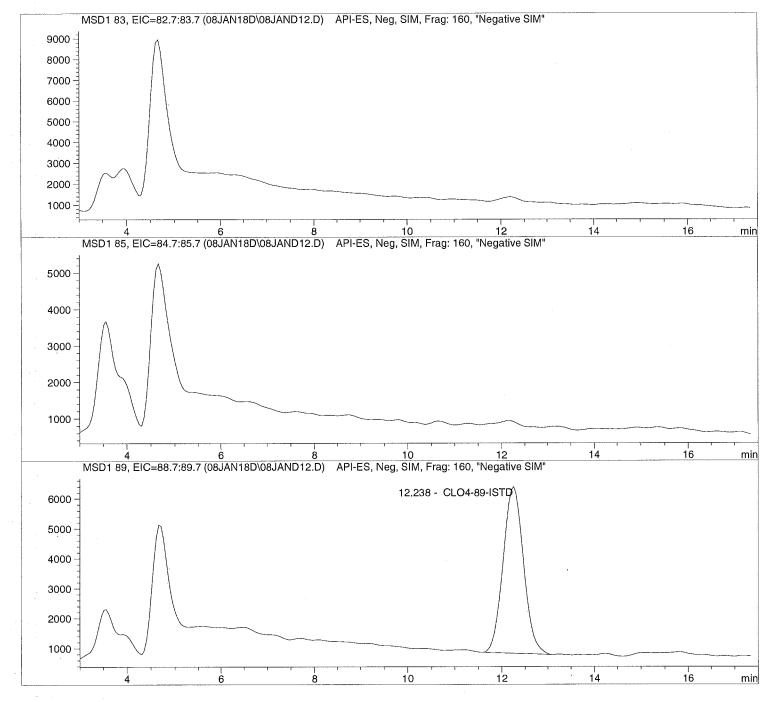
CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Sample Name: 1736221005 Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND12.D

\_\_\_\_\_\_\_

Injection Date: 1/08/2018 11:50:08 Sample Name: 1736221005

Seq Line: Location: 12

Acq Operator:

TNB

Inj. No.: Inj. Vol.: Vial 82 1  $25 \mu 1$ 

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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Sample Information

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

0.000

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LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|------|-----------------------|------------------|
| 0.000       |      | 0.0  | 0.0000                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|------|-----------------------|------------------|
| 0.000       |      | 0.0  | 0.0000                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.238      | PBA  | 169084.7 | 5.0000                | CLO4-89-ISTD     |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND13.D

Sample Name: 1736222001 \_\_\_\_\_\_\_

Injection Date:

1/08/2018 12:09:16

Seq Line: Location: 13

Sample Name: Acq Operator:

1736222001

TNB

Inj. No.: Inj. Vol.: Vial 83 1  $25 \mu l$ 

Acq. Method:

CLO4-DOD.M

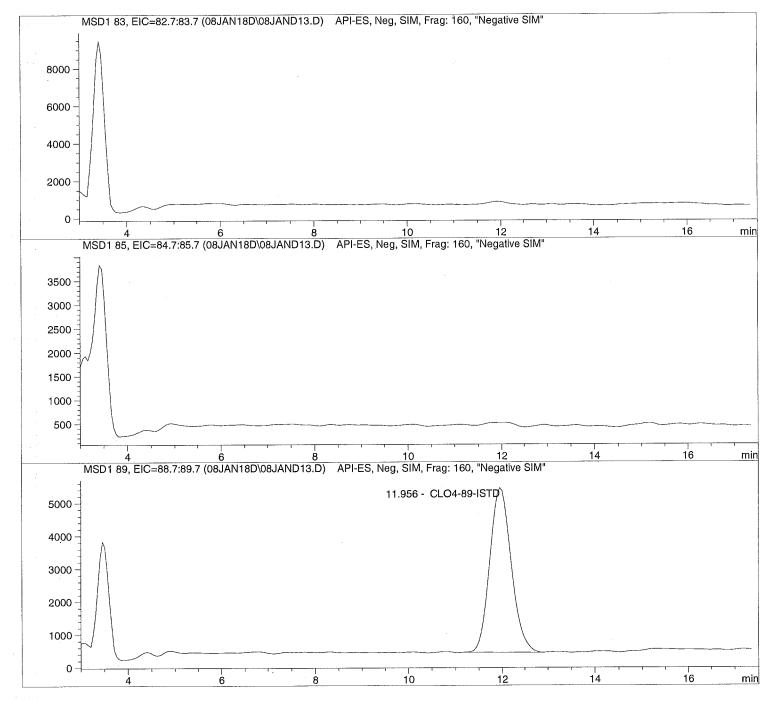
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND13.D

\_\_\_\_\_\_

Injection Date: 1/08/2018 12:09:16

Seg Line: Location: 13

Sample Name: Acq Operator: 1736222001

Inj. No.: Inj. Vol.: Vial 83 1  $25 \mu l$ 

Sample Name: 1736222001

Acq. Method:

CLO4-DOD.M

TNB

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|------|-----------------------|------------------|
| 0.000       |      | 0.0  | 0.0000                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT    | Type | Area | Amount      | Compound |   |
|-------|------|------|-------------|----------|---|
| [min] |      |      | [ug/sample] | Name     |   |
|       |      |      |             |          |   |
| 0.000 |      | 0.0  | 0.0000      | CLO4-85  | ļ |
|       |      |      |             |          | _ |

Signal3: MSD1 89, EIC=88.7:89.7

| RT [min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|----------|------|----------|-----------------------|------------------|--|
| 11.956   | BBA  | 163058.7 | 5.0000                | CLO4-89-ISTD     |  |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND14.D

Sample Name: 1736222002

Injection Date: Sample Name:

1/08/2018 12:28:24 1736222002

100

Seq Line: Location:

14 Vial 84

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

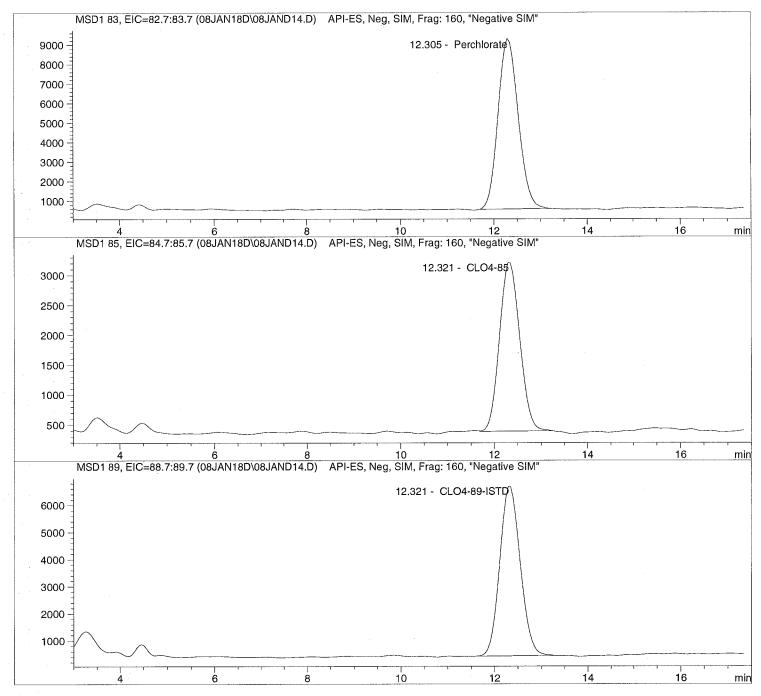
CLO4-DOD.M

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: Location: 14

Sample Name: Acq Operator:

1736222002 100

Inj. No.: Inj. Vol.: Vial 84 1  $25~\mu$ l

Acq. Method:

CLO4-DOD.M

TNB

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: Dilution:

1.000000 100.000000

Sample Amount:

0.000

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LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.305      | BBA  | 260213.5 | 619.8599              | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT [min] | Туре       | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|----------|------------|---------|-----------------------|------------------|--|
| 12.32    | <br>21 BBA | 84484.5 | 607.5170              | <br> CLO4-85     |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.321      | BBA  | 189341.2 | 500.0000              | CLO4-89-ISTD     |



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND15.D

Sample Name: 1736222003 \_\_\_\_\_\_\_

Injection Date: Sample Name:

1/08/2018 12:47:33 1736222003 10x

Seq Line: Location:

15 Vial 85

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

 ${\tt CLO4-DOD.M}$ 

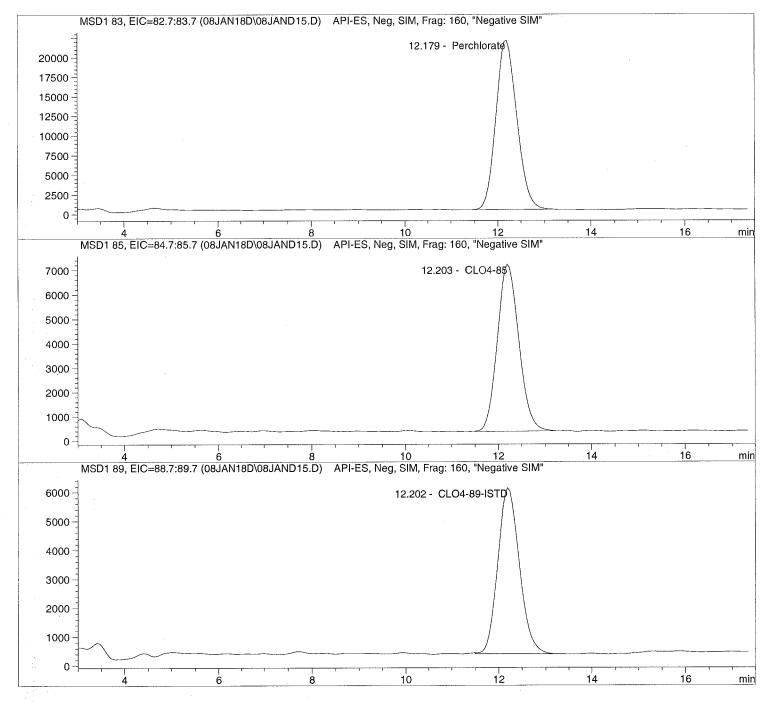
C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

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10X

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND15.D

Sample Name: 1736222003 

Injection Date: 1/08/2018 12:47:33 Sample Name:

1736222003 10X

Seq Line: Location:

15 Vial 85

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

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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Sample Information

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 10.000000

Sample Amount:

0.000

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LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.179      | PBA  | 672525.0 | 156.6497              | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.203      | BBA  | 219017.6 | 158.9967              | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name  |  |
|-------------|------|----------|-----------------------|-------------------|--|
| 12.202      | BBA  | 184162.5 | 50.0000               | <br> CLO4-89-ISTD |  |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND16.D

Sample Name: 582606 \_\_\_\_\_\_

Injection Date:

1/08/2018 13:08:12

Seq Line: Location:

Sample Name:

582606

Vial 71

Acq Operator:

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

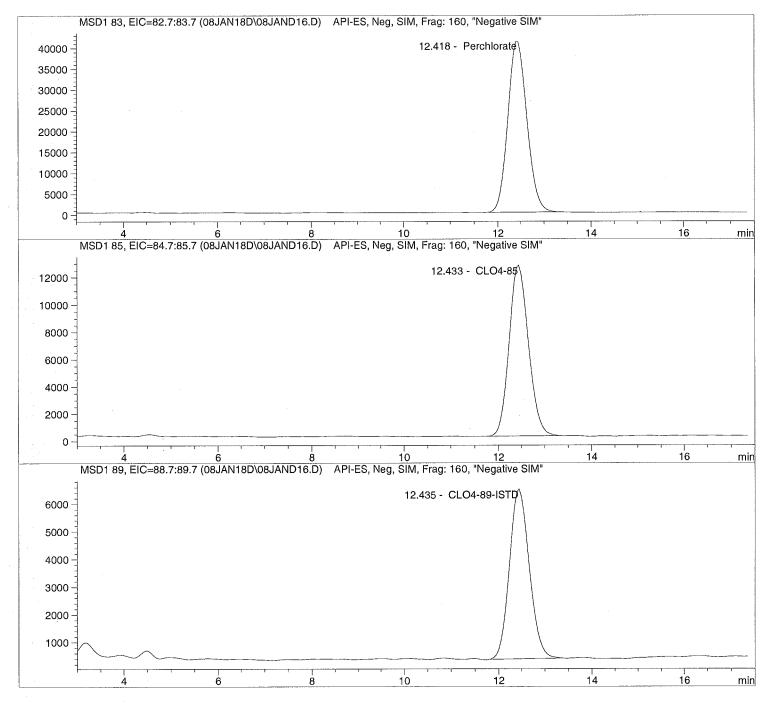
CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Sample Name: 582606 CCV@25 Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND16.D

\_\_\_\_\_\_\_\_

Injection Date: Sample Name:

1/08/2018 13:08:12 582606 CCV@25

Seq Line: Location:

16 Vial 71 1

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

 $25 \mu 1$ 

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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Sample Information

\_\_\_\_\_\_

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier:

1.000000 1.000000

Dilution: Sample Amount:

25.000

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LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type | Area      | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|-----------|-----------------------|------------------|--|
| 12.418      | PBA  | 1188700.2 | 26.2466               | Perchlorate      |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.433      | PBA  | 367172.0 | 25.7528               | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.435      | PBA  | 184529.9 | 5.0000                | CLO4-89-ISTD     |

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND17.D

Sample Name: 582607 LODV@1.

Injection Date: Sample Name:

1/08/2018 13:27:20 582607

Seq Line: Location:

17 Vial 72

Acq Operator:

TNB

LODV@1.

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method: Analysis Method:  ${\tt CLO4-DOD.M}$ 

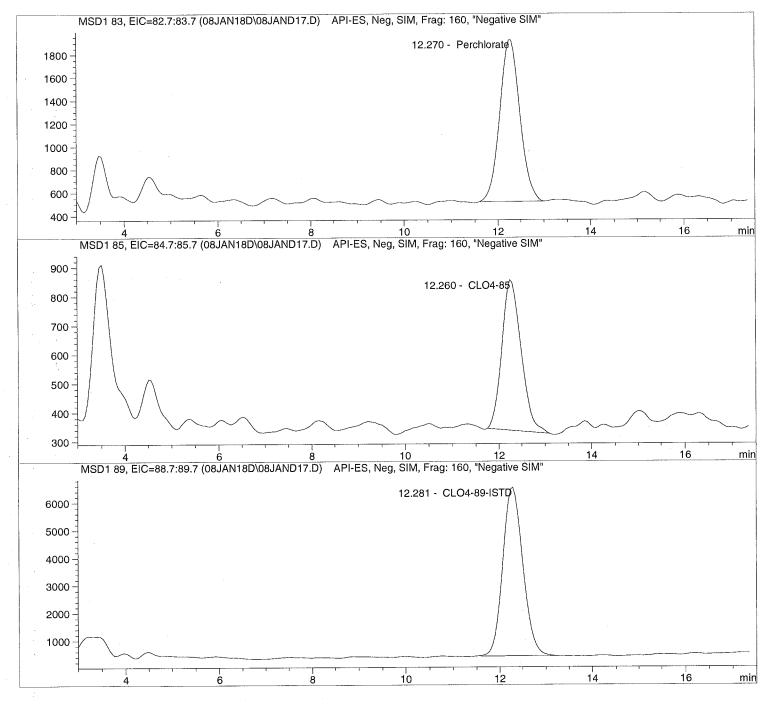
 ${\tt C: \hpchem\l} {\tt METHODS\clo4-DPR.M}$ 

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

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Sample Name: 582607 LODV@1. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND17.D \_\_\_\_\_\_\_

Injection Date: 1/08/2018 13:27:20 Sample Name: 582607 LODV@1.

Seq Line: Location:

17 Vial 72

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

 $25 \mu 1$ 

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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Sample Information

\_\_\_\_\_\_\_

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

1.000

\_\_\_\_\_\_

LCMS Results

\_\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.270      | PBA  | 43177.0 | 1.0870                | Perchlorate      |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре    | Area    | Amount [ug/sample] | Compound<br>Name |
|-------------|---------|---------|--------------------|------------------|
| 12.260      | <br>PBA | 15255.9 |                    | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT [min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|----------|------|----------|-----------------------|------------------|--|
| 12.281   | BBA  | 187499.3 | 5.0000                | CLO4-89-ISTD     |  |



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND18.D

Sample Name: 1736222004

.

Injection Date: Sample Name:

1/08/2018 13:46:29 1736222004 Seq Line: Location:

18 Vial 86

Sample Name: Acq Operator:

TNB

Inj. No.:
Inj. Vol.:

 $\begin{array}{c} 1 \\ 25 \ \mu 1 \end{array}$ 

Acq. Method:

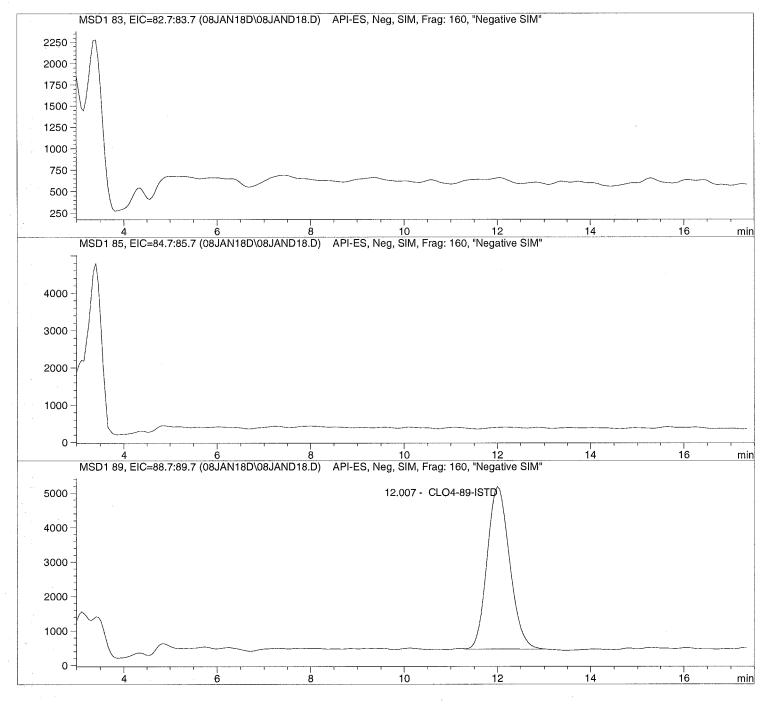
CLO4-DOD.M

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: Location: 18

1

Sample Name: Acq Operator:

1736222004

TNB

Vial 86 Inj. No.:  $25 \mu 1$ Inj. Vol.:

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

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LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT [min] | Туре | Area | Amount<br>[ug/sample] | Compound<br>Name |
|----------|------|------|-----------------------|------------------|
| 0.000    |      | 0.0  | 0.0000                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

|   | RT    | Type | Area | Amount      | Compound |  |
|---|-------|------|------|-------------|----------|--|
|   | [min] |      | • .  | [ug/sample] | Name     |  |
| l |       |      |      |             |          |  |
|   | 0.000 |      | 0.0  | 0.0000      | CLO4-85  |  |
| • |       |      |      |             |          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.007      | BBA  | 157843.1 | 5.0000                | CLO4-89-ISTD     |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND19.D

Sample Name: 1736222005

Injection Date:

1/08/2018 14:05:39

Seq Line: Location: 19

Sample Name:

1736222005

Inj. No.:

Vial 87

Acq Operator:

TNB

Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

CLO4-DOD.M

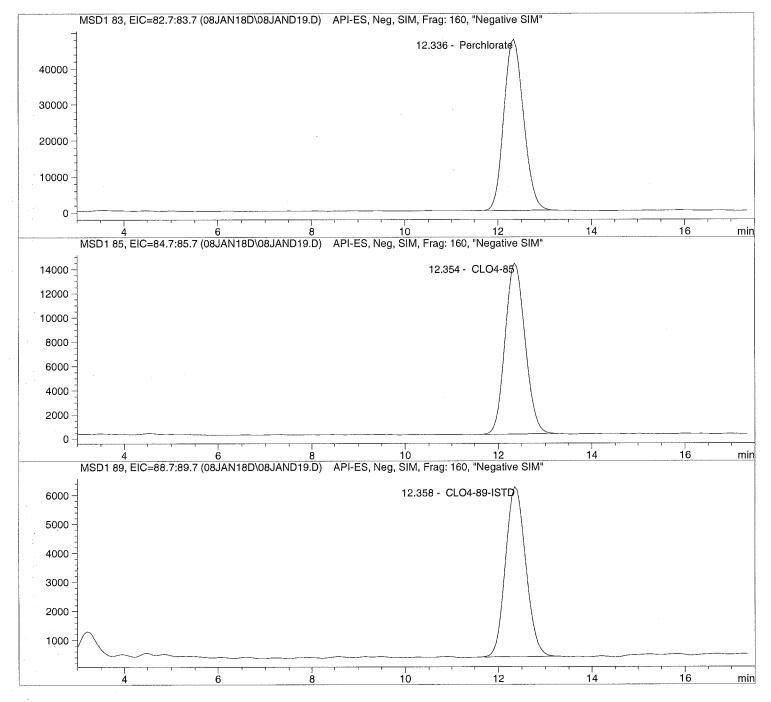
Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

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Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND19.D

Sample Name: 1736222005 1K \_\_\_\_\_\_

Injection Date: 1/08/2018 14:05:39

Seq Line:

19

Sample Name: Acq Operator:

1736222005 1K

TNB

Location: Inj. No.: Inj. Vol.: Vial 87 1  $25 \mu 1$ 

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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Sample Information

Sorted By:

Signal

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1000.000000

Sample Amount:

0.000

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LCMS Results

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Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area      | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|-----------|-----------------------|------------------|
| 12.336      | PBA  | 1375622.1 | 31318.8180            | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Type | Area     | Amount [ug/sample] | Compound<br>Name |
|-------------|------|----------|--------------------|------------------|
| 12.354      | PBA  | 414786.1 | 30245.6824         | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| - | RT     | Type | Area     | Amount      | Compound     |
|---|--------|------|----------|-------------|--------------|
| į | [min]  |      |          | [ug/sample] | Name         |
| İ |        |      |          |             |              |
|   | 12.358 | PBA  | 174781.8 | 5000.0000   | CLO4-89-ISTD |

\_\_\_\_\_\_

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND20.D

Sample Name: 1736222006 \_\_\_\_\_\_

Injection Date:

1/08/2018 14:24:48

Seq Line: Location:

20 Vial 88

Sample Name: Acq Operator: 1736222006 TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

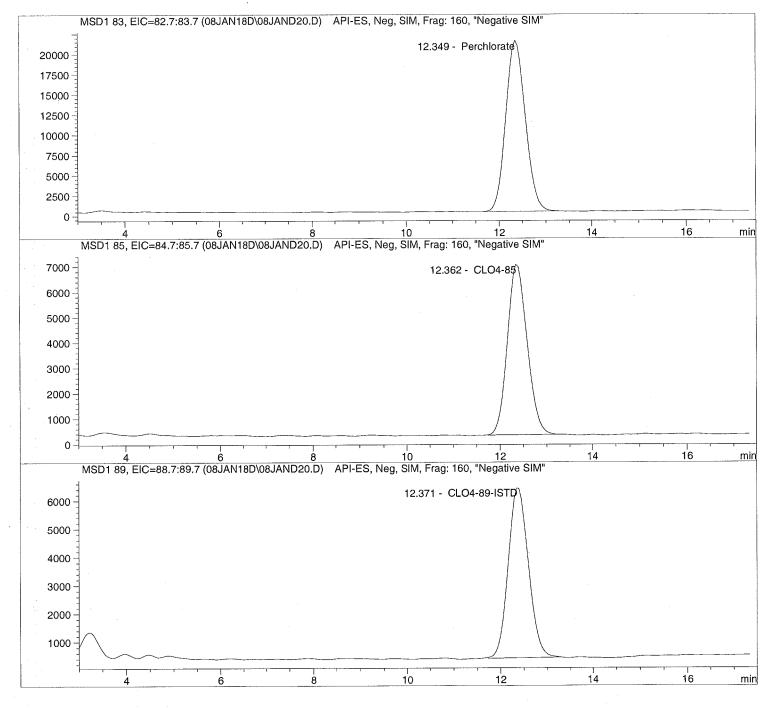
CLO4-DOD.M

C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND20.D

Sample Name: 1736222006 \_\_\_\_\_\_

Injection Date: 1/08/2018 14:24:48

Seq Line:

2.0

Sample Name:

1736222006 1K

Location:

Vial 88

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu l$ 

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: Dilution:

1.000000 1000.000000

Sample Amount:

0.000

\_\_\_\_\_\_

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name | - |
|-------------|------|----------|-----------------------|------------------|---|
| 12.349      | PBA  | 615406.7 | 14685.8937            | Perchlorate      |   |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.362      | BBA  | 197523.7 | 14672.3128            | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |   |
|-------------|------|----------|-----------------------|------------------|---|
| 12.371      | BBA  | 180646.8 | 5000.0000             | CLO4-89-ISTD     | İ |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND21.D.

Sample Name: 1736222007 \_\_\_\_\_\_

Injection Date:

1/08/2018 14:44:00

Seq Line:

Sample Name: Acq Operator: 1736222007 10X

Location: Inj. No.: Inj. Vol.: Vial 89  $25 \mu 1$ 

Acq. Method:

CLO4-DOD.M

TNB

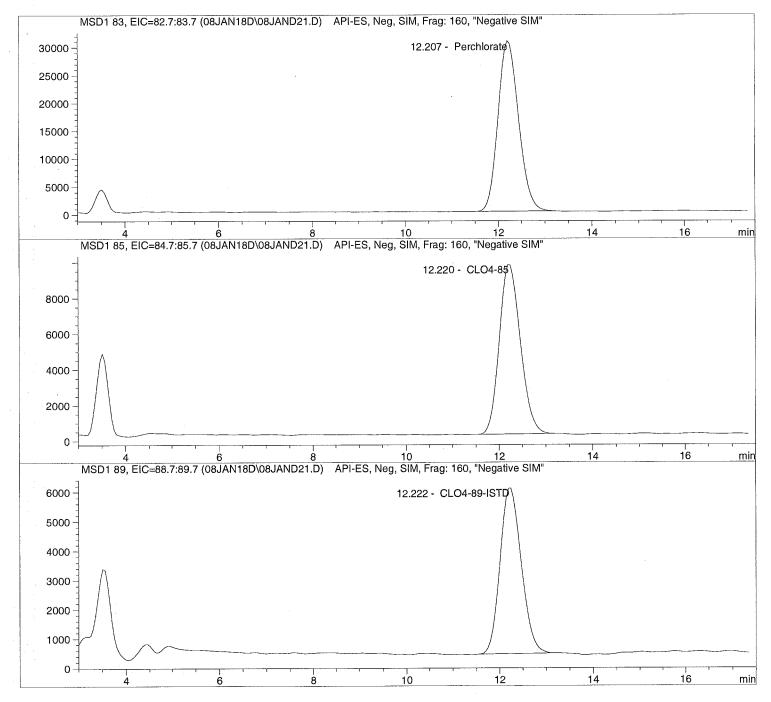
C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

\_\_\_\_\_\_\_





Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND21.D

Sample Name: 1736222007 \_\_\_\_\_\_

Injection Date: 1/08/2018 14:44:00

1736222007 10X

Seq Line: Location:

Sample Name: Acq Operator:

Inj. No.:

Vial 89

TNB

Inj. Vol.:

 $25 \mu 1$ 

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: Dilution:

1.000000 10.000000

Sample Amount:

0.000

\_\_\_\_\_\_

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |   |
|-------------|------|----------|-----------------------|------------------|---|
| 12.207      | PBA  | 938832.6 | 218.6278              | Perchlorate      | - |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.220      | PBA  | 299209.2 | 219.5516              | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.222      | PBA: | 178666.8 | 50.0000               | CLO4-89-ISTD     |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND22.D

Sample Name: 1736222008 \_\_\_\_\_\_

Injection Date:

1/08/2018 15:03:11

Seq Line: Location: 22

1K

Sample Name:

1736222008

Inj. No.:

Vial 90

Acq Operator:

TNB

Inj. Vol.:

1  $25 \mu l$ 

Acq. Method:

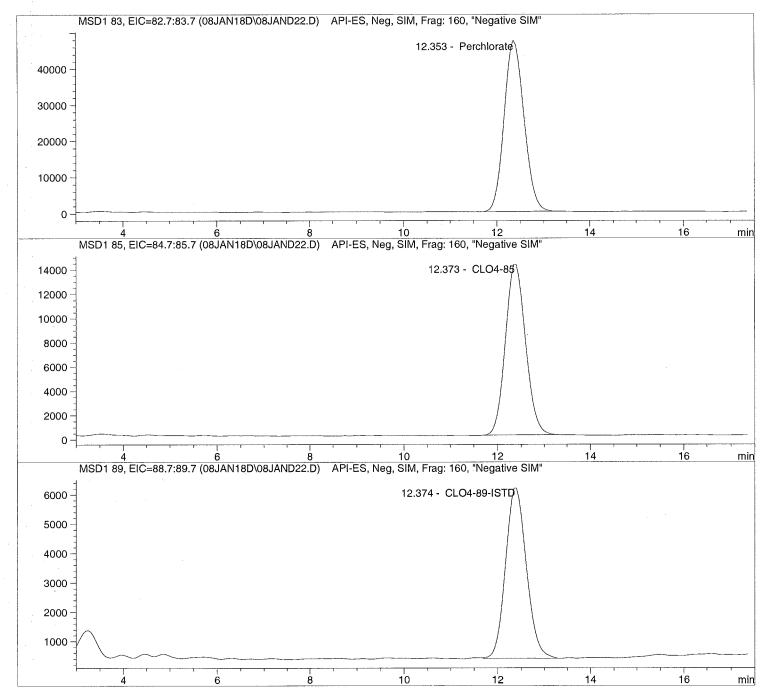
CLO4-DOD.M

C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

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 Sample Name: 1736222008 1K

Seq Line: Location:

22 Vial 90

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu l$ 

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: Dilution:

1.000000 1000.000000

Sample Amount:

0.000

LCMS Results

\_\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| ١ | RT     | Туре | Area      | Amount      | Compound    |
|---|--------|------|-----------|-------------|-------------|
| İ | [min]  |      |           | [ug/sample] | Name        |
|   |        |      |           |             |             |
|   | 12.353 | PBA  | 1374991.0 | 30809.3521  | Perchlorate |

Signal2: MSD1 85, EIC=84.7:85.7

|   | RT [min] | Туре | Area     | Amount [ug/sample] | Compound<br>Name |
|---|----------|------|----------|--------------------|------------------|
| - | 12.373   | PBA  | 416880.0 |                    | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name  |  |
|-------------|------|----------|-----------------------|-------------------|--|
| 12.374      | BBA  | 178007.8 | 5000.0000             | <br> CLO4-89-ISTD |  |

\_\_\_\_\_\_\_

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND25.D

Sample Name: 1800210001 

Injection Date:

1/08/2018 16:00:36

Seg Line: Location:

Sample Name: Acq Operator: 1800210001

Inj. No.:

Vial 92

TNB

Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

 ${\tt CLO4-DOD.M}$ 

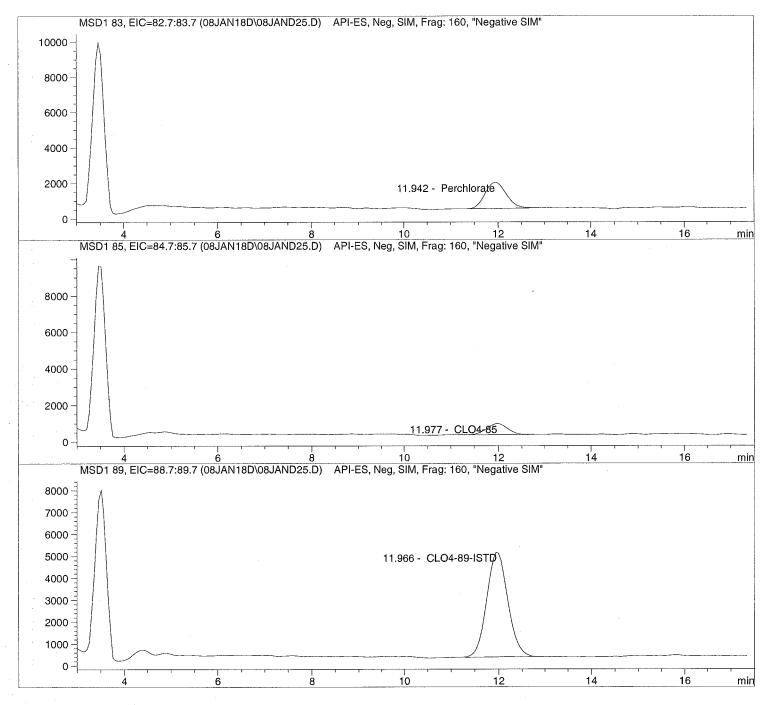
Analysis Method:

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 \_\_\_\_\_\_

Seq Line:

Inj. Vol.:

Injection Date: 1/08/2018 16:00:36
Sample Name: 1800210001
Acq Operator: TNB

Location: Inj. No.:

25 Vial 92  $25 \mu l$ 

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

\_\_\_\_\_\_\_\_

LCMS Results

\_\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT [min] | Туре | Area    | Amount [ug/sample] | Compound<br>Name |
|----------|------|---------|--------------------|------------------|
| 11.942   | BBA  | 45760.9 | 1.4594             | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT [min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|----------|------|---------|-----------------------|------------------|--|
| 11.977   | BBA  | 18773.2 | 1.6264                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |  |
|-------------|------|----------|-----------------------|------------------|--|--|
| 11.966      | BBA  | 146856.5 | 5.0000                | CLO4-89-ISTD     |  |  |

\_\_\_\_\_\_

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D

Sample Name: 582609

Injection Date: Sample Name:

1/08/2018 16:21:37 582609 LODV@1.

Seq Line: Location:

Vial 72

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

 $25 \mu 1$ 

Acq. Method: Analysis Method: CLO4-DOD.M

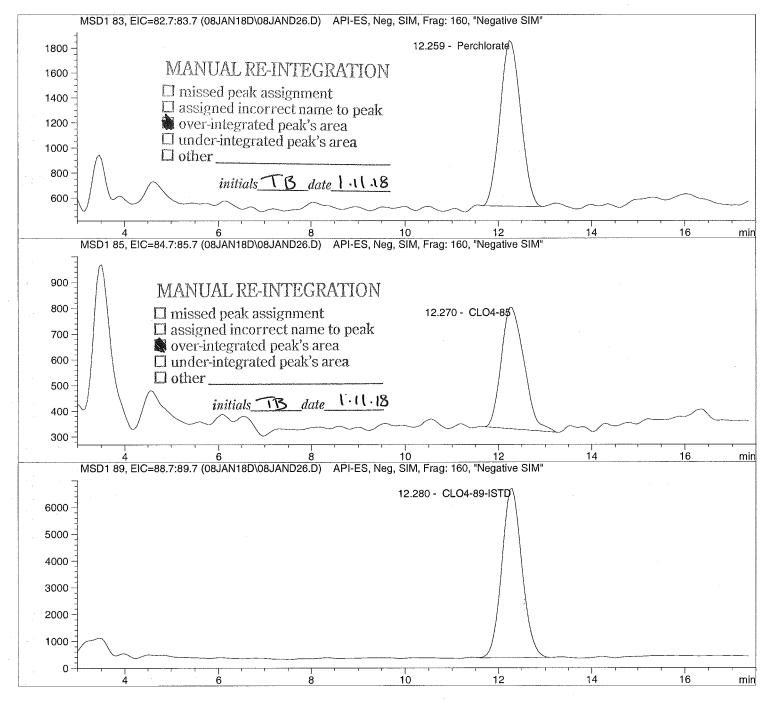
C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis

\_\_\_\_\_\_\_



Sample Name: 582609 LODV@1. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D

\_\_\_\_\_\_\_

Injection Date: 1/08/2018 16:21:37 Sample Name: 582609 LODV@1.

Seg Line: Location: 26

Acq Operator:

TNB

Inj. No.: Inj. Vol.: Vial 72 1  $25 \mu 1$ 

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: Dilution:

1.000000 1.000000

Sample Amount:

1.000

LCMS Results

\_\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area    | Amount [ug/sample] | Compound<br>Name |  |
|-------------|------|---------|--------------------|------------------|--|
| 12.259      | MM   | 40806.9 | 1.0183             | Perchlorate      |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |  |
|-------------|------|---------|-----------------------|------------------|--|--|
| 12.270      | MM   | 16046.3 | 1.0109                | CLO4-85          |  |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount [ug/sample] | Compound<br>Name |   |
|-------------|------|----------|--------------------|------------------|---|
| 12.280      | BBA  | 189512.5 | 5.0000             | CLO4-89-ISTD     | ĺ |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND27.D

Sample Name: 582608

Injection Date:

1/08/2018 16:40:46

Seq Line: Location:

27 Vial 71

Sample Name: Acq Operator: 582608 CCV@25 TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

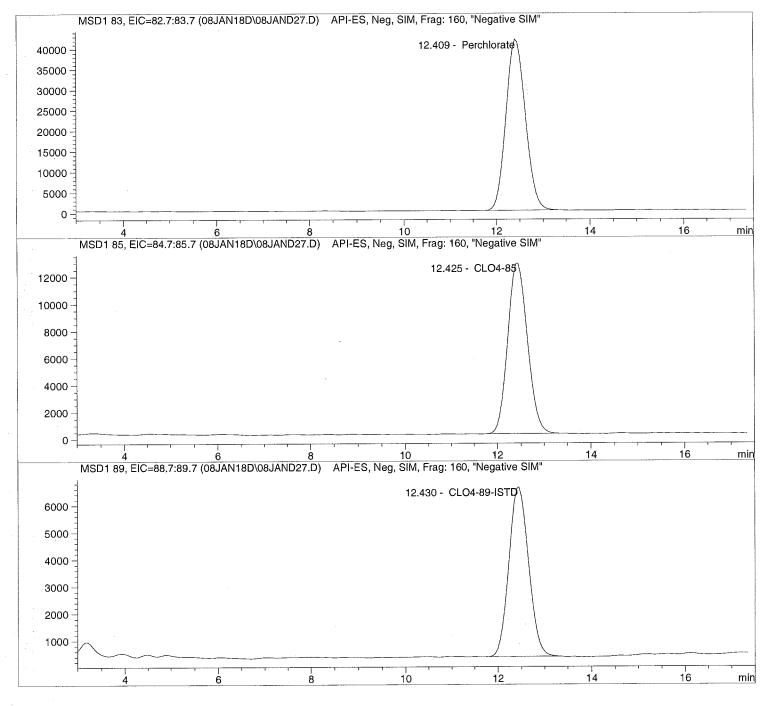
Acq. Method: Analysis Method: CLO4-DOD.M

C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



Sample Name: 582608 CCV@25 Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND27.D

Injection Date: 1/08/2018 16:40:46 Sample Name: 582608 CCV@25 Acq Operator:

Seq Line: Location: Inj. No.:

Inj. Vol.:

Vial 71

 $25 \mu l$ 

Acq. Method:

CLO4-DOD.M

TNB

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: Dilution: Sample Amount:

1.000000 1.000000 25.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Type Area |           | Amount<br>[ug/sample] | Compound<br>  Name |  |  |
|-------------|-----------|-----------|-----------------------|--------------------|--|--|
| 12.409      | PBA       | 1190044.5 | 26.6371               | Perchlorate        |  |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |   |  |
|-------------|------|----------|-----------------------|------------------|---|--|
| 12.425      | PBA  | 365901.1 | 26.0386               | CLO4-85          | ļ |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Type | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.430      | PBA  | 181695.7 | 5.0000                | CLO4-89-ISTD     |  |

\_\_\_\_\_\_



**Environmental Division** 

## Raw Data

Initial Calibration

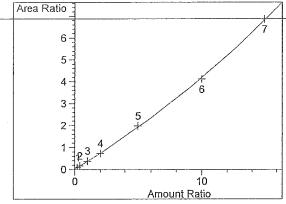


```
Calibration Table
Perchlorate
Calib. Data Modified :
                                 11/29/2017 8:02:06 AM
               : Internal Standard : Peak Area
Calculate
Based on
Rel. Reference Window: 20.000 %
Abs. Reference Window: 0.000 min
Rel. Non-ref. Window: 20.000 %
Abs. Non-ref. Window: 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported Partial Calibration : No recalibration if peaks missing
                                  Quadratic (some peaks differ, see below)
Curve Type
                                   Ignored (some peaks differ, see below)
Origin
Weight
                                   Linear (Amnt) (some peaks differ, see below)
Recalibration Settings:
                               Average all calibrations
Average Response :
                                 Floating Average New 75%
Average Retention Time:
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
  #
___|
         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 Lvl Amount Area
                                           Amt/Area Ref Grp Name
 [min] Sig
 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
                 10.00000 3.91583e5 2.55374e-5
                   25.00000 1.09763e6 2.27764e-5
                   50.00000 2.29834e6 2.17549e-5
                 75.00000 2.2363466 2.173496-5
75.00000 3.73021e6 2.01061e-5
1.00000 1.56787e4 6.37808e-5
2.00000 2.80487e4 7.13046e-5
5.00000 6.5132364 7.67668e-5
              7
 12.106 2 1
                                                         1 CLO4-85
               2
               3
                 10.00000 1.31325e5 7.61471e-5
                   25.00000 3.46913e5 7.20642e-5
                   50.00000 6.96156e5 7.18230e-5
                  50.00000 6.96156e5 7.18230e-5
75.00000 1.13077e6 6.63264e-5
5.00000 1.88880e5 2.64718e-5 +II CLO4-89-ISTD
5.00000 1.81109e5 2.76076e-5
5.00000 1.75128e5 2.85505e-5
5.00000 1.75597e5 2.84743e-5
5.00000 1.69148e5 2.95599e-5
               7
 12.107 3 1
               2
                    5.00000 1.64867e5 3.03275ete35of 134
```

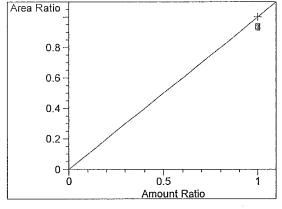
## More compound-specific settings:

```
Compound: Perchlorate
                          : From 8.390 min To 13.052 min
 Time Window
 Curve Type
                          : Quadratic
 Origin
                          : Ignored
 Calibration Level Weights:/
                          : 1
   Level 1
                          : 0.5
   Level 2
   Level 3
                          : 0.2
   Level 4
                          : 0.1
   Level 5
                          : 0.04
                          : 0.02
   Level 6
   Level 7
                          : 0.013333
Compound: CLO4-85
                          : From 8.366 min To 13.046 min
 Time Window
 Curve Type
                          : Quadratic
 Origin
                          : Ignored
 Calibration Level Weights:/
   Level 1
                          : 0.5
   Level 2
   Level 3
                          : 0.2
   Level 4
                          : 0.1
   Level 5
                          : 0.04
   Level 6
                          : 0.02
   Level 7
                          : 0.013333
Compound: CLO4-89-ISTD
                          : From 8.457 min To 13.107 min
 Time Window
                          : Linear
 Curve Type
 Origin
                          : Included
 Calibration Level Weights:/
   Level 1
   Level 2
   Level 3
                           1
   Level 4
                           1
   Level 5
   Level 6
                           1
   Level 7
                          Peak Sum Table
                          ***No Entries in table***
  _____
                        Calibration Curves
                       Area Ratio
                                  Perchlorate at exp. RT: 12.090
                                 MSD1 83, EIC=82.7:83.7
    20
                                 Correlation:
                                                        0.99991
                                 Residual Std. Dev.:
                                                        0.08487
                                 Formula: y = ax^2 + bx + c
    15
                                               2.87739e-2
                                       a:
                                       b:
                                               1.07712
    10
                                              -5.23718e-3
                                       x: Amount Ratio
                                       y: Area Ratio
     5
                                 Calibration Level Weights:
                                     Level 1
                                                : 1
                                     Level 2
                                                : 0.5
                      10
                                     Level 3
                                                : 0.2
                Amount Ratio
                                     Level 4
                                                : 0.1
                                     Level 5
                                                : 0.04
                                     Level 6
                                                : 0.02
                                     Level 7
                                                : 0.013333
```

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```
CLO4-85 at exp. RT: 12.106
MSD1 85, EIC=84.7:85.7
                       0.99988
Correlation:
Residual Std. Dev.:
                      0.04548
Formula: y = ax^2 + bx + c
              7.12800e-3
      a:
              3.46840e-1
      b:
              1.42573e-2
      c:
      x: Amount Ratio
      y: Area Ratio
Calibration Level Weights:
    Level 1
              : 1
               : 0.5
    Level 2
    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
              1.00000
      m:
              0.00000
      b:
      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 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 | Ini              | SampleType | Run          | Perchlorate         | Perchlorate  | Perchlorate  |
|-------|------------------|----------|------------------|------------|--------------|---------------------|--------------|--------------|
| #*    |                  |          |                  |            |              | Area                | RT           | Amount       |
|       |                  |          |                  |            |              |                     |              |              |
| *     | ' ICAL1@ 1.0ug/L | vial 71  | ' 1 <sup>'</sup> | Control    | ' 1 <i>'</i> | 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             | CLO4-85      | CLO4-85      |
| #*    |                  |          |                  |            |              | Area                | RT           | 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      |
| X     | 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     |
|       |                  |          |                  |            |              |                     |              |              |
|       | <b>2</b> 3       | T 1 - 1  | <b>-</b> '       | a          | -            | 07.0 ( a.a. T.a.m.) | GT 0.4 0.0   |              |
| 11 44 | Sample           | Location | ınj              | SampleType | Run          | CLO4-89-ISTD        | CLO4-89-ISTD | CLO4-89-ISTD |
| #*    | 1                | 1        |                  | j          |              | Area                | RT           | Amount       |
| *     | TCD110 1 000/1   | 174-1 71 |                  |            |              | 1 00000-5           | 10.050       |              |
| . *   | 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  |                  | 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<br>=== | 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  |           |          |
| Ω    | 17ial 78 | TCAL Verfalour/I. | $CI_{OI} - NO_{D}$ | 1          | Ctrl Samo  |           |          |



Data file: C:\HPCHEM\l\DATA\28NOV17P\28NOVP01.D

Sample Name: ICAL1@ 1.0ug/L

Injection Date: 11/28/2017 09:08:10 Seq Line: 1
Sample Name: ICALI@ 1.0ug/L Location: Vial /1

Acq Operator: TNB Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method:

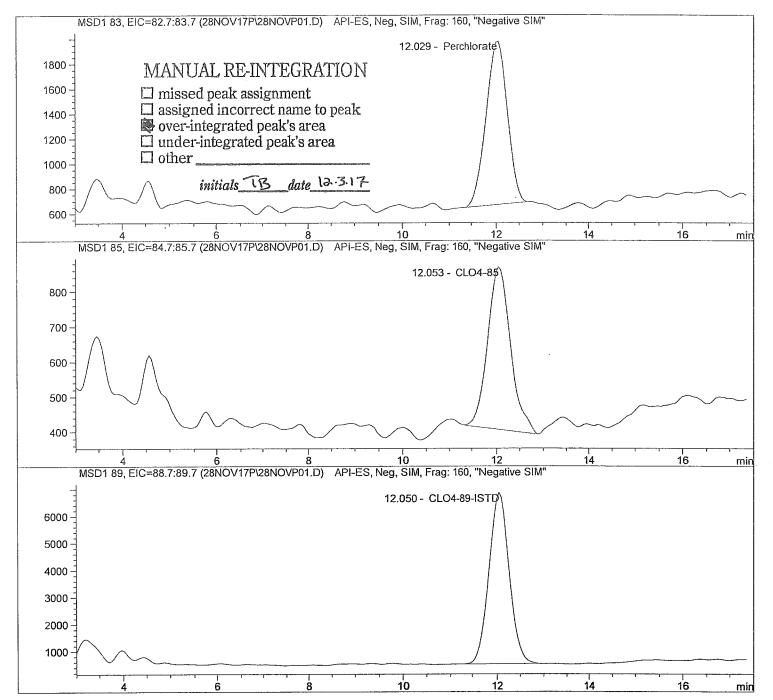
CLO4-DOD.M

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 μ1

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

Signal2: MSD1 85, EIC=84.7:85.7

| 1 | RT<br>[min] | Type     |  | Area    |      | ount<br>ample] | 1 | Compound<br>Name |  |
|---|-------------|----------|--|---------|------|----------------|---|------------------|--|
| - | 12.053      | <br> BBA |  | 15678.7 | <br> | 0.9871         |   | <br>85           |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>  [min] | Type        | :         | Area     | Amount<br> [ug/sample] | Compound  <br>  Name |  |
|---------------|-------------|-----------|----------|------------------------|----------------------|--|
| 12.05         | - <br>0 BBA | <br> <br> | 188880.3 | 5.0000                 | <br> CLO4-89-ISTD    |  |

\*\*\* End of Report \*\*\*



Page 2 of 2

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP02.D

Sample Name: ICAL2@ 2.0ug/L

T. ' . ' . Data 11/20/2017 00:22:40 Com Time.

 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

erator: TNB Inj. No.: 1
Inj. Vol.: 25 µl

Acq. Method:

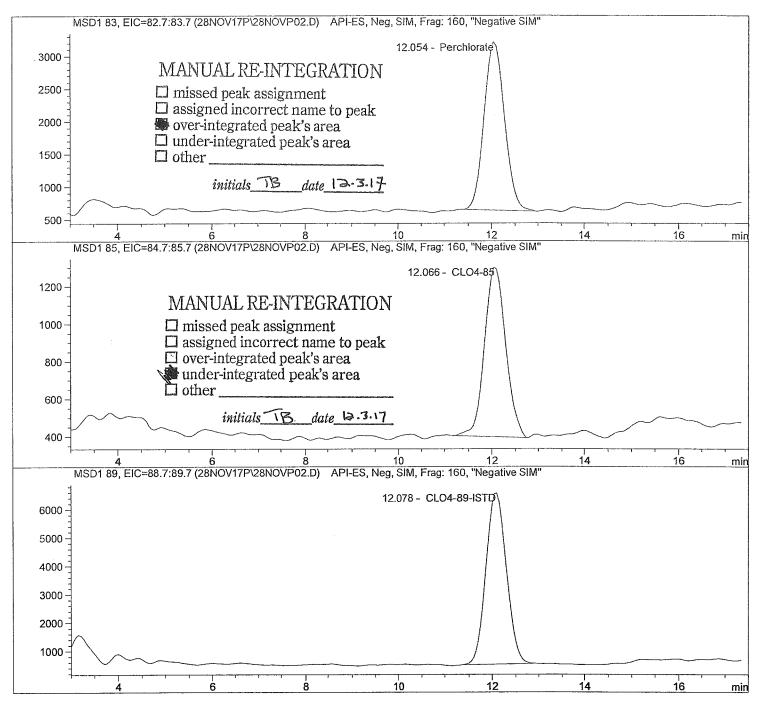
CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/3/2017 11:06:36

Perchlorate analysis





2017

Dec

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP02.D Sample Name: ICAL2@ 2.0ug/L

\_\_\_\_\_\_\_\_\_\_

Injection Date: 11/28/2017 09:33:49
Sample Name: ICAL2@ 2.0ug/L
Acq Operator: TNB

Location: Inj. No.:

Seq Line:

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   Type  <br>  [min] | Area    | Amount  <br> [ug/sample] | Compound<br>Name        | 1 |
|------------------------|---------|--------------------------|-------------------------|---|
| <br>  12.054 MM        | 77407.7 | <br>  1.9872             | <b></b><br> Perchlorate | 1 |

Signal2: MSD1 85, EIC=84.7:85.7

| RT   Type<br>  [min] | Area  <br> | Amount [ug/sample] | Compound<br>  Name | 1 |
|----------------------|------------|--------------------|--------------------|---|
| <br>  12.066 MM      | 28048.7    | 2.0105             | <br> CL04-85       | 1 |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>  [min] | Type<br>  | Ar | ea  <br> [u | Amount<br>g/sample] | 1          | Compound<br>Name |           |
|---------------|-----------|----|-------------|---------------------|------------|------------------|-----------|
| 12.078        | <br>  PBA |    | 1109.4      | 5.0000              | <br> CLO4- | 89-ISTD          | <br> <br> |

\*\*\* End of Report \*\*\*



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Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP03.D

Sample Name: ICAL3@ 5.Oug/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:

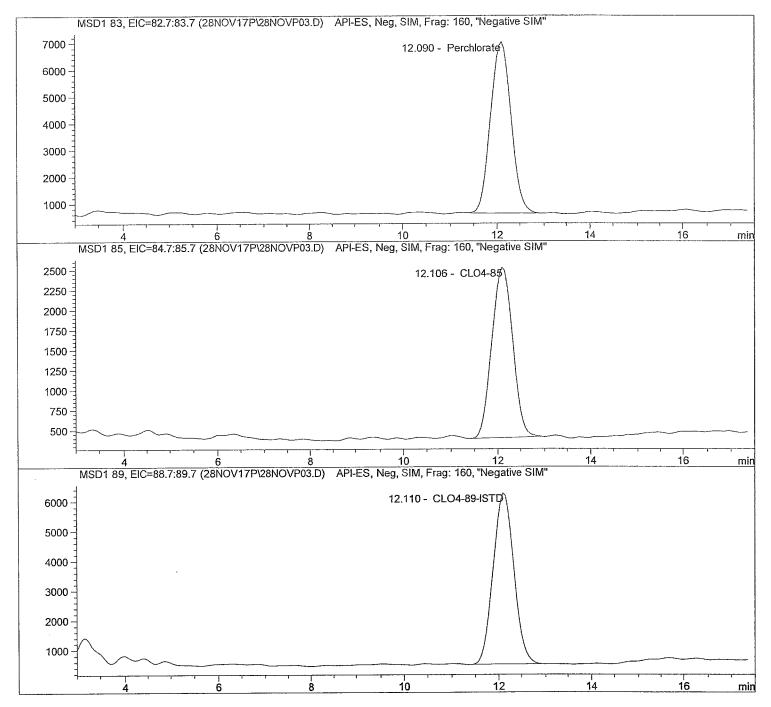
CLO4-DOD.M

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.Oug/L

Injection Date: 11/28/2017 09:53:00
Sample Name: ICAL3@ 5.0ug/L
Acq Operator: TNB

Seq Line: 3
Location: Vial 73
Inj. No.: 1

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 | Type | Area | Amount | Compound | [min] | | | | | | | | | | | | Name | 12.090|BBA | 192984.6| 5.0058|Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

| RT  <br>  [min] | Type | Area    | Amount<br> [ug/sample] | Compound  <br>  Name |
|-----------------|------|---------|------------------------|----------------------|
| 12.106          | PBA  | 65132.3 | 5.0510                 | <br> CLO4-85         |

Signal3: MSD1 89, EIC=88.7:89.7

| RT  <br>  [min] | Type | Ar | rea  <br> [u | Amount<br>g/sample] | •       | Compound<br>Name |         |
|-----------------|------|----|--------------|---------------------|---------|------------------|---------|
| 12.110          | PBA  | 17 | <br> 5128.5  | 5.0000              | CLO4-89 | 9-ISTD           | -  <br> |



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: Sample Name: ICAL4@ 10.ug/L Location: Vial 74 Inj. No.: 1 Acq Operator: 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

\_\_\_\_\_\_\_ MSD1 83, EIC=82.7:83.7 (28NOV17P\28NOVP04.D) API-ES, Neg, SIM, Frag: 160, "Negative SIM" 12.084 - Perchiorate 12000 10000 8000 6000 4000 2000 14 16 MSD1 85, EIC=84.7:85.7 (28NOV17P\28NOVP04.D) API-ES, Neg, SIM, Frag: 160, "Negative SIM" 4500 12.101 - CLO4-85 4000 3500 3000 2500 2000 1500 1000 500 10 14 16 MSD1 89, EIC=88.7:89.7 (28NOV17P\28NOVP04.D) API-ES, Neg, SIM, Frag: 160, "Negative SIM" 12.109 - CLO4-89-ISTD 6000 5000 4000 3000 2000 1000 14 10 16



Data file: C:\HPCHEM\l\DATA\28NOV17P\28NOVP04.D

Sample Name: ICAL4@ 10.ug/L

Injection Date: 11/28/2017 10:12:13
Sample Name: ICAL4@ 10.ug/L
Acq Operator: TNB Seq Line: Location: Vial 74

Inj. No.: Inj. Vol.:

1 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: MSDl 83, EIC=82.7:83.7

| R    | .   Type | F   | Area     | Amount          | Compound    |  |
|------|----------|-----|----------|-----------------|-------------|--|
| [m   | .n]      | 1   | 1        | [ug/sample]     | Name        |  |
|      |          | -   |          |                 |             |  |
| 1 12 | 084 BBA  | 1 3 | 391582.9 | 9 <b>.5</b> 789 | Perchlorate |  |

Signal2: MSD1 85, EIC=84.7:85.7

|  | RT<br>[min] | Type     |      | Area     | Amount<br> [ug/sample] | •            | npound  <br>Name |
|--|-------------|----------|------|----------|------------------------|--------------|------------------|
|  | 12.101      | <br> PBA | <br> | 131324.7 | 9.8568                 | <br> CLO4-85 |                  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>  [min] | Type     | Area  | Amount<br> [ug/sample | ]           | Compound<br>Name | 1    |
|---------------|----------|-------|-----------------------|-------------|------------------|------|
| 12.109        | <br> PBA | 18096 | 2.1  5.00             | <br>00 CLO4 | 1-89-ISTD        | <br> |



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP05.D Sample Name: ICAL5@ 25.ug/L

11/28/2017 10:31:23 Seq Line: Injection Date: ICAL5@ 25.ug/L Location: Vial 75 Sample Name: Acq Operator: TNB Inj. No.: 1

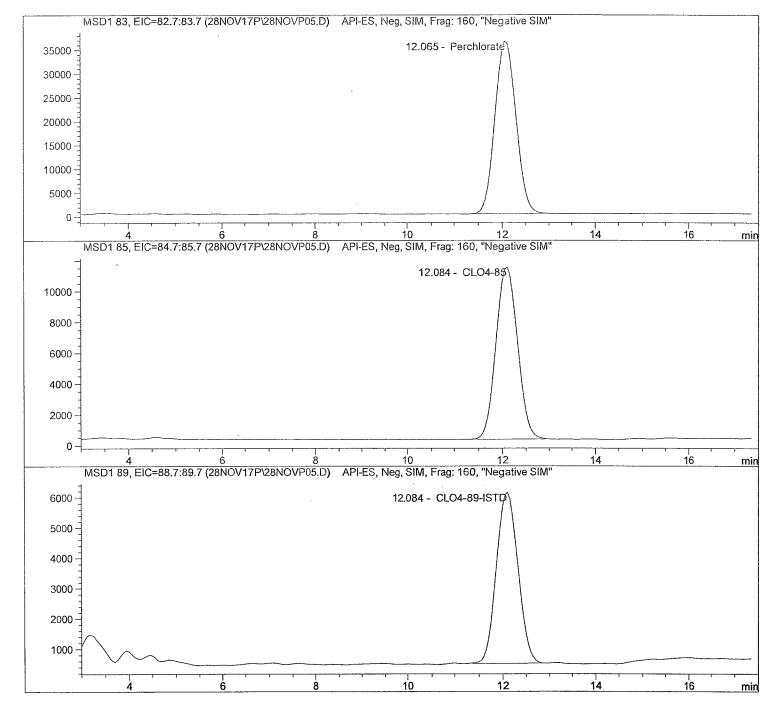
Inj. Vol.: 25 µl

CLO4-DOD.M Acq. Method:

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed: 12/3/2017 11:06:36

Perchlorate analysis





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Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP05.D Sample Name: ICAL5@ 25.ug/L

Injection Date: 11/28/2017 10:31:23
Sample Name: ICAL5@ 25.ug/L
Acq Operator: TNB

Location: Vial 75 Inj. No.:

Seq Line:

Inj. Vol.:

1 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

| 1 | RT     | Type | 1 | Area      | Amount      | 1     | Compound    | 1 |
|---|--------|------|---|-----------|-------------|-------|-------------|---|
| 1 | [min]  |      | 1 |           | [ug/sample] | ı     | Name        | ١ |
| 1 |        |      | - |           |             | -   - |             | - |
| 1 | 12.065 | PBA  | 1 | 1097625.1 | 25.5523     | 3   ] | Perchlorate | ١ |
|   |        |      |   |           |             |       |             |   |

Signal2: MSD1 85, EIC=84.7:85.7

| RT   T    | 'ype | Area     | Amount      | Compound |
|-----------|------|----------|-------------|----------|
| [min]     |      | 1        | [ug/sample] | Name     |
|           | -    |          |             |          |
| 12.084 PE | BA   | 346912.7 | 25.5843     | CLO4-85  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>  [min] | Type<br> |         | Area     | Amount<br> [ug/sample] | Compound<br>Name  | 1 |
|---------------|----------|---------|----------|------------------------|-------------------|---|
| 12.084        | <br> BBA | -  <br> | 175597.1 | 5.0000                 | <br> CLO4-89-ISTD | 1 |

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP06.D

Sample Name: ICAL6@ 50.ug/L

25 μ1

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

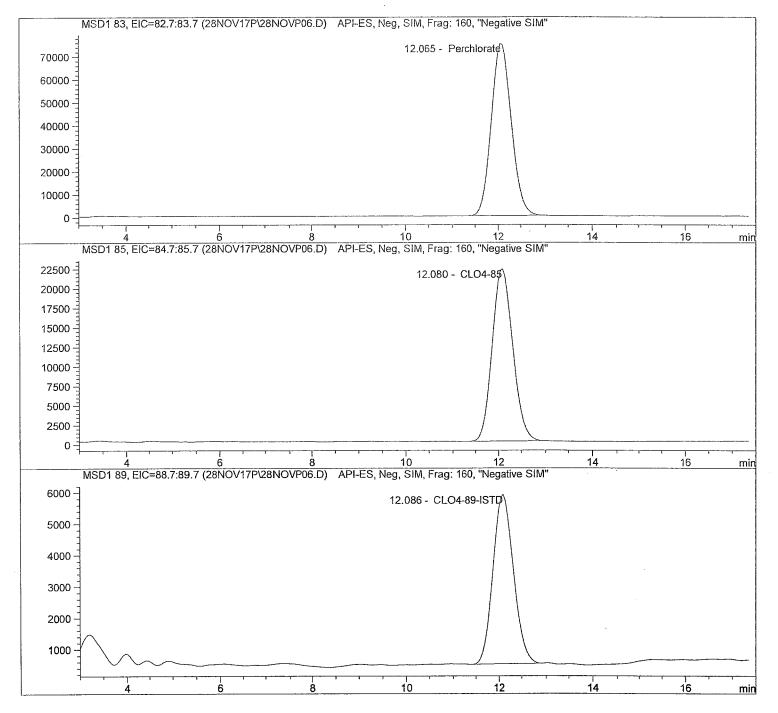
Inj. Vol.:

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

Seq Line: Injection Date: 11/28/2017 10:50:33 Location: Vial 76
Inj. No.: 1
Inj. Vol.: 25 µl Sample Name: ICAL6@ 50.ug/L
Acq Operator: TNB

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 | Type | Area | Amount | Compound | [min] | | | | | | | | | | | Name | \_\_\_\_ | 12.065|BBA | 2298336.2| 49.8316|Perchlorate |

Signal2: MSD1 85, EIC=84.7:85.7

| 1 | RT     | Type |   | Area     | Amount      | l Co    | ompound |  |
|---|--------|------|---|----------|-------------|---------|---------|--|
|   | [min]  |      |   |          | [ug/sample] | ĺ       | Name    |  |
|   |        |      |   |          |             |         |         |  |
| - | 12.080 | PBA  | 1 | 696155.7 | 49.1828     | CLO4-85 |         |  |
|   |        |      |   |          |             |         |         |  |

Signal3: MSD1 89, EIC=88.7:89.7

|   | RT<br>[min] | Type      |      | Area     | Amount<br> [ug/sample] | Compound  <br>  Name |  |
|---|-------------|-----------|------|----------|------------------------|----------------------|--|
| 1 | 12.086      | <br>  PBA | <br> | 169148.1 | 5.0000                 | <br> CLO4-89-ISTD    |  |

\_\_\_\_\_\_

Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP07.D

Sample Name: ICAL7@ 75.ug/L

1

11/28/2017 11:09:43 Seq Line: Injection Date:

Location: ICAL7@ 75.ug/L Vial 77 Sample Name: Inj. No.: Acq Operator: TNB 25 µl Inj. Vol.:

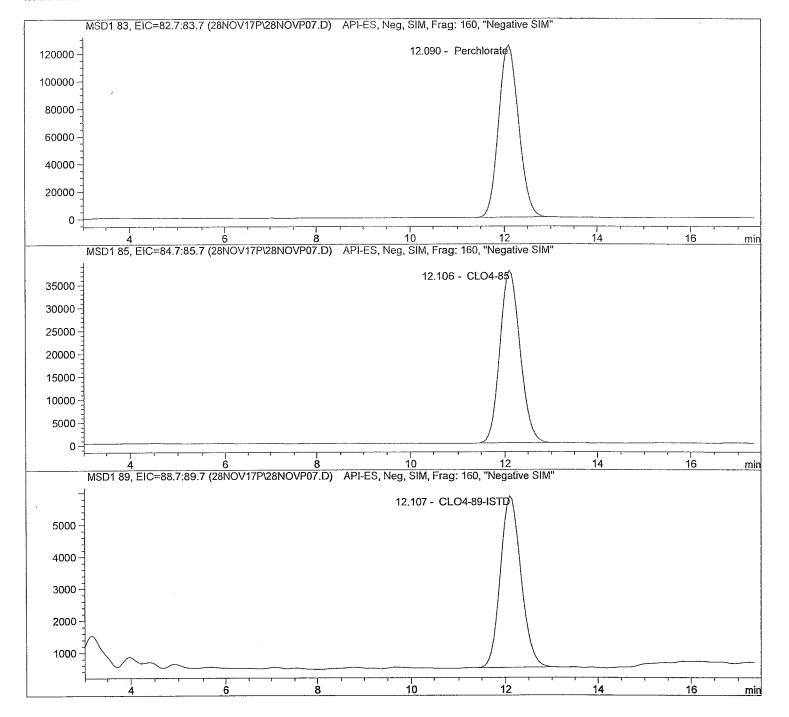
Acq. Method:

CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

12/3/2017 11:06:36 Last Changed:

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:
 ICAL70 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 | Type | Area | Amount | Compound | [min] | | [ug/sample] | Name | |-----|----| 12.090|PBA | 3730211.3| 74.9999|Perchlorate |

Signal2: MSD1 85, EIC=84.7:85.7

| -  | RT     | '     | ľype |   | Area    |     | Amount      | 1     | Compound |   |
|----|--------|-------|------|---|---------|-----|-------------|-------|----------|---|
| 1  | [min]  |       |      |   |         | 1 [ | [ug/sample] | 1     | Name     | ١ |
| 1- |        | -   - |      | - |         | -   |             | -   - |          | 1 |
| ĺ  | 12.106 | 6   P | ВА   | 1 | 1130772 | .01 | 75.3391     | 1     | CLO4-85  | ļ |
|    |        |       |      |   |         |     |             |       |          | _ |

Signal3: MSD1 89, EIC=88.7:89.7

| RT     | Type     | Area     | Amount      | Compound          |
|--------|----------|----------|-------------|-------------------|
| [min]  |          |          | [ug/sample] | Name              |
| 12.107 | <br> BBA | 164866.7 | 5.0000      | <br> CLO4-89-ISTD |

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Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP08.D

Sample Name: ICAL Verf@10ug/L

Seq Line: 11/28/2017 11:28:53 Injection Date: Vial 78 ICAL Verf@10ug/L Location: Sample Name: 1

Inj. No.: TNB 25 µl Inj. Vol.:

Acq. Method:

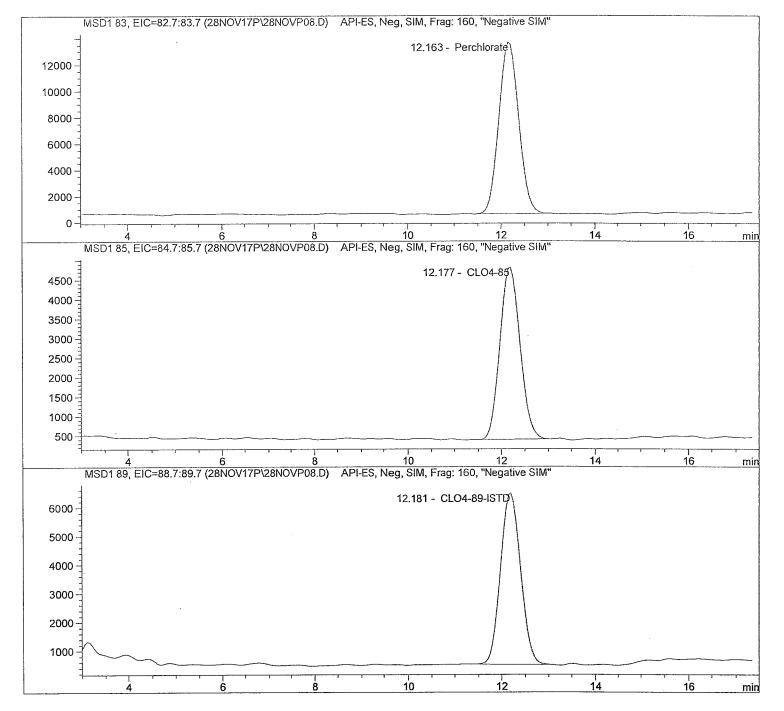
Acq Operator:

CLO4-DOD.M

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

12/3/2017 11:06:36 Last Changed:

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
Sample Name: ICAL Verf@10ug/L
Acq Operator: TNB

Seg Line:

Seq Line: 6
Location: Vial 78
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 | Type | Area | Amount | Compound | [min] | | | | | | | | | | | Name | 12.163|PBA | 383615.2| 9.5953|Perchlorate

Signal2: MSD1 85, EIC=84.7:85.7

Compound Name \_\_\_\_\_ | 12.177|PBA | 131459.5| 10.0855|CLO4-85

Signal3: MSD1 89, EIC=88.7:89.7

| RT | Type | Area | Amount | Compound | | [min] | | | | | | | | | Name | \_\_\_\_\_ 12.181|BBA | 176961.2| 5.0000|CLO4-89-ISTD

\*\*\* End of Report \*\*\*



123 of 134

Sun. 3. Dec. 2017 11:08:43 am

Page 2 of 2



**Environmental Division** 

# **Raw Data**

Unmodified



Data file: C:\HPCHEM\1\DATA\28NOV17P\28NOVP01.D

Sample Name: ICAL1@ 1.0ug/L 

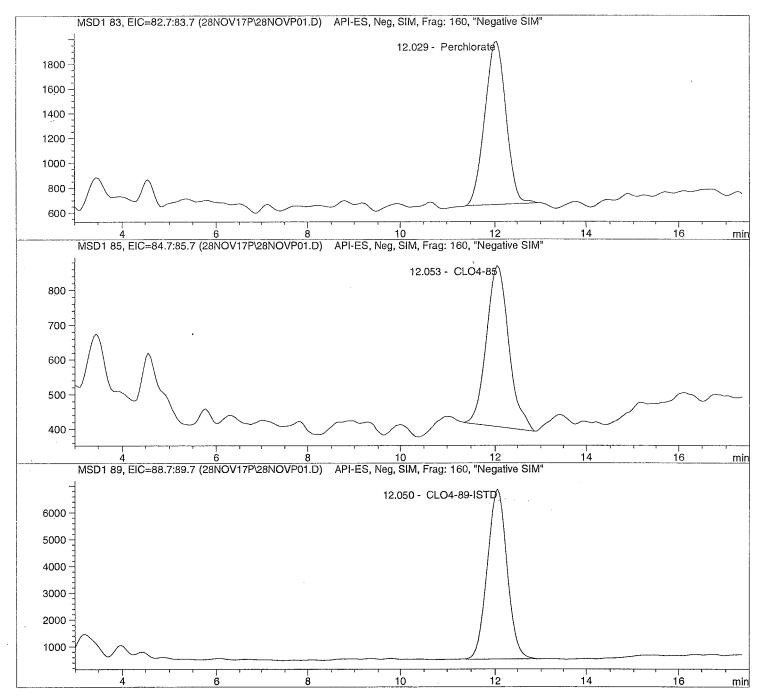
11/28/2017 09:08:10 Injection Date: Seq Line: <u>Vial</u> Sample Name: ICAL1@ 1.0ug/L Location: Inj. No.: 1 Acq Operator: TNB Inj. Vol.:  $25 \mu 1$ 

CLO4-DOD.M Acq. Method:

C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

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:

Acq Operator:

Inj. No.:

Vial 71

Inj. Vol.:

 $25 \mu 1$ 

1

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: Dilution:

1.000000 1.000000

Sample Amount:

1.000

\_\_\_\_\_\_

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.029      | BBA  | 42017.4 | 1.0510                | Perchlorate      |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.053      | BBA  | 15678.7 | 0.9871                | CLO4-85          |

Signal3: MSD1 89, EIC=88.7:89.7

| RȚ<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.050      | BBA  | 188880.3 | 5.0000                | CLO4-89-ISTD     |  |

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:

Sample Name:

ICAL2@ 2.0ug/L

Location: Inj. No.: Vial 72

Acq Operator:

TNB

Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

CLO4-DOD.M

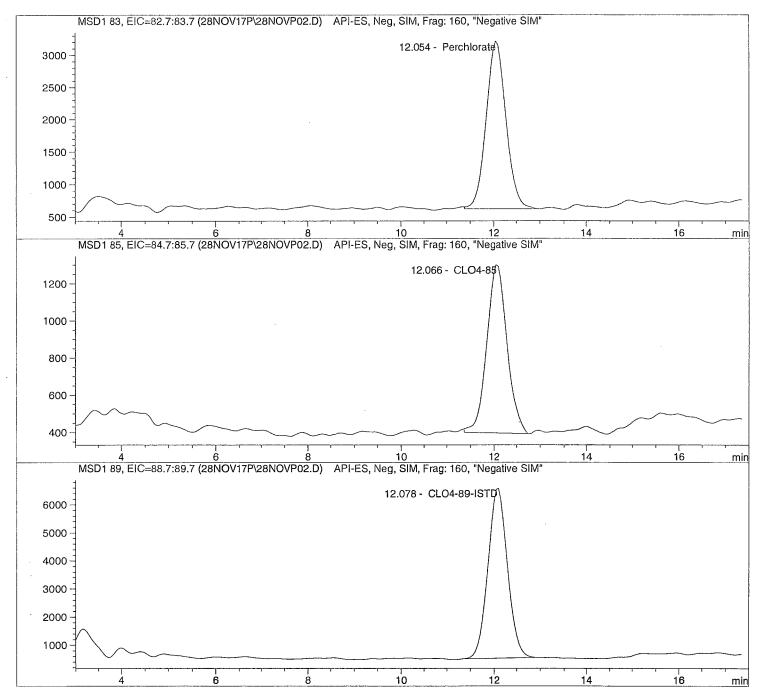
Analysis Method:

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: Location: 2.

Sample Name: Acq Operator: ICAL2@ 2.0ug/L

Inj. No.:

<u>Vial</u> 72

TNB

Inj. Vol.:

1  $25 \mu 1$ 

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<br>[min] | Type | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.054      | BBA  | 78519.1 | 2.0151                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.066      | BBA  | 28009.6 | 2.0074                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|----------|-----------------------|------------------|--|
| 12.078      | PBA  | 181109.4 | 5.0000                | CLO4-89-ISTD     |  |



00864616

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D Sample Name: 582600

Injection Date: Sample Name: 1/08/2018 08:36:51 582600 LODV@1.

Seq Line: Location: 2 Vial 72

Acq Operator:

TNB

Inj. No.: Inj. Vol.:  $\begin{array}{c} 1 \\ 25 \ \mu 1 \end{array}$ 

Acq. Method:

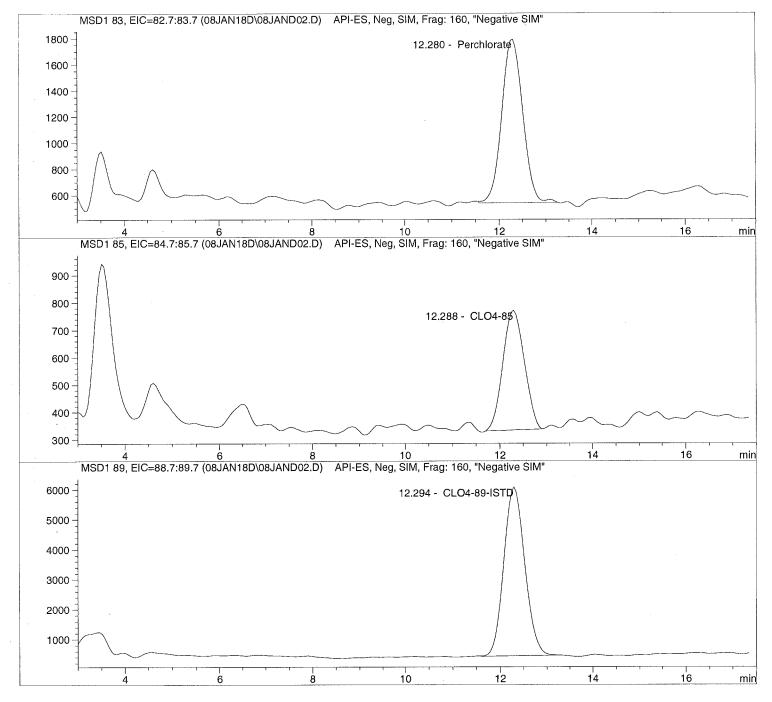
 ${\tt CLO4-DOD.M}$ 

Analysis Method: C:\HPCHEM\1\METHODS\CLO4-DPR.M

Last Changed:

12/20/2017 08:11:26

Perchlorate analysis



00864617

Sample Name: 582600 LODV@1. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND02.D

\_\_\_\_\_\_\_

1/08/2018 08:36:51 Injection Date: 582600 LODV@1. Sample Name: Acq Operator:

TNB

Seq Line: Vial 72 Location: Inj. No.: 1  $25 \mu l$ Inj. Vol.:

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: Dilution:

1.000000 1.000000

Sample Amount:

1.000

LCMS Results

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.280      | BBA  | 39034.0 | 1.0510                | Perchlorate      |  |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount [ug/sample] | Compound<br>Name |  |
|-------------|------|---------|--------------------|------------------|--|
| 12.288      | PBA  | 13990.1 | 0.9402             | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|----------|-----------------------|------------------|
| 12.294      | BBA  | 175472.0 | 5.0000                | CLO4-89-ISTD     |

\_\_\_\_\_\_



Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND10.D

Sample Name: 1736221003 \_\_\_\_\_\_\_

Injection Date: Sample Name:

1/08/2018 11:11:49 1736221003

Seq Line: Location:

10 Vial 80

Acq Operator:

TNB

Inj. No.: Inj. Vol.:

1  $25 \mu 1$ 

Acq. Method:

CLO4-DOD.M

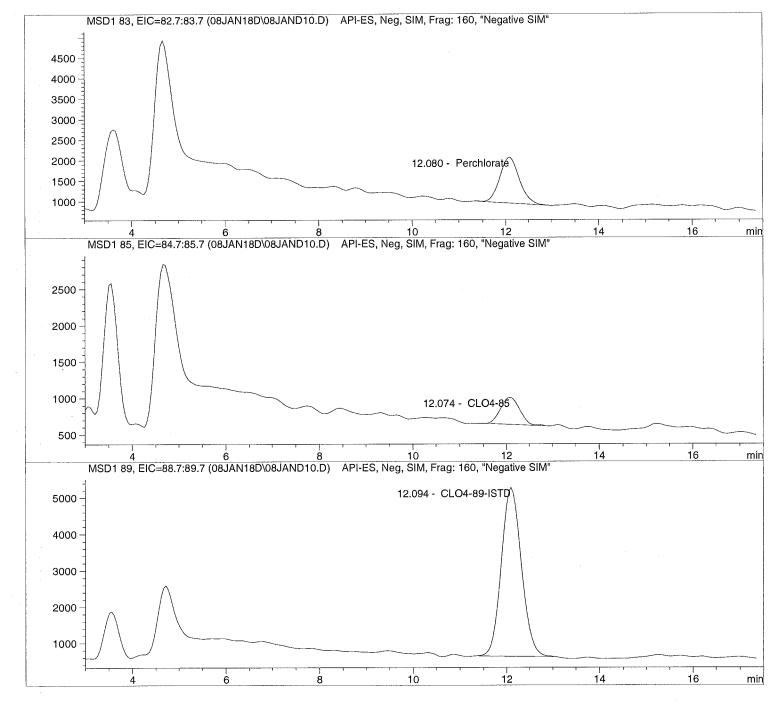
C:\HPCHEM\1\METHODS\CLO4-DPR.M Analysis Method:

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 Sample Name:

Seg Line:

10

Acq Operator:

1736221003

TNB

Location: Inj. No.: Inj. Vol.:

Vial 80 1  $25 \mu 1$ 

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: Dilution:

1.000000 1.000000

Sample Amount:

0.000

LCMS Results

\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.080      | BBA  | 33243.2 | 1.1079                | <br> Perchlorate |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |  |
|-------------|------|---------|-----------------------|------------------|--|
| 12.074      | PBA  | 10836.0 | 0.8947                | CLO4-85          |  |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount<br>[ug/sample] | Compound<br>Name |  |  |
|-------------|------|----------|-----------------------|------------------|--|--|
| 12.094      | BBA  | 141559.2 | 5.0000                | CLO4-89-ISTD     |  |  |

Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D

Sample Name: 582609 LODV@1. 

Injection Date:

1/08/2018 16:21:37

Seq Line: Location: 26

Sample Name: Acq Operator:

582609 TNB

LODV@1.

Inj. No.: Inj. Vol.: Vial 72

 $25 \mu 1$ 

Acq. Method:

Last Changed:

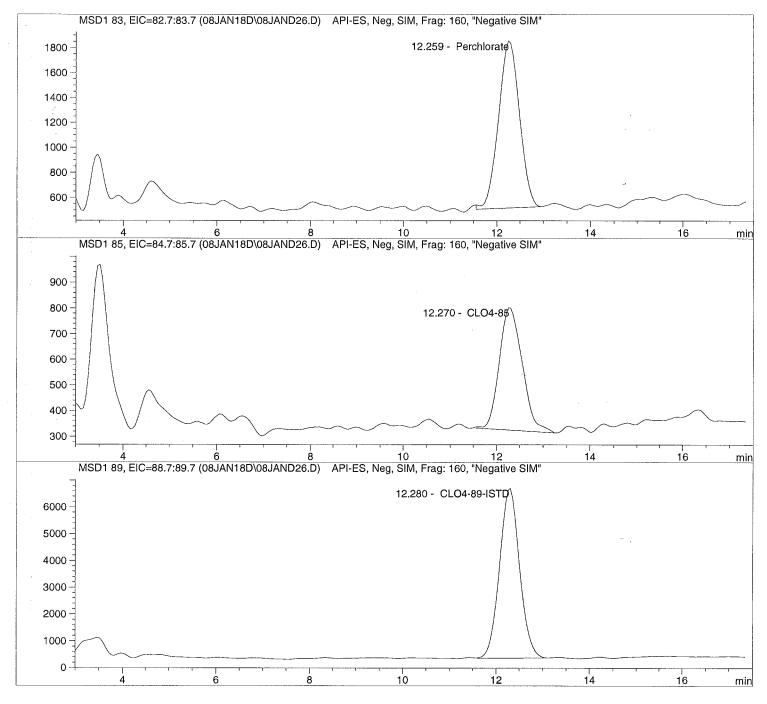
CLO4-DOD.M

Analysis Method:

C:\HPCHEM\1\METHODS\CLO4-DPR.M

12/20/2017 08:11:26

Perchlorate analysis





00864621

LODV@1. Data file: C:\HPCHEM\1\DATA\08JAN18D\08JAND26.D Sample Name: 582609 

Injection Date: 1/08/2018 16:21:37 Sample Name: 582609 LODV@1. Acq Operator: TNB

Seq Line: 26 Vial 72 Location: Inj. No.: 1 Inj. Vol.:  $25 \mu l$ 

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

1.000

Calib. Data Modified: Wed, 20. Dec. 2017,08:01:52 am

Multiplier: Dilution:

1.000000 1.000000

Sample Amount:

LCMS Results

\_\_\_\_\_\_

Signal1: MSD1 83, EIC=82.7:83.7

| RT<br>[min] | Туре | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.259      | BBA  | 41926.3 | 1.0454                | Perchlorate      |

Signal2: MSD1 85, EIC=84.7:85.7

| RT<br>[min] | Type | Area    | Amount<br>[ug/sample] | Compound<br>Name |
|-------------|------|---------|-----------------------|------------------|
| 12.270      | BBA  | 16347.7 | 1.0336                | <br> CLO4-85     |

Signal3: MSD1 89, EIC=88.7:89.7

| RT<br>[min] | Туре | Area     | Amount [ug/sample] | Compound<br>Name |  |
|-------------|------|----------|--------------------|------------------|--|
| 12.280      | BBA  | 189512.5 | 5.0000             | CLO4-89-ISTD     |  |



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                    |

Defense Environmental Restoration Program DERP

DH Dorelle Harrison Document and issues DI

**ECP Environmental Condition of Property** 

United States Environmental Protection Agency **EPA ERDC** Engineer Research and Development Center Explanation of Significant Differences **ESD** 

**GWTP Ground Water Treatment Plant IWWP** Installation Wide Work Plan

KB Kent Becher KN Kim Nemmers

Longhorn Army Ammunition Plant LHAAP

LUC Land Use Control

MMM Monthly Managers' Meeting

Military Munitions Response Program MMRP

Nick Smitch NS PB Paul Bruckwicki

Performance-Based Remediation **PBR** 

Pre-Design Investigation PDI

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) Metals (6020A)

Ortho-Phosphate (365.3/SM4500 P) Hexavalent Chromium (7196A) Organic Carbon (415.1/SM5310) 1,4-Dioxane (8270D-SIM)

VOC (8260C) Anions (9056)

**GWTP Influent** *Monthly Sampling – October 2017* 

Metals (6020A) Perchlorate (6850)

Hexavalent Chromium (7196A)

#### **LHAAP-001 November 2017**

| Location ID:<br>Sample Date: |      | TRRP<br>PCL | 27WW02-<br>112017<br>11/20/17 | 27WW04-<br>112017<br>11/20/17 | 131-112117<br>11/21/17   | 132-112117<br>11/21/17   | 27WW03-<br>112117<br>11/21/17 | 27WW01-<br>112117<br>11/21/17   | 27WW01-<br>112117-a<br>11/21/17                     |
|------------------------------|------|-------------|-------------------------------|-------------------------------|--------------------------|--------------------------|-------------------------------|---------------------------------|-----------------------------------------------------|
|                              |      |             | NW, inside<br>site boundary.  | NW, inside site boundary.     | N, inside<br>OB/OD area. | S, inside<br>OB/OD area. | W, inside<br>OB/OD area.      | NW, inside<br>site<br>boundary. | NW, inside site<br>boundary.<br>Field<br>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

## **LHAAP-02 November 2017**

| Location ID:<br>Sample Date: |      | 35AWW13_111617<br>11/16/17                                                            | 35AWW13_111617_a<br>11/16/17                                                                       |
|------------------------------|------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
|                              |      | Parent                                                                                | Field Duplicate                                                                                    |
|                              |      | Shallow zone,<br>unimpacted<br>downgradient. Field<br>filtered w/10 micron<br>filter. | Shallow zone, unimpacted<br>downgradient. Field<br>filtered w/10 micron filter.<br>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:<br>Sample Date:     |      | Daily Maximum<br>Conc | LH18/24-<br>SP650_1017W<br>10/5/17 | LH18/24-<br>SP650_101217<br>10/12/17<br>bllected from a spig | LH18/24-<br>SP650_101217<br>10/12/17 | LH18/24-<br>SP650_101817<br>10/18/17 | LH18/24-SP650-<br>102517<br>10/25/17 |
|----------------------------------|------|-----------------------|------------------------------------|--------------------------------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Location Description             |      |                       | Weekly                             | Monthly EFF                                                  | Weekly                               | Weekly                               | Weekly                               |
| Perchlorate (6850<br>Perchlorate | μg/L | 17                    | < 4.0 U                            | < 4.0 U                                                      | < 4.0 U                              | < 4.0 U                              | < 4.0 U                              |

μg/L - micrograms per liter

# **GWTP Weekly Sampling - October 2017**

| Location ID:<br>Sample Date:     | Units | Daily Maximum<br>Conc | LH18/24-<br>SP650_1017W<br>10/5/17 | LH18/24-<br>SP650_101217<br>10/12/17 | LH18/24-<br>SP650_101817<br>10/18/17 | LH18/24-SP650-<br>102517<br>10/25/17 |
|----------------------------------|-------|-----------------------|------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
|                                  |       |                       | GWTP–Collecte                      | d from a spigot on t<br>Sampled \    | =                                    | luent TK-650.                        |
| 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** 

|                               |       |               | LH18/24-    | LH18/24-     |
|-------------------------------|-------|---------------|-------------|--------------|
| Location ID:                  |       | Daily Maximum | SP650_1017B | SP650_101817 |
| Sample Date:                  | Units | Conc          | 10/5/17     | 10/18/17     |
| Collected from a              |       |               |             |              |
|                               |       |               |             | on the       |
|                               |       |               |             | arge of      |
|                               |       |               |             | t TK-650     |
|                               |       |               |             | npled        |
|                               |       |               | Biw         | eekly.       |
| Volatile Organic Compounds (8 |       |               |             |              |
| 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          |

 $<sup>\</sup>ensuremath{\mathsf{J}}$  - estimated value between the limit of quantitation and the detection limit

NA - not analyzed

 $\mu g/L$  - micrograms per liter

mg/L - milligrams per liter

**GWTP Monthly Effluent Sampling - October 2017** 

|                                             | LH18/24- |               |                  |  |  |
|---------------------------------------------|----------|---------------|------------------|--|--|
| Location ID:                                |          | Daily Maximum | SP650_101217     |  |  |
| Sample Date:                                | Units    | Conc          |                  |  |  |
|                                             |          |               | Collected from a |  |  |
|                                             |          |               | spigot on the    |  |  |
|                                             |          |               | discharge of     |  |  |
|                                             |          |               | effluent TK-650  |  |  |
|                                             |          |               | Sampled monthly. |  |  |
| Volatile Organic Compounds (8               | 3260C)   |               | monthly.         |  |  |
| 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               |  |  |

 $\mu g/L$  - micrograms per liter

mg/L - milligrams per liter

**GWTP Monthly Influent Sampling - October 2017** 

| Location ID:<br>Sample Date: | Units          | LH18/24-<br>SP140_101217<br>10/12/17                               |  |  |  |
|------------------------------|----------------|--------------------------------------------------------------------|--|--|--|
|                              |                | Collected from a spigot on the influent to TK-140 Sampled monthly. |  |  |  |
| Metals (6020A)               | 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

 $\mu g/L$  - micrograms per liter



#### 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, 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)



#### 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.

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 <a href="mailto:rose.m.zeiler.civ@mail.mil">rose.m.zeiler.civ@mail.mil</a>.

Sincerely,

Rose M. Zeiler, Ph.D.

Longhorn AAP Site Manager

#### Copies furnished:

R. Mayer, USEPA Region 6, Dallas, TX

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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)

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# **Acronyms and Abbreviations**

μg/L Micrograms Per Liter

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 2<sup>nd</sup> year RA(O) report was finalized in May 2016. After two years of MNA, the 2<sup>nd</sup> 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).

# 11 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.

# 12 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 2<sup>nd</sup> 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**.

**Chemical of Concern (COC)** Concentration **Basis** Groundwater (µg/L) Tetrachloroethene **MCL** 5 5 Trichloroethene MCL 7 1,1-Dichloroethene MCL Cis-1,2-dichloroethene 70 **MCL** Vinyl chloride 2 **MCL** 1,1,2-trichloroethane<sup>(a)</sup> 5 **MCL** 1,2-dichloroethane<sup>(a)</sup> 5 **MCL** 

**Table 1-1: Groundwater Cleanup Levels** 

Notes and Abbreviations:

μg/L – micrograms per liter

MCL – maximum contaminant level

Although arsenic has not been designated as a COC, groundwater will be monitored for arsenic as described in the  $2^{nd}$  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  $10 \,\mu\text{g/L}$ .

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

<sup>(</sup>a) Not currently classified as a constituent of concern, but will be included in the list of chemicals for Long-Term Monitoring

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 x 10<sup>-5</sup> to 1.4 x 10<sup>-3</sup> 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.

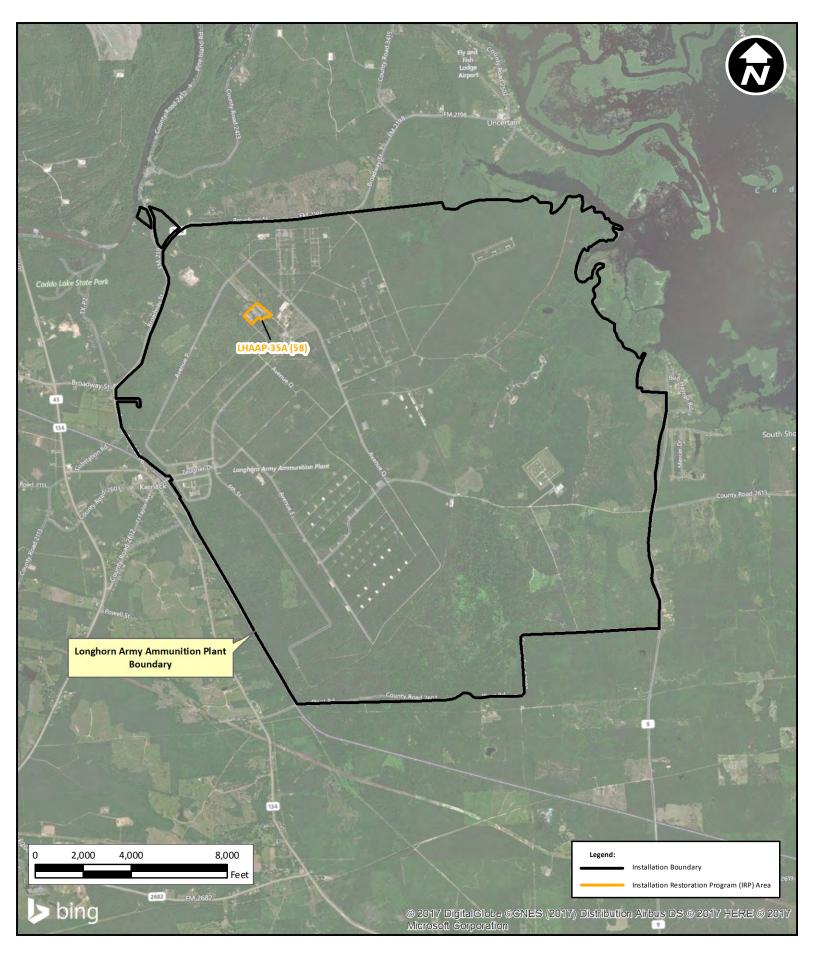
# 124 Remedial Action Ob ectives

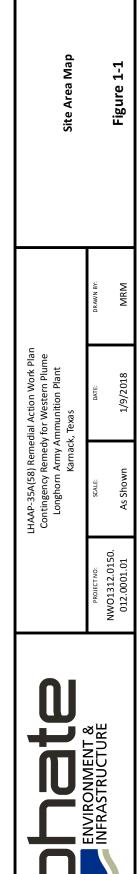
The final remedy for groundwater at LHAAP-35A (58) will protect human health and meet Applicable or Relevant and Appropriate Requirements (ARARs). The site was determined to pose no significant ecological risks (Shaw, 2011). The RAOs for LHAAP-35A (58) are consistent with the reasonably anticipated future use of the site as a national wildlife refuge and include:

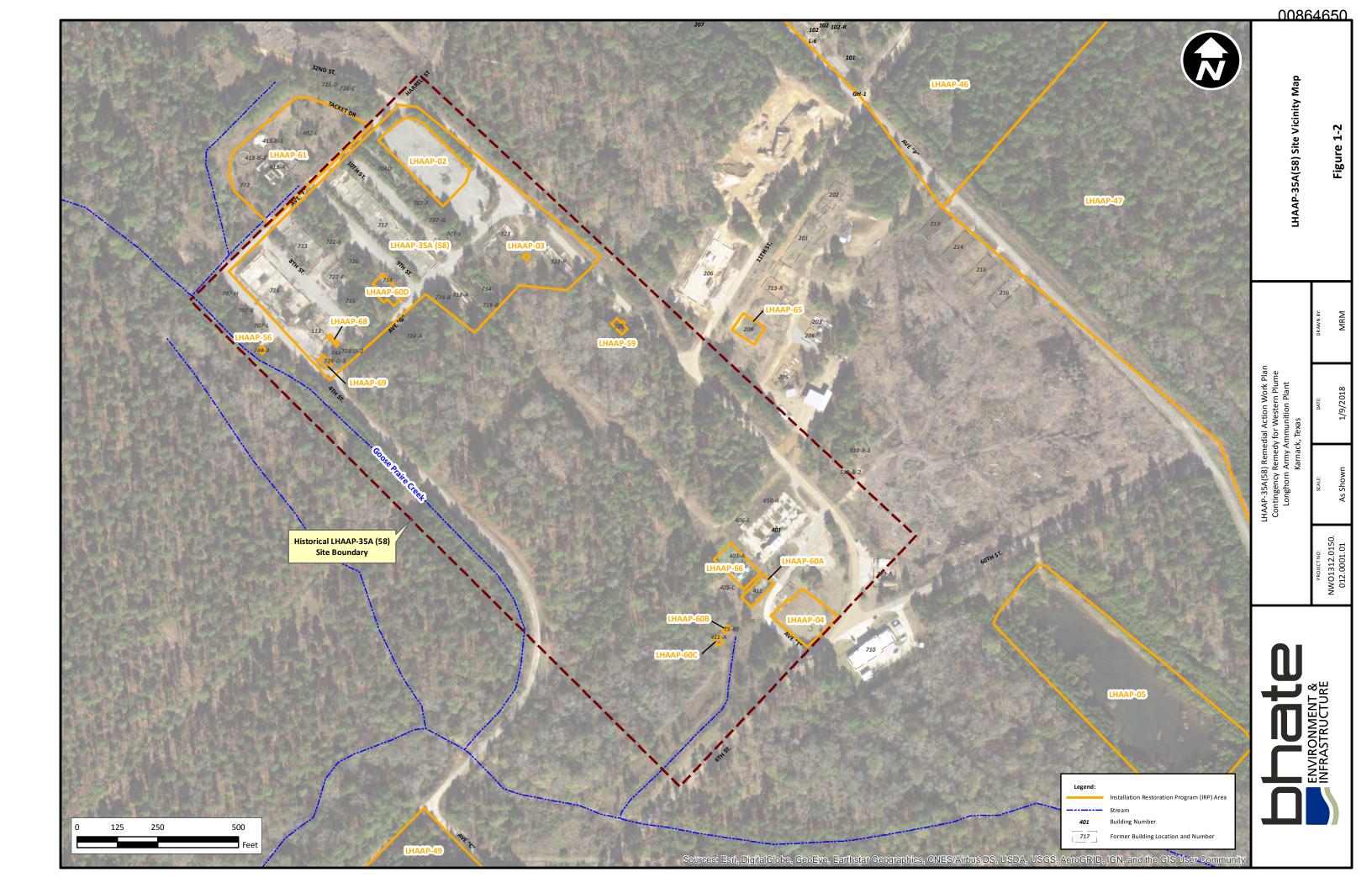
- Protection of human health by preventing human exposure to the contaminated groundwater.
- Protection of human health and the environment by preventing contaminated groundwater from migrating to nearby surface water.
- Return of groundwater to its potential beneficial use as drinking water, wherever practicable.

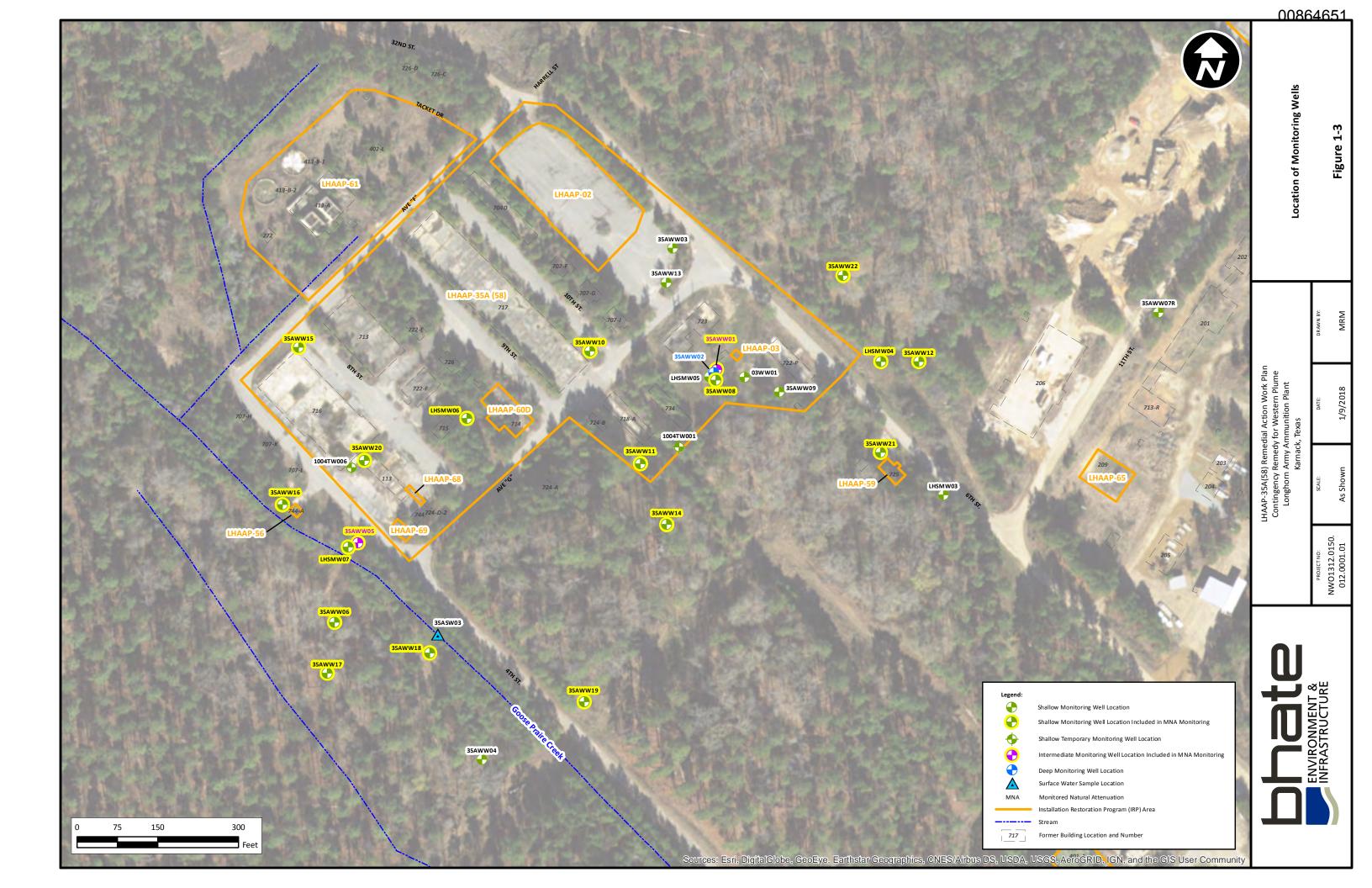


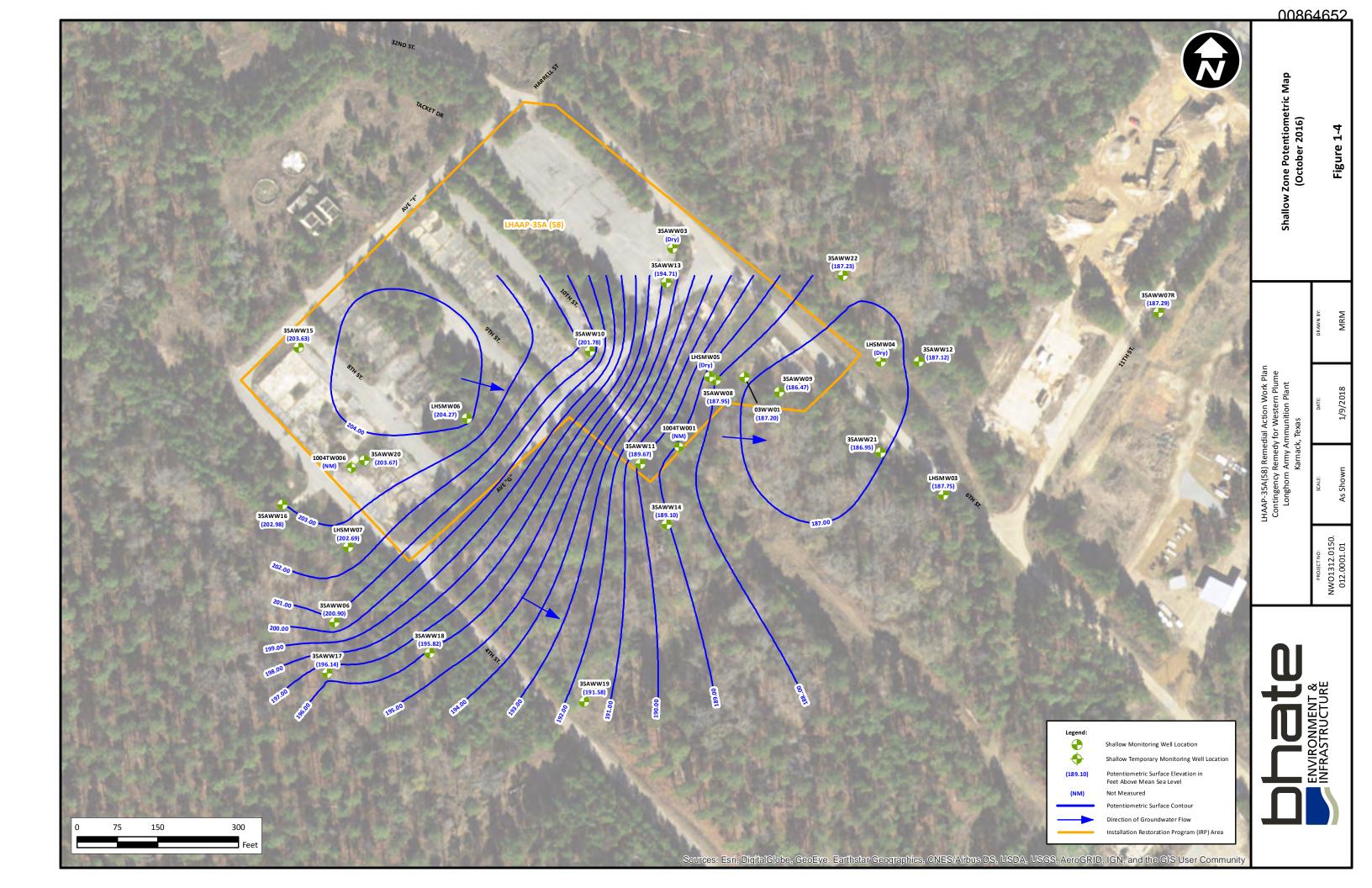


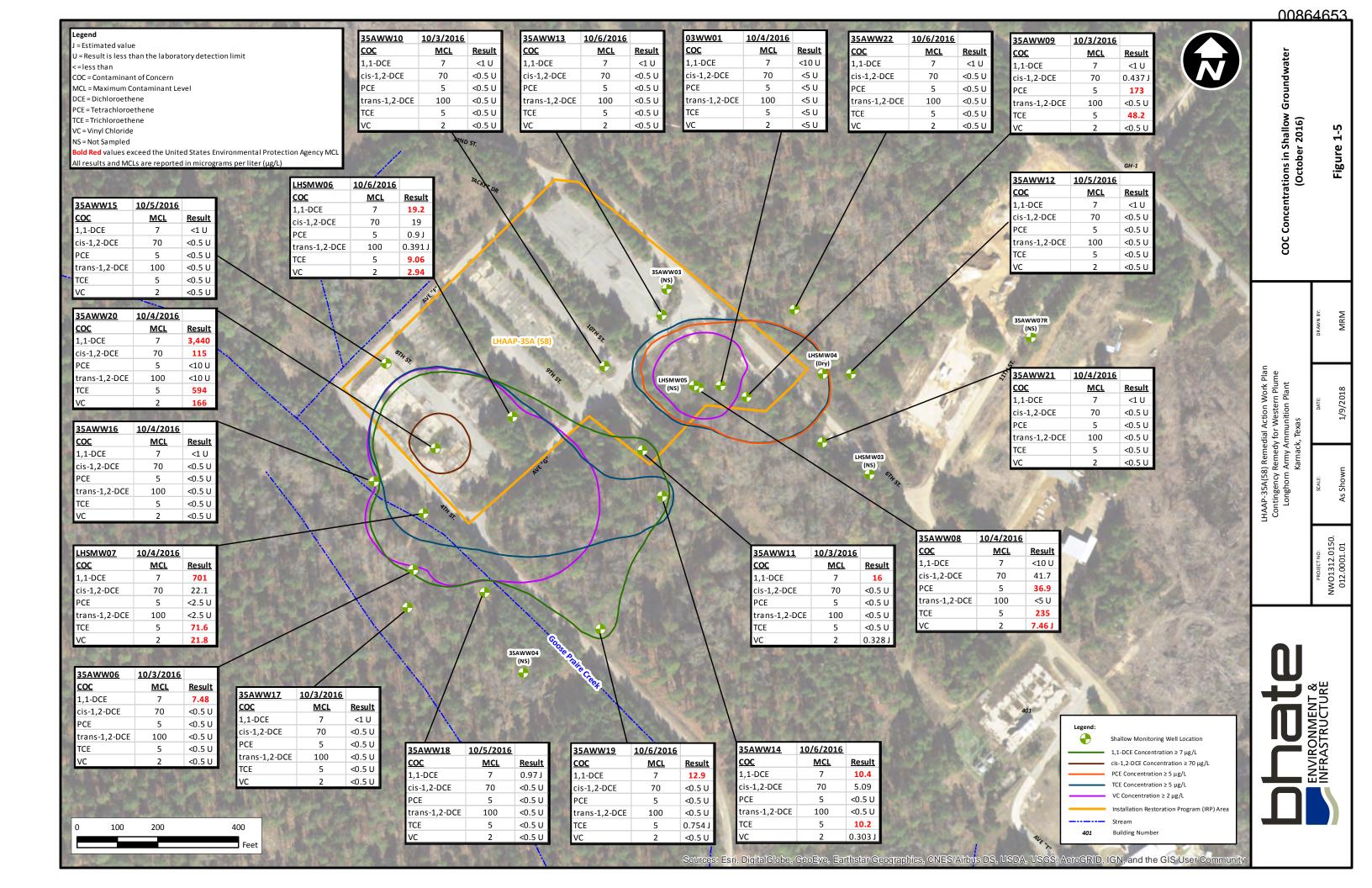


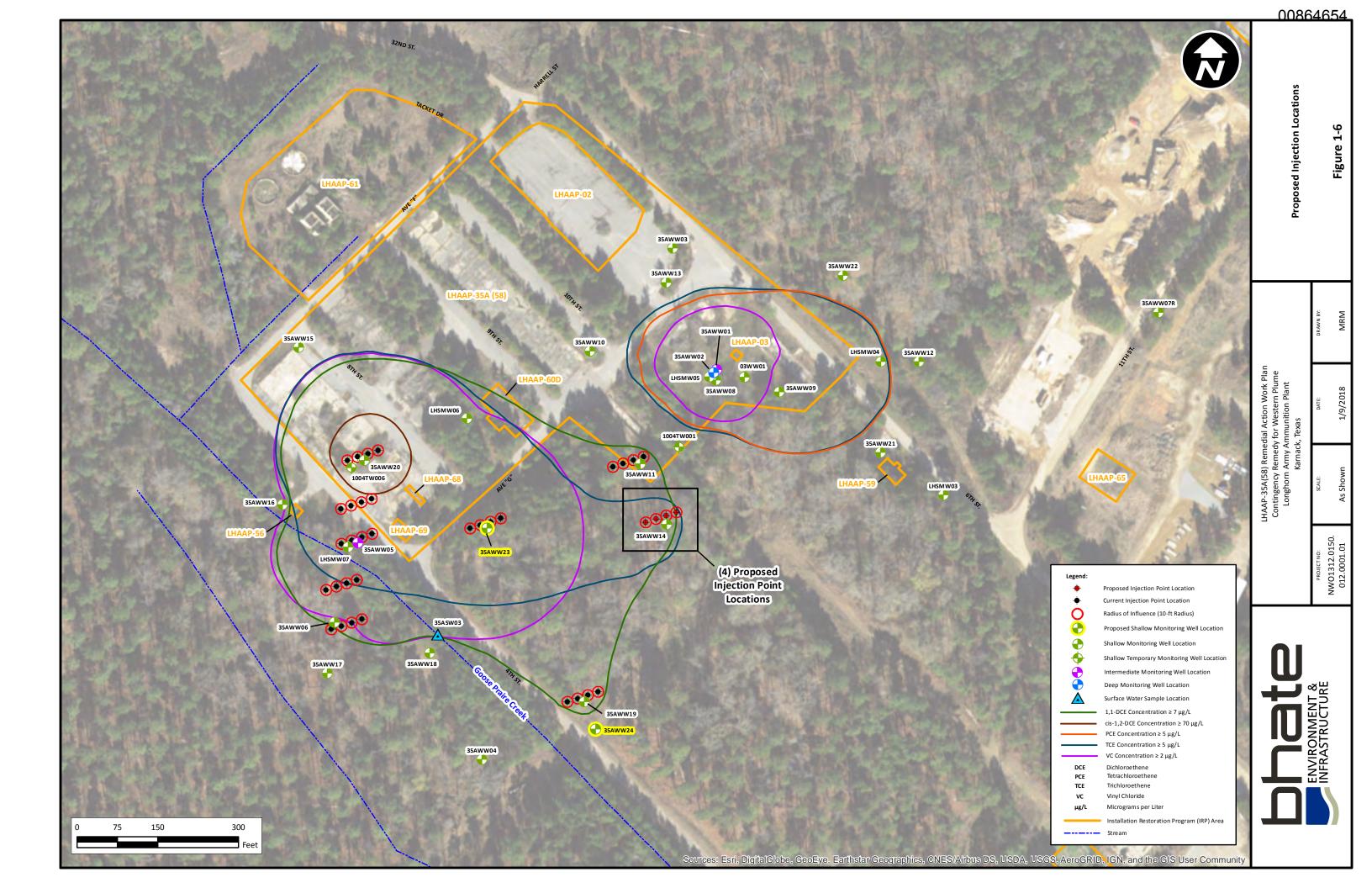












# 2 LAND USE CONTROL PLAN

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. 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  $SRS^{\circledast}$  - 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<sup>7</sup> 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

- AECOM Technical Services, Inc. (AECOM), 2013, Final Remedial Action Work Plan LHAAP-35A (58), Shops Area, Group 4 Longhorn Army Ammunition Plant, Karnack, Texas, August
- AECOM, 2014, Final Installation-Wide Work Plan, Longhorn Army Ammunition Plant, Karnack, Texas, July.
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- USACE, 2010, Record of Decision, LHAAP-35A (58), Shops Area, Group 4, Longhorn Army Ammunition Plant, Karnack, Texas, September

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.

#### TCEO

- 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 4<sup>th</sup> Quarter. As a correction, Bhate will collect air samples in the next week or the following week to account for the 4<sup>th</sup> Quarter sampling. Then a second air sampling event will be completed in February or March 2018 for the 1<sup>st</sup> Quarter Based upon prior air sampling results not indicating any issues, AP and RM 2018. 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 February 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 |
|------|------------------|----------------------|---------|
| AIX. | Unified States A | ATHIV EHVITOHILEHIAL | Command |

April Palmie AP

AR Administrative Record

**Aaron Williams** AW

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 **Explanation of Significant Differences ESD** 

**Ground Water Treatment Plant GWTP IWWP** Installation Wide Work Plan

KB Kent Becher KN Kim Nemmers

**LHAAP** Longhorn Army Ammunition Plant

Land Use Control LUC

Monthly Managers' Meeting **MMM** 

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-<br>General<br>Project<br>Management | General<br>ProjectMeeting (MMM)LHAAP on<br>1/18/2018 at 10:302017 Meeting to Regulators and Army on 1<br> |                                 | <ul> <li>Meeting Minutes issued final for the December 13, 2017 Meeting to Regulators and Army on 12/20/17</li> <li>TCEQ comments issued on 1/4/18 and revisions made</li> <li>TCEQ and EPA concurred with changes on 1/10/18</li> </ul> |                                                                                                                                                                                  |                                                                                                 |  |
|                                             | Restoration Advisory<br>Board (RAB)<br>Meeting                                                            | Next RAB at<br>LHAAP            | N/A                                                                                                                                                                                                                                      | <ul> <li>Meeting minutes provided to Regulators for RAB on 11/13/17</li> <li>Final minutes sent to RAB Members on 11/16/17</li> <li>Next RAB planned for January 18th</li> </ul> |                                                                                                 |  |
|                                             | IWWP                                                                                                      | Receive comments<br>on Draft    | February 12,<br>2018                                                                                                                                                                                                                     | • Issued to Regulators via portal on January 12, 2018 and delivered on January 16, 2018                                                                                          |                                                                                                 |  |
| Task 2:<br>LHAAP-02                         | LHAAP-02<br>Technical<br>Memorandum for<br>Semi-Annual                                                    | Submit Draft                    | September 11,<br>2018                                                                                                                                                                                                                    |                                                                                                                                                                                  | Technical Memorandum will capture three years of semi-<br>annual groundwater monitoring results |  |
|                                             | Groundwater<br>Monitoring                                                                                 | Validated Data<br>Package       | N/A                                                                                                                                                                                                                                      | Provided during December 2017 MMM                                                                                                                                                |                                                                                                 |  |
| Task 3:<br>LHAAP-03                         | DF ROD                                                                                                    | Issue as Revised<br>Draft Final | April 20, 2018                                                                                                                                                                                                                           | Under Army review                                                                                                                                                                |                                                                                                 |  |
|                                             | ESD (LHAAP-58)                                                                                            | Submit Draft                    | May 7, 2018                                                                                                                                                                                                                              | Under Army review                                                                                                                                                                |                                                                                                 |  |
| Task 4:<br>LHAAP-04                         | Remedial<br>Design/Remedial<br>Action Work Plan                                                           | Submit Draft                    | March 22, 2018                                                                                                                                                                                                                           | • Install monitoring wells in December 2017 and sample ground water in January 2018                                                                                              |                                                                                                 |  |
| Task 5:<br>LHAAP-12                         | 2017 Annual RA-O<br>Report                                                                                | Submit Draft                    | April 16, 2018                                                                                                                                                                                                                           | Sampling completed in December 2017     Validated data package to be presented at January 2018     MMM                                                                           |                                                                                                 |  |
| Task 6:<br>LHAAP-16                         | Remedial Action<br>Work Plan                                                                              | Submit Draft                    | January 31,<br>2018                                                                                                                                                                                                                      | Under Army review                                                                                                                                                                |                                                                                                 |  |

# Document and Issue Tracking January 18, 2018

| Task                 | Description                                                      | Next Action                   | Tentative<br>Delivery Date<br>to Regulators | Current Status                                                                                                                                                                                                                                                                                | Remarks |  |
|----------------------|------------------------------------------------------------------|-------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--|
| Task 7:<br>LHAAP-17  | PDI Report                                                       | Submit Draft                  | May 10, 2018                                | <ul> <li>PDI field work began November 2017</li> <li>Validated data package for samples collected in<br/>November 2017 to be presented at January 2018 MMM</li> </ul>                                                                                                                         |         |  |
| Task 9:<br>LHAAP-37  | Year 1 Quarter 1<br>RA-O Sampling                                | Validated Data<br>Deliverable | January 2018                                | <ul> <li>January 2018</li> <li>Groundwater sampling completed in November 2017</li> <li>Validated data package to be presented at January 2018</li> <li>MMM</li> </ul>                                                                                                                        |         |  |
| Task 10:<br>LHAAP-46 | Year 4 1 <sup>st</sup><br>Semiannual RA-O<br>Sampling            | Validated Data<br>Deliverable | March 2018                                  | Sampling scheduled for February 2018                                                                                                                                                                                                                                                          |         |  |
| Task 11:<br>LHAAP-50 | Year 3 Annual RA-O<br>Report                                     | Submit Draft                  | February 20,<br>2018                        | Under Army review                                                                                                                                                                                                                                                                             |         |  |
|                      | Year 4 1 <sup>st</sup><br>Semiannual RA-O<br>Sampling            | Validated Data<br>Package     | January 2018                                | <ul> <li>Groundwater sampling completed in November 2017</li> <li>Validated data package to be presented at January 2018</li> <li>MMM</li> </ul>                                                                                                                                              |         |  |
| Task 12:<br>LHAAP-58 | LHAAP-58<br>Explanation of<br>Significant<br>Difference          | Issue as Draft<br>Final       | To be<br>determined                         | <ul> <li>Provided Draft ESD to Regulators on 11/13/2017</li> <li>TCEQ Comments Receive 12/5/2017</li> <li>EPA Comments Received on 11/30/2017</li> <li>Response to Regulator comments on the ESD is under Army review</li> </ul>                                                              |         |  |
|                      | LHAAP-58 Revised<br>Final Remedial<br>Action Work Plan<br>(RAWP) |                               |                                             | <ul> <li>Final RAWP was revised to change the substrate and add additional injection points</li> <li>Received TCEQ and EPA comments on 1/9/18; Resolved comments on 1/9/18</li> <li>Issued with revisions as Final Revised via portal on 1/12/2018 and via hard copy on 1/16/18</li> </ul>    |         |  |
|                      | LHAAP-58 Semi-<br>Annual RA-O Report<br>Year 3                   | Submit Draft                  | January 19,<br>2018                         | <ul> <li>Annual RA-O Report Year 3 is being prepared for Draft<br/>Submittal to Regulators on or before 1/19/2018.<br/>Groundwater sampling completed in November 2017 for<br/>Year 4 RA-O</li> <li>Validated data package from Year 4 RAO to be presented<br/>at January 2018 MMM</li> </ul> |         |  |
| Task 13:<br>LHAAP-67 | Year 4 1 <sup>st</sup><br>Semiannual RA-O<br>Sampling            | Validated Data<br>Package     | January 2018                                | <ul> <li>Groundwater sampling completed in November 2017</li> <li>Validated data package to be presented at January 2018<br/>MMM</li> </ul>                                                                                                                                                   |         |  |

# Document and Issue Tracking January 18, 2018

| Task                                                   | Description                                        | Next Action  | Tentative<br>Delivery Date<br>to Regulators | Current Status                                                            | Remarks |
|--------------------------------------------------------|----------------------------------------------------|--------------|---------------------------------------------|---------------------------------------------------------------------------|---------|
| <b>Task 14:</b>                                        | LHAAP-001-R-01                                     | Receive      | January 29,                                 | • Issued to Regulators in December 20, 2017                               |         |
| LHAAP-001-                                             | LUC Remedial                                       | Comments on  | 2018                                        |                                                                           |         |
| R-01                                                   | Design                                             | Draft        |                                             |                                                                           |         |
|                                                        | LHAAP-001-R-01                                     | Submit Draft | March 28, 2018                              | Sampling completed in November 2017; validated data                       |         |
|                                                        | 2nd Annual                                         |              |                                             | provided in December 2017 MMM                                             |         |
|                                                        | Groundwater Monitoring Report                      |              |                                             |                                                                           |         |
| <b>Task 15:</b>                                        | LHAAP-001-R-03                                     | Received     | January 29,                                 | • Issued to Regulators in December 20, 2017.                              |         |
| LHAAP-001-                                             | LUC Remedial                                       | Comments on  | 2018                                        |                                                                           |         |
| R-03                                                   | Design                                             | Draft        |                                             |                                                                           |         |
| Task 16<br>Groundwater<br>Treatment<br>Plant<br>(GWTP) | 4th Qtr 2017 GWTP<br>Quarterly OM&M<br>Report      | Submit Draft | April 27, 2018                              | Will begin preparation of report upon validation of<br>December 2017 data |         |
| Task 17:<br>LHAAP-18/24                                | LHAAP-18/24<br>Annual Compliance<br>Report         | Submit Draft | April 27, 2018                              | Groundwater sampling completed in December 2017                           |         |
| Task 18:<br>Surface<br>Water                           | Annual Surface<br>Water Sampling<br>Report- Year 1 |              |                                             | Surface water sampling completed in December 2017                         |         |
| Task 19: LUC<br>Management                             | 2017 Comprehensive<br>LUC Management<br>Plan       |              |                                             | • Issued Final on 11/30/2017                                              |         |

# 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 Sample Date Location Description: |         |                |          | 12WW21-120417<br>12/4/2017<br>Site 12 – N, |          | 12WW21-120417-FD<br>12/4/2017<br>Site 12 – N, middle region, |          | 12WW24-120417<br>12/4/2017<br>Site 12 - East of |          |
|------------------------|---------------------------------------------|---------|----------------|----------|--------------------------------------------|----------|--------------------------------------------------------------|----------|-------------------------------------------------|----------|
|                        |                                             |         |                |          |                                            |          |                                                              |          |                                                 |          |
|                        |                                             |         |                |          |                                            |          |                                                              |          |                                                 |          |
|                        |                                             |         | central region |          | middle region                              |          | Duplicate                                                    |          | 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       | 130-1     | 11417                            | 17WW0     | 1-111517                       | 17WW02    | 2-111517                        | 17WW02-   | 111517-FD                           | 17WW0     | 3-111417                        | 17WW04    | 4-111617                          | 17WW0    | 5-111617                        | 17WW0     | 6-111617                         |
|------------------------|---------|-----------------|-----------|----------------------------------|-----------|--------------------------------|-----------|---------------------------------|-----------|-------------------------------------|-----------|---------------------------------|-----------|-----------------------------------|----------|---------------------------------|-----------|----------------------------------|
|                        |         | Sample Date     | 11/14     | 1/2017                           | 11/14     | 1/2017                         | 11/15     | /2017                           | 11/15     | /2017                               | 11/14     | /2017                           | 11/16     | 5/2017                            | 11/10    | 5/2017                          | 11/16     | 5/2017                           |
|                        | Locatio | on Description: | impacted, | w Zone,<br>outside site<br>ndary | impacted, | w Zone<br>within site<br>ndary | impacted, | w Zone,<br>within site<br>ndary | impacted, | v Zone,<br>within site<br>Duplicate | impacted, | w Zone,<br>within site<br>ndary | unimpacte | w Zone,<br>ed, outside<br>oundary | unimpact | Zone,<br>ed, outside<br>oundary | impacted, | w Zone,<br>outside site<br>ndary |
| Parameter              | Units   | MCL/ <b>MSC</b> | 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       | 17WW0    | 7-111417                            | 17WW0    | 8-111417                          | 17WW0  | 9-111517                            | 17WW10    | )-111517                         | 17WW1      | 1-111617                             | 17WW1    | 3-111417                         | 17WW1    | 4-111517                          | 17WW1    | 5-111517                             |
|------------------------|---------|-----------------|----------|-------------------------------------|----------|-----------------------------------|--------|-------------------------------------|-----------|----------------------------------|------------|--------------------------------------|----------|----------------------------------|----------|-----------------------------------|----------|--------------------------------------|
|                        |         | Sample Date     | 11/14    | 1/2017                              | 11/14    | 1/2017                            | 11/15  | /2017                               | 11/15     | /2017                            | 11/16      | /2017                                | 11/14    | 1/2017                           | 11/15    | 5/2017                            | 11/15    | 5/2017                               |
|                        | Locatio | on Description: | unimpact | iate Zone,<br>ed, within<br>oundary | unimpact | w Zone,<br>ted, within<br>oundary | •      | iate Zone,<br>ed, outside<br>undary | unimpacte | v Zone,<br>ed, outside<br>undary | unimpacted | iate Zone,<br>d,within site<br>ndary | unimpact | w Zone,<br>ed, within<br>oundary | unimpact | w Zone,<br>ed, outside<br>oundary | unimpact | iate Zone,<br>ed, outside<br>oundary |
| Parameter              | Units   | MCL/ <b>MSC</b> | 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       | 17WW1     | 6-111517                       | 17WW1    | 7-111517                           | 17WW17-             | 111517-FD                                    | 17WW18    | 3-111517                           | 18WW10    | D-111517                         | 18WW1     | 1-111617                         | 18WW1     | 5-111617                             |
|------------------------|---------|-----------------|-----------|--------------------------------|----------|------------------------------------|---------------------|----------------------------------------------|-----------|------------------------------------|-----------|----------------------------------|-----------|----------------------------------|-----------|--------------------------------------|
|                        |         | Sample Date     | 11/15     | /2017                          | 11/15    | /2017                              | 11/15               | /2017                                        | 11/15     | /2017                              | 11/15     | /2017                            | 11/16     | /2017                            | 11/16     | 5/2017                               |
|                        | Locatio | on Description: | unimpacte | Zone,<br>ed, outside<br>undary | unimpact | iate Zone,<br>ed, within<br>undary | unimpact<br>site bo | iate Zone,<br>ed, within<br>undary,<br>icate | unimpacte | ate Zone,<br>ed, outside<br>undary | impacted, | w Zone,<br>outside site<br>ndary | unimpacte | w Zone,<br>ed, outside<br>undary | unimpacte | iate Zone,<br>ed, outside<br>oundary |
| Parameter              | Units   | MCL/ <b>MSC</b> | 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

|                        |                         | Sample ID   | 35BWW0     | 1-110817                           | 35BWW0 | )4-110917                   | 35BWW04     | -110917-FD                            | 35BWW0 | 5-110817                 | 35BWW0      | 06-110817                           | 35BWW0 | 7-110917                      |
|------------------------|-------------------------|-------------|------------|------------------------------------|--------|-----------------------------|-------------|---------------------------------------|--------|--------------------------|-------------|-------------------------------------|--------|-------------------------------|
|                        |                         | Sample Date | 11/8       | /2017                              | 11/9   | /2017                       | 11/9        | /2017                                 | 11/8/  | /2017                    | 11/8/       | /2017                               | 11/9/  | /2017                         |
|                        | Location Description: u |             | unimpacted | w zone,<br>d, within site<br>ndary |        | ne, impacted,<br>e boundary | within site | ne, impacted,<br>e boundary<br>licate |        | e, impacted,<br>boundary | zone, unimp | shallow<br>acted, within<br>oundary | unimp  | w zone,<br>pacted<br>pradient |
| 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                             |

|                        |         | Sample ID               | 35 <b>B</b> WW | 08-110717                          | 35BWW0 | 9-110717                       | 35BWW1 | 10-110717                 | 35BWW1 | 1-110817                         | 35BWW1     | 2-110917                           | 35BWW1 | 3-110717                  |
|------------------------|---------|-------------------------|----------------|------------------------------------|--------|--------------------------------|--------|---------------------------|--------|----------------------------------|------------|------------------------------------|--------|---------------------------|
|                        |         | Sample Date             | 11/7           | /2017                              | 11/7   | /2017                          | 11/7   | /2017                     | 11/8   | /2017                            | 11/9/      | 2017                               | 11/7/  | /2017                     |
|                        | Locatio | Location Description: u |                | w zone,<br>d, within site<br>ndary | impa   | w zone,<br>acted<br>e boundary |        | pacted, within<br>oundary | low ir | zone, v.<br>mpact,<br>e boundary | unimpacted | w zone,<br>I, within site<br>ndary |        | zone, v.<br>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                         |

|                        |         | Sample ID                | 35BWW13 | -110717-FD                        | 35BWW1 | 14-110717                   | 35BWW1 | 15-110717                   | 35BWW1 | 6-110717                    | 35BWW1     | 7-110717                           | 35BWW1     | 8-110717                           |
|------------------------|---------|--------------------------|---------|-----------------------------------|--------|-----------------------------|--------|-----------------------------|--------|-----------------------------|------------|------------------------------------|------------|------------------------------------|
|                        |         | Sample Date              | 11/7    | /2017                             | 11/7   | /2017                       | 11/7   | /2017                       | 11/7   | /2017                       | 11/7/      | /2017                              | 11/7       | /2017                              |
|                        | Locatio | Location Description: Id |         | zone, v.<br>outside site<br>ndary |        | ne, impacted,<br>e boundary |        | ne, impacted,<br>e boundary |        | ne, impacted,<br>e boundary | unimpacted | w zone,<br>d, within site<br>ndary | unimpacted | w zone,<br>, outside site<br>ndary |
| 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                                 | 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                                  |

|                        |         | Sample ID                | 35BWW1 | 9-110717                           | 35BWW2 | 0-110817                 | 35BWW2     | 23-110917                          | 35BWW2     | 4-110817                         | 35BWW2 | 5-110817                   | 35BWW25     | -110817-FD                           |
|------------------------|---------|--------------------------|--------|------------------------------------|--------|--------------------------|------------|------------------------------------|------------|----------------------------------|--------|----------------------------|-------------|--------------------------------------|
|                        |         | Sample Date              | 11/7   | /2017                              | 11/8/  | 2017                     | 11/9       | /2017                              | 11/8/      | 2017                             | 11/8/  | 2017                       | 11/8/       | /2017                                |
|                        | Locatio | Location Description: ur |        | w zone,<br>, outside site<br>ndary |        | e, impacted,<br>boundary | unimpacted | w zone,<br>, outside site<br>ndary | unimpacted | v zone,<br>outside site<br>idary |        | e, impacted,<br>e boundary | outside sit | ne, impacted,<br>e boundary<br>ICATE |
| 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                                  | 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                                    |

|                        |         | Sample ID      | 35BWW2     | 6-110917                           | LHSMW5 | 8-110817                 |
|------------------------|---------|----------------|------------|------------------------------------|--------|--------------------------|
|                        |         | Sample Date    | 11/9/      | 2017                               | 11/8/  | 2017                     |
|                        | Locatio | n Description: | unimpacted | w zone,<br>I, within site<br>ndary |        | e, impacted,<br>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      | 50WW0! | 5-111017                    | 50WW05-     | 111017-FD                              | 50WW0          | 6-111317                 | 50WW08             | 3-111317                                      | 50WW08-                | 111317-FD                                         | 50WW0         | 9-111017                    |
|------------------------|---------|----------------|--------|-----------------------------|-------------|----------------------------------------|----------------|--------------------------|--------------------|-----------------------------------------------|------------------------|---------------------------------------------------|---------------|-----------------------------|
|                        |         | Sample Date    | 11/10  | /2017                       | 11/10       | )/2017                                 | 11/13          | 3/2017                   | 11/13              | /2017                                         | 11/13                  | 3/2017                                            | 11/10         | 0/2017                      |
|                        | Locatio | n Description: |        | ower shallow,<br>e boundary | outside sit | ower shallow,<br>e boundary.<br>licate | 2116 20 - FINE | E, outside site<br>ndary | shallow<br>site bo | E, upper<br>u, inside<br>undary.<br>quarterly | inside site<br>Sampled | pper shallow,<br>boundary.<br>quarterly<br>licate | Site 50-E, lo | ower shallow,<br>e 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                  | 50WW1  | 1-111317                            | 50WW1      | 2-111417                            | 50WW1  | 3-111317                    | 50WW14         | 4-111317                                         | 50WW1                     | 5-111017                                             |
|------------------------|---------|----------------|--------|---------------------------|--------|-------------------------------------|------------|-------------------------------------|--------|-----------------------------|----------------|--------------------------------------------------|---------------------------|------------------------------------------------------|
|                        |         | Sample Date    | 11/10  | /2017                     | 11/13  | 3/2017                              | 11/14      | 1/2017                              | 11/13  | 3/2017                      | 11/13          | 3/2017                                           | 11/10                     | 0/2017                                               |
|                        | Locatio | n Description: | · ·    | ntermediate,<br>boundary. |        | ENE, upper<br>outside site<br>ndary | shallow, c | ENE, upper<br>outside site<br>ndary |        | pper shallow,<br>e boundary | out<br>site bo | ower shallow,<br>side<br>undary,<br>ockett Ave., | shallow, o<br>boundary, a | NNE, upper<br>outside site<br>along Goose<br>e 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    | Ü                         | 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      | 50WW1                     | 6-111417                                            | 50WW17                     | 7-111017                                                 | 50WW18                                       | 8-111017                                                                | 50WW2        | 1-111017                                            | 50WW2      | 2-111317                           | 50WW2  | 3-111417                     |
|------------------------|---------|----------------|---------------------------|-----------------------------------------------------|----------------------------|----------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------|--------------|-----------------------------------------------------|------------|------------------------------------|--------|------------------------------|
|                        |         | Sample Date    | 11/14                     | 1/2017                                              | 11/10                      | )/2017                                                   | 11/10                                        | )/2017                                                                  | 11/10        | /2017                                               | 11/13      | 3/2017                             | 11/14  | /2017                        |
|                        | Locatio | n Description: | shallow, o<br>boundary, a | NE, upper<br>outisde site<br>along Goose<br>e Creek | penetratin<br>outside site | NE, fully<br>ng shallow,<br>e boundary,<br>Prairie Creek | upper s<br>outsid<br>boundal<br>Goose<br>Cre | 0 - NE,<br>shallow,<br>de site<br>ry, along<br>Prairie<br>eek.<br>npled | outside site | pper shallow,<br>e boundary,<br>f S.Crockett<br>ve. | shallow, o | SE, upper<br>outside site<br>ndary |        | pper shallow,<br>e 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                            |

|                        |         | Sample ID      | 50WW24     | 4-111017                           | 50WW27       | 7-111017                                     |
|------------------------|---------|----------------|------------|------------------------------------|--------------|----------------------------------------------|
|                        |         | Sample Date    | 11/10      | )/2017                             | 11/10        | /2017                                        |
|                        | Locatio | n Description: | shallow, o | NE, upper<br>outside site<br>odary | outside site | oper shallow,<br>e boundary,<br>rockett 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

| Location ID: Sample Date:  Location D | Units<br>Description | MCL/MSC | 03WW01-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW01_<br>111617<br>11/16/17<br>Site 58 - E,<br>inside site<br>boundary. | 35AWW05-<br>111317<br>11/13/17<br>Site 58 -<br>SW,<br>outside the<br>site<br>boundary. | 35AWW06-<br>111417<br>11/14/17<br>Site 58 - SW,<br>outside the<br>site<br>boundary. | 35AWW07_<br>111717<br>11/17/17<br>Site 58 - E,<br>outside<br>site<br>boundary. | 35AWW08-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW09-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW10-<br>111517<br>11/15/17<br>Site 58 -<br>ESE,<br>inside site<br>boundary. | 35AWW11-<br>111417<br>11/14/17<br>Site 58 - SE,<br>inside site<br>boundary. | 35AWW12_<br>111617<br>11/16/17<br>Site 58 - E,<br>outside site<br>boundary. |
|---------------------------------------|----------------------|---------|------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Alkalinity, Total                     | mg/L                 | NV      | 3310                                                                         | NA                                                                         | NA                                                                                     | 666                                                                                 | NA                                                                             | 4360                                                                          | 286                                                                           | 62.1                                                                            | 452                                                                         | NA                                                                          |
| Phosphorus (365.4)                    | 6/ -                 |         | 5510                                                                         |                                                                            |                                                                                        | 330                                                                                 |                                                                                | .500                                                                          | _50                                                                           | 0=11                                                                            |                                                                             |                                                                             |
| 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)          |                      | 123     |                                                                              |                                                                            |                                                                                        | 0.000                                                                               |                                                                                |                                                                               | 0.000                                                                         |                                                                                 | 51555                                                                       |                                                                             |
| Total Organic Carbon                  | mg/L                 | NV      | 191                                                                          | NA                                                                         | NA                                                                                     | 2.29                                                                                | NA                                                                             | 581                                                                           | 6.79                                                                          | 3.89                                                                            | 5.05                                                                        | NA                                                                          |
| etals (6020A)                         |                      |         |                                                                              |                                                                            |                                                                                        |                                                                                     |                                                                                |                                                                               |                                                                               |                                                                                 |                                                                             |                                                                             |
| Total Arsenic                         |                      |         |                                                                              | < 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 (8260      | 0C)                  |         |                                                                              |                                                                            |                                                                                        |                                                                                     |                                                                                |                                                                               |                                                                               |                                                                                 |                                                                             |                                                                             |
| 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                                                                     |

| Location ID: Sample Date:  Location D  1,2,4-Trichlorobenzene | Units<br>Description<br>μg/L | MCL/MSC | 03WW01-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW01_<br>111617<br>11/16/17<br>Site 58 - E,<br>inside site<br>boundary. | 35AWW05-<br>111317<br>11/13/17<br>Site 58 -<br>SW,<br>outside the<br>site<br>boundary. | 35AWW06-<br>111417<br>11/14/17<br>Site 58 - SW,<br>outside the<br>site<br>boundary. | 35AWW07_<br>111717<br>11/17/17<br>Site 58 - E,<br>outside<br>site<br>boundary. | 35AWW08-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW09-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW10-<br>111517<br>11/15/17<br>Site 58 -<br>ESE,<br>inside site<br>boundary. | 35AWW11-<br>111417<br>11/14/17<br>Site 58 - SE,<br>inside site<br>boundary. | 35AWW12_<br>111617<br>11/16/17<br>Site 58 - E,<br>outside site<br>boundary. |
|---------------------------------------------------------------|------------------------------|---------|------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 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                                          |                              |         |                                                                              | < 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                                                                    |

| Location ID: Sample Date:  Location D  Bromodichloromethane | Units<br>Description<br>µg/L | MCL/MSC | 03WW01-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW01_<br>111617<br>11/16/17<br>Site 58 - E,<br>inside site<br>boundary. | 35AWW05-<br>111317<br>11/13/17<br>Site 58 -<br>SW,<br>outside the<br>site<br>boundary. | 35AWW06-<br>111417<br>11/14/17<br>Site 58 - SW,<br>outside the<br>site<br>boundary. | 35AWW07_<br>111717<br>11/17/17<br>Site 58 - E,<br>outside<br>site<br>boundary. | 35AWW08-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW09-<br>111517<br>11/15/17<br>Site 58 - E,<br>inside<br>site<br>boundary. | 35AWW10-<br>111517<br>11/15/17<br>Site 58 -<br>ESE,<br>inside site<br>boundary. | 35AWW11-<br>111417<br>11/14/17<br>Site 58 - SE,<br>inside site<br>boundary. | 35AWW12_<br>111617<br>11/16/17<br>Site 58 - E,<br>outside site<br>boundary. |
|-------------------------------------------------------------|------------------------------|---------|------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 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                                                                    |

| Location ID:<br>Sample Date:   | Units       | MCL/MSC | 03WW01-<br>111517<br>11/15/17               | 35AWW01_<br>111617<br>11/16/17           | 35AWW05-<br>111317<br>11/13/17                       | 35AWW06-<br>111417<br>11/14/17                    | 35AWW07_<br>111717<br>11/17/17               | 35AWW08-<br>111517<br>11/15/17              | 35AWW09-<br>111517<br>11/15/17              | 35AWW10-<br>111517<br>11/15/17                | 35AWW11-<br>111417<br>11/14/17            | 35AWW12_<br>111617<br>11/16/17            |
|--------------------------------|-------------|---------|---------------------------------------------|------------------------------------------|------------------------------------------------------|---------------------------------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|-------------------------------------------|-------------------------------------------|
| Location C                     | Description |         | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 - E,<br>inside site<br>boundary. | Site 58 -<br>SW,<br>outside the<br>site<br>boundary. | Site 58 - SW,<br>outside the<br>site<br>boundary. | Site 58 - E,<br>outside<br>site<br>boundary. | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 -<br>ESE,<br>inside site<br>boundary. | Site 58 - SE,<br>inside site<br>boundary. | Site 58 - E,<br>outside site<br>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                                        |

| Location ID:                    |             |         | 03WW01-<br>111517                           | 35AWW01_<br>111617                       | 111317                                               | 35AWW06-<br>111417                                | 35AWW07_<br>111717                           | 35AWW08-<br>111517                          | 35AWW09-<br>111517                          | 35AWW10-<br>111517                            | 35AWW11-<br>111417                        | 35AWW12_<br>111617                        |
|---------------------------------|-------------|---------|---------------------------------------------|------------------------------------------|------------------------------------------------------|---------------------------------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|-------------------------------------------|-------------------------------------------|
| Sample Date:                    | Units       | MCL/MSC | 11/15/17                                    | 11/16/17                                 | 11/13/17                                             | 11/14/17                                          | 11/17/17                                     | 11/15/17                                    | 11/15/17                                    | 11/15/17                                      | 11/14/17                                  | 11/16/17                                  |
| Location D                      | escription  |         | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 - E,<br>inside site<br>boundary. | Site 58 -<br>SW,<br>outside the<br>site<br>boundary. | Site 58 - SW,<br>outside the<br>site<br>boundary. | Site 58 - E,<br>outside<br>site<br>boundary. | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 -<br>ESE,<br>inside site<br>boundary. | Site 58 - SE,<br>inside site<br>boundary. | Site 58 - E,<br>outside site<br>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                    | · , ,       |         | 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)                 | <u> </u>    |         |                                             |                                          |                                                      |                                                   |                                              |                                             |                                             |                                               |                                           |                                           |
| Sulfide                         | mg/L        | NV      | 10.4                                        | NA                                       | NA                                                   | < 1.0 U                                           | NA                                           | 30.4                                        | < 1.0 U                                     | 1.24                                          | < 1.0 U                                   | NA                                        |

| Location ID:<br>Sample Date:  |                                               | MCL/MSC | 03WW01-<br>111517<br>11/15/17 | 35AWW01_<br>111617<br>11/16/17 | 35AWW05-<br>111317<br>11/13/17                       | 35AWW06-<br>111417<br>11/14/17                    | 35AWW07_<br>111717<br>11/17/17               | 35AWW08-<br>111517<br>11/15/17              | 35AWW09-<br>111517<br>11/15/17              | 35AWW10-<br>111517<br>11/15/17                | 35AWW11-<br>111417<br>11/14/17            | 35AWW12_<br>111617<br>11/16/17            |
|-------------------------------|-----------------------------------------------|---------|-------------------------------|--------------------------------|------------------------------------------------------|---------------------------------------------------|----------------------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------------|-------------------------------------------|-------------------------------------------|
| Location D                    | Location Description  Dechlorinating Bacteria |         |                               |                                | Site 58 -<br>SW,<br>outside the<br>site<br>boundary. | Site 58 - SW,<br>outside the<br>site<br>boundary. | Site 58 - E,<br>outside<br>site<br>boundary. | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 - E,<br>inside<br>site<br>boundary. | Site 58 -<br>ESE,<br>inside site<br>boundary. | Site 58 - SE,<br>inside site<br>boundary. | Site 58 - E,<br>outside site<br>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                |                                               |         |                               | 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

 $\mu g/L$  - 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

|                                 |             |             | 35AWW13       | 35AWW14_      | 35AWW15      | 35AWW16-      | 35AWW16-      | 35AWW17-     | 35AWW18-     | 35AWW19      | 35AWW20-      | 35AWW20-             |
|---------------------------------|-------------|-------------|---------------|---------------|--------------|---------------|---------------|--------------|--------------|--------------|---------------|----------------------|
| Location ID:                    |             |             | 111617        | 111717        | 111617       | 111317        | 111317-a      | 111317       | 111317       | 111717       | 111417        | 35AWW20-<br>111417-a |
| Sample Date:                    |             | MCL/MSC     | 11/16/17      | 11/17/17      | 11/16/17     | 11/13/17      | 11/13/17      | 11/13/17     | 11/13/17     | 11/17/17     | 11/14/17      | 11/14/17             |
| Sample Date.                    | Offics      | IVICE/IVISC | 11/10/17      | 11, 17, 17    | 11, 10, 17   | 11, 13, 17    | Site 58 - SW, | 11/15/17     | 11, 13, 17   | 11/1//1/     | 11/14/17      | Site 58 - SW,        |
|                                 |             |             |               |               |              | Site 58 - SW, | outside site  |              |              |              | Site 58 - SW, | inside site          |
|                                 |             |             |               |               |              | outside site  | boundary,     | Site 58 -    | Site 58 -    | Site 58 -    | inside site   | boundary,            |
|                                 |             |             | Site 58 - NE, | Site 58 - SE, | Site 58 - W, | boundary,     | near          | SW,          | SSW,         | SSW,         | boundary,     | between              |
| Location L                      | Description |             | inside site   | outside site  | inside site  | near          | Building 744- | outside site | outside site | outside site | between       | Building             |
|                                 |             |             | boundary.     | boundary.     | boundary.    | Building 744- | A.            | boundary.    | boundary.    | boundary.    | Building      | 716 and 113.         |
|                                 |             |             |               |               |              | A.            | Field         |              |              |              | 716 and 113.  | Field                |
|                                 |             |             |               |               |              |               | duplicate.    |              |              |              |               | 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 (826 | 0C)         |             |               |               |              |               |               |              |              |              |               |                      |
| 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              |

|                             |             |         | 35AWW13       | 35AWW14_      | 35AWW15_     | 35AWW16-      | 35AWW16-      | 35AWW17-     | 35AWW18-     | 35AWW19      | 35AWW20-      | 35AWW20-      |
|-----------------------------|-------------|---------|---------------|---------------|--------------|---------------|---------------|--------------|--------------|--------------|---------------|---------------|
| Location ID:                |             |         | 111617        | 111717        | 111617       | 111317        | 111317-a      | 111317       | 111317       | 111717       | 111417        | 111417-a      |
| Sample Date:                | Units       | MCL/MSC | 11/16/17      | 11/17/17      | 11/16/17     | 11/13/17      | 11/13/17      | 11/13/17     | 11/13/17     | 11/17/17     | 11/14/17      | 11/14/17      |
| ·                           |             |         |               |               |              |               | Site 58 - SW, |              |              |              |               | Site 58 - SW, |
|                             |             |         |               |               |              | Site 58 - SW, | outside site  |              |              |              | Site 58 - SW, | inside site   |
|                             |             |         | Site 58 - NE. | Site 58 - SE, | Site 58 - W, | outside site  | boundary,     | Site 58 -    | Site 58 -    | Site 58 -    | inside site   | boundary,     |
| Location [                  | Description |         | inside site   | outside site  | inside site  | boundary,     | near          | SW,          | SSW,         | SSW,         | boundary,     | between       |
| 2000.1011                   | esemption   |         | boundary.     | boundary.     | boundary.    | near          | Building 744- | outside site | outside site | outside site | between       | Building      |
|                             |             |         | boundary.     | boundary.     | Journau, y.  | Building 744- | A.            | boundary.    | boundary.    | boundary.    | Building      | 716 and 113.  |
|                             |             |         |               |               |              | A.            | Field         |              |              |              | 716 and 113.  | Field         |
|                             | ,           |         |               |               |              |               | duplicate.    |              |              |              |               | 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        |             |         |               | < 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       |

|                         |             |         | 35AWW13       | 35AWW14       | 35AWW15      | 35AWW16-      | 35AWW16-      | 35AWW17-     | 35AWW18-     | 35AWW19      | 35AWW20-      | 35AWW20-      |
|-------------------------|-------------|---------|---------------|---------------|--------------|---------------|---------------|--------------|--------------|--------------|---------------|---------------|
| Location ID:            |             |         | 111617        | 111717        | 111617       | 111317        | 111317-a      | 111317       | 111317       | 111717       | 111417        | 111417-a      |
| Sample Date:            |             | MCL/MSC | 11/16/17      | 11/17/17      | 11/16/17     | 11/13/17      | 11/13/17      | 11/13/17     | 11/13/17     | 11/17/17     | 11/14/17      | 11/14/17      |
|                         | 00          | •       |               |               |              |               | Site 58 - SW, |              |              |              |               | Site 58 - SW, |
|                         |             |         |               |               |              | Site 58 - SW, | outside site  |              |              |              | Site 58 - SW, | inside site   |
|                         |             |         | Site 58 - NE, | Site 58 - SE, | Site 58 - W, | outside site  | boundary,     | Site 58 -    | Site 58 -    | Site 58 -    | inside site   | boundary,     |
| Location [              | Description |         | inside site   | outside site  | inside site  | boundary,     | near          | SW,          | SSW,         | SSW,         | boundary,     | between       |
| Location                | Description |         | boundary.     | boundary.     | boundary.    | near          | Building 744- | outside site | outside site | outside site | between       | Building      |
|                         |             |         | boundary.     | boundary.     | boundary.    | Building 744- | A.            | boundary.    | boundary.    | boundary.    | Building      | 716 and 113.  |
|                         |             |         |               |               |              | A.            | Field         |              |              |              | 716 and 113.  | Field         |
|                         |             |         |               |               |              |               | duplicate.    |              |              |              |               | 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       |

| Location ID:<br>Sample Date:   |             | MCL/MSC | 35AWW13_<br>111617<br>11/16/17            | 35AWW14_<br>111717<br>11/17/17             | 35AWW15_<br>111617<br>11/16/17           | 35AWW16-<br>111317<br>11/13/17                                            | 35AWW16-<br>111317-a<br>11/13/17                                                                 | 35AWW17-<br>111317<br>11/13/17                | 35AWW18-<br>111317<br>11/13/17                 | 35AWW19_<br>111717<br>11/17/17                 | 35AWW20-<br>111417<br>11/14/17                                                   | 35AWW20-<br>111417-a<br>11/14/17                                                                        |
|--------------------------------|-------------|---------|-------------------------------------------|--------------------------------------------|------------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                                | Description | -       | Site 58 - NE,<br>inside site<br>boundary. | Site 58 - SE,<br>outside site<br>boundary. | Site 58 - W,<br>inside site<br>boundary. | Site 58 - SW,<br>outside site<br>boundary,<br>near<br>Building 744-<br>A. | Site 58 - SW,<br>outside site<br>boundary,<br>near<br>Building 744-<br>A.<br>Field<br>duplicate. | Site 58 -<br>SW,<br>outside site<br>boundary. | Site 58 -<br>SSW,<br>outside site<br>boundary. | Site 58 -<br>SSW,<br>outside site<br>boundary. | Site 58 - SW,<br>inside site<br>boundary,<br>between<br>Building<br>716 and 113. | Site 58 - SW,<br>inside site<br>boundary,<br>between<br>Building<br>716 and 113.<br>Field<br>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 | 5)          |         |                                           |                                            |                                          |                                                                           |                                                                                                  |                                               |                                                |                                                |                                                                                  |                                                                                                         |
| 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                                                                                                      |

|                                 |                  |         | 35AWW13_      | 35AWW14_      | 35AWW15_     | 35AWW16-      | 35AWW16-      | 35AWW17-     | 35AWW18-     | 35AWW19_     | 35AWW20-      | 35AWW20-      |
|---------------------------------|------------------|---------|---------------|---------------|--------------|---------------|---------------|--------------|--------------|--------------|---------------|---------------|
| Location ID:                    |                  |         | 111617        | 111717        | 111617       | 111317        | 111317-a      | 111317       | 111317       | 111717       | 111417        | 111417-a      |
| Sample Date:                    | Units            | MCL/MSC | 11/16/17      | 11/17/17      | 11/16/17     | 11/13/17      | 11/13/17      | 11/13/17     | 11/13/17     | 11/17/17     | 11/14/17      | 11/14/17      |
|                                 |                  |         |               |               |              |               | Site 58 - SW, |              |              |              |               | Site 58 - SW, |
|                                 |                  |         |               |               |              | Site 58 - SW, | outside site  |              |              |              | Site 58 - SW, | inside site   |
|                                 |                  |         | Site 58 - NE, | Site 58 - SE, | Site 58 - W, | outside site  | boundary,     | Site 58 -    | Site 58 -    | Site 58 -    | inside site   | boundary,     |
| Location D                      | escription       |         | inside site   | outside site  | inside site  | boundary,     | near          | SW,          | SSW,         | SSW,         | boundary,     | between       |
|                                 |                  |         | boundary.     | boundary.     | boundary.    | near          | Building 744- | outside site | outside site | outside site | between       | Building      |
|                                 |                  |         | ,             | ,             |              | Building 744- | Α.            | boundary.    | boundary.    | boundary.    | Building      | 716 and 113.  |
|                                 |                  |         |               |               |              | A.            | Field         |              |              |              | 716 and 113.  | Field         |
| A : (0056)                      |                  |         |               |               |              |               | duplicate.    |              |              |              |               | Duplicate.    |
| Anions (9056)                   |                  | 1       |               |               | 1            | ı             |               |              |              |              | ı             |               |
| 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                    | ous Iron mg/L NV |         |               | 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       |

|                               |                      |         | 35AWW13_      | 35AWW14_      | 35AWW15_     | 35AWW16-      | 35AWW16-      | 35AWW17-     | 35AWW18-     | 35AWW19_     | 35AWW20-      | 35AWW20-      |
|-------------------------------|----------------------|---------|---------------|---------------|--------------|---------------|---------------|--------------|--------------|--------------|---------------|---------------|
| Location ID:                  |                      |         | 111617        | 111717        | 111617       | 111317        | 111317-a      | 111317       | 111317       | 111717       | 111417        | 111417-a      |
| Sample Date:                  | Units                | MCL/MSC | 11/16/17      | 11/17/17      | 11/16/17     | 11/13/17      | 11/13/17      | 11/13/17     | 11/13/17     | 11/17/17     | 11/14/17      | 11/14/17      |
|                               |                      |         |               |               |              |               | Site 58 - SW, |              |              |              |               | Site 58 - SW, |
|                               |                      |         |               |               |              | Site 58 - SW, | outside site  |              |              |              | Site 58 - SW, | inside site   |
|                               |                      |         | Site 58 - NE, | Site 58 - SE, | Site 58 - W, | outside site  | boundary,     | Site 58 -    | Site 58 -    | Site 58 -    | inside site   | boundary,     |
| Location D                    | escrintion           |         | inside site   | outside site  | inside site  | boundary,     | near          | SW,          | SSW,         | SSW,         | boundary,     | between       |
| Location 5                    | Location Description |         |               |               | boundary.    | near          | Building 744- | outside site | outside site | outside site | between       | Building      |
|                               |                      |         |               |               | bouridary.   | Building 744- | A.            | boundary.    | boundary.    | boundary.    | Building      | 716 and 113.  |
|                               |                      |         |               |               |              | A.            | Field         |              |              |              | 716 and 113.  | Field         |
|                               |                      |         |               |               |              |               | duplicate.    |              |              |              |               | 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

 $\mu g/L$  - 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

| Location ID: Sample Date:  Location E | Units<br>Description | MCL/MSC | 35AWW21-<br>111317<br>11/13/17<br>Site 58 - ESE,<br>outside site<br>boundary,<br>beside<br>Building 725. | 35AWW22_<br>111717<br>11/17/17<br>Site 58 - ENE,<br>outside site<br>boundary. | LHSMW03_<br>111717<br>11/17/17<br>Site 58 -<br>ESE,<br>outside site<br>boundary. | LHSMW06_<br>111717<br>11/17/17<br>Site 58 - SW,<br>inside site<br>boundary,<br>beside<br>Building<br>715. | LHSMW07-<br>111417<br>11/14/17<br>Site 58 -<br>SW,<br>outside site<br>boundary. | 1004TW001_<br>111717<br>11/17/17<br>Site 58 - SE,<br>inside site<br>boundary. |
|---------------------------------------|----------------------|---------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Alkalinity, Total                     | mg/L                 | NV      | NA                                                                                                       | NA                                                                            | NA                                                                               | NA                                                                                                        | 750                                                                             | NA                                                                            |
| Phosphorus (365.4)                    | - ∕ە…                | 1 ***   |                                                                                                          |                                                                               |                                                                                  |                                                                                                           | , , , ,                                                                         | . 37 1                                                                        |
| Phosphorus                            | mg/L                 | NV      | NA                                                                                                       | NA                                                                            | NA                                                                               | NA                                                                                                        | 0.0250 J                                                                        | NA                                                                            |
| Total Organic Carbon (415.1)          |                      |         |                                                                                                          | l                                                                             | l                                                                                | l                                                                                                         | ,v                                                                              |                                                                               |
| 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 (826       | 0C)                  |         |                                                                                                          |                                                                               |                                                                                  |                                                                                                           |                                                                                 |                                                                               |
| 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                                                                            |

| Location ID:<br>Sample Date:<br>Location D | Units<br>Pescription | MCL/MSC | 35AWW21-<br>111317<br>11/13/17<br>Site 58 - ESE,<br>outside site<br>boundary,<br>beside<br>Building 725. | 35AWW22_<br>111717<br>11/17/17<br>Site 58 - ENE,<br>outside site<br>boundary. | LHSMW03_<br>111717<br>11/17/17<br>Site 58 -<br>ESE,<br>outside site<br>boundary. | LHSMW06_<br>111717<br>11/17/17<br>Site 58 - SW,<br>inside site<br>boundary,<br>beside<br>Building<br>715. | LHSMW07-<br>111417<br>11/14/17<br>Site 58 -<br>SW,<br>outside site<br>boundary. | 1004TW001_<br>111717<br>11/17/17<br>Site 58 - SE,<br>inside site<br>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                                                                            |

| Location ID:<br>Sample Date:<br>Location D | ·    | MCL/MSC | boundary,<br>beside<br>Building 725. | 35AWW22_<br>111717<br>11/17/17<br>Site 58 - ENE,<br>outside site<br>boundary. | LHSMW03_<br>111717<br>11/17/17<br>Site 58 -<br>ESE,<br>outside site<br>boundary. | LHSMW06_<br>111717<br>11/17/17<br>Site 58 - SW,<br>inside site<br>boundary,<br>beside<br>Building<br>715. | LHSMW07-<br>111417<br>11/14/17<br>Site 58 -<br>SW,<br>outside site<br>boundary. | 1004TW001_<br>111717<br>11/17/17<br>Site 58 - SE,<br>inside site<br>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                                                                            |

| Location ID:<br>Sample Date:    | Units | MCL/MSC                                                                | 35AWW21-<br>111317<br>11/13/17              | 35AWW22_<br>111717<br>11/17/17                 | LHSMW03_<br>111717<br>11/17/17                                          | LHSMW06_<br>111717<br>11/17/17                | LHSMW07-<br>111417<br>11/14/17            | 1004TW001_<br>111717<br>11/17/17 |
|---------------------------------|-------|------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------|----------------------------------|
| Location D                      |       | Site 58 - ESE,<br>outside site<br>boundary,<br>beside<br>Building 725. | Site 58 - ENE,<br>outside site<br>boundary. | Site 58 -<br>ESE,<br>outside site<br>boundary. | Site 58 - SW,<br>inside site<br>boundary,<br>beside<br>Building<br>715. | Site 58 -<br>SW,<br>outside site<br>boundary. | Site 58 - SE,<br>inside site<br>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                               |

| Location ID:<br>Sample Date:    | Units                                                                  | MCL/MSC                                     | 35AWW21-<br>111317<br>11/13/17                 | 35AWW22_<br>111717<br>11/17/17                                          | LHSMW03_<br>111717<br>11/17/17                | LHSMW06_<br>111717<br>11/17/17            | LHSMW07-<br>111417<br>11/14/17 | 1004TW001_<br>111717<br>11/17/17 |
|---------------------------------|------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------|--------------------------------|----------------------------------|
| Location D                      | Site 58 - ESE,<br>outside site<br>boundary,<br>beside<br>Building 725. | Site 58 - ENE,<br>outside site<br>boundary. | Site 58 -<br>ESE,<br>outside site<br>boundary. | Site 58 - SW,<br>inside site<br>boundary,<br>beside<br>Building<br>715. | Site 58 -<br>SW,<br>outside site<br>boundary. | Site 58 - SE,<br>inside site<br>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                               |

| Location ID:<br>Sample Date:  |                                                                        | MCL/MSC                                     | 35AWW21-<br>111317<br>11/13/17                 | 35AWW22_<br>111717<br>11/17/17                                          | LHSMW03_<br>111717<br>11/17/17                | LHSMW06_<br>111717<br>11/17/17            | LHSMW07-<br>111417<br>11/14/17 | 1004TW001_<br>111717<br>11/17/17 |
|-------------------------------|------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------|--------------------------------|----------------------------------|
| Location D                    | Site 58 - ESE,<br>outside site<br>boundary,<br>beside<br>Building 725. | Site 58 - ENE,<br>outside site<br>boundary. | Site 58 -<br>ESE,<br>outside site<br>boundary. | Site 58 - SW,<br>inside site<br>boundary,<br>beside<br>Building<br>715. | Site 58 -<br>SW,<br>outside site<br>boundary. | Site 58 - SE,<br>inside site<br>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

 $\mu g/L$  - 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    | 67WW0                                  | 1-112817 | 67WW02                              | 2-112817 | 67WW0!                                   | 5-112817 | 67WW0                              | 6-112917 | 67WW07                                 | 7-112917 | 67WW08                           | 8-112817 |
|------------------------|------------|--------------|----------------------------------------|----------|-------------------------------------|----------|------------------------------------------|----------|------------------------------------|----------|----------------------------------------|----------|----------------------------------|----------|
|                        |            | 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<br>site boundary. |          | Site 67-SE, outside site boundary. |          | Site 67 - E, outside<br>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  | 67WW0                           | 9-112717   | 67WW09                                | A-112917   | 67WW1                                   | 0-112917 | 67WW1                              | 1-112717 | 67WW12                              | 2-112917 |
|------------------------|------------|--------------|--------------------------------------------|------------|---------------------------------|------------|---------------------------------------|------------|-----------------------------------------|----------|------------------------------------|----------|-------------------------------------|----------|
|                        |            | Sample Date  | 11/28                                      | 11/28/2017 |                                 | 11/27/2017 |                                       | 11/29/2017 |                                         | 9/2017   | 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<br>site boundary. |            | Site 67 - SE, outside<br>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                                        | Ū          | < 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                                        | Ū          | < 1                             | U          | < 1                                   | U          | < 1                                     | U        | < 1                                | U        | < 1                                 | U        |

### LHAAP-67 Semiannual MNA Groundwater Sampling

|                        |                       | Sample ID   | 67WW12-                                        | 112917-FD | 67WW13                               | 3-112817 | 67WW14                                                                | 1-112717 | 67WW1                           | 5-112717 |
|------------------------|-----------------------|-------------|------------------------------------------------|-----------|--------------------------------------|----------|-----------------------------------------------------------------------|----------|---------------------------------|----------|
|                        |                       | 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<br>the site boundary<br>beside Ignatius Avenue. |          | 67-W, outside site<br>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

### **Groundwater Treatment Plant - Processed Groundwater Volumes**

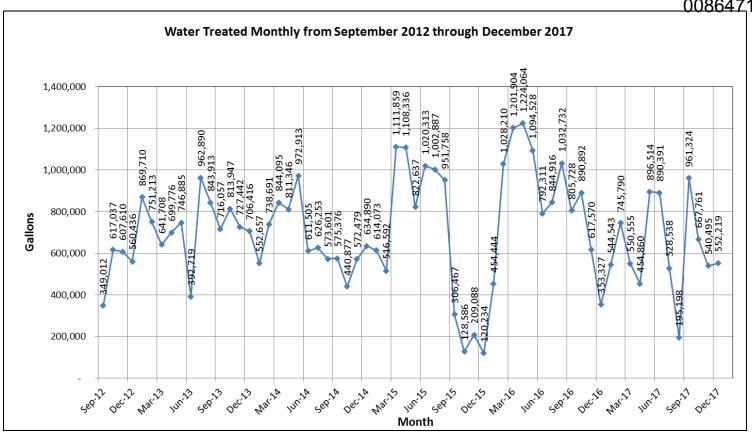
The amount of groundwater treated is determined by measuring the number of gallons of processed water.

#### **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   |
| Oat 09    | Nov-08                                | Dag 09  | Jan-09  | Feb-09    | Mon 00    | A mm ()() | May 00    | I.m. 00   | I1 00     | A 110 00  | Com 00    |
| Oct-08    |                                       | Dec-08  |         |           | 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 |
| 0 ( 10    | NT 10                                 | D 10    | T 11    | F 1 11    | 3.4 11    | A 11      | 3.6 11    | T 11      | T 1 11    | A 11      | 0 11      |
| 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   |
| 0 10      | 37 10                                 | D 10    | Y 10    | F 1 12    | 3.6 4.0   | . 10      | 3.5. 40   | Y 10      | x 1.40    |           | G 12      |
| 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 |         |           |           |           |           |           |           |           |           |
| 007,701   | 540,574                               | 554,419 |         |           |           |           |           |           |           |           |           |

<sup>\*</sup>Indicates Estimate



**Water Discharge Location and Volume (Gallons)** 

| Month  | Harrison Bayou | LHAAP-18/24<br>Sprinklers | INF Pond | INF Pond to<br>Harrison Bayou | Contract Hauled<br>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                           |

# 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 13<sup>th</sup> 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

# LONGHORN ARMY AMMUNITION PLANT 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

## **Table of Contents**

| Introduction                 | . 4 |
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| November 2017 Sampling Event | . 4 |
| Findings and Recommendations | . 4 |

## List of Tables

Table 1: Review of Historical Sample Collection Documentation

## List of 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

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)

### 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           | 17.96 feet BTOC          |
|                             | below top of casing (BTOC             |                          |
| Perchlorate results         | Not detected                          | 990 micrograms per liter |
| 2009 Results previously rep | ported for the wrong depth and need t | o be switched            |
|                             | <u> </u>                              |                          |

### **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

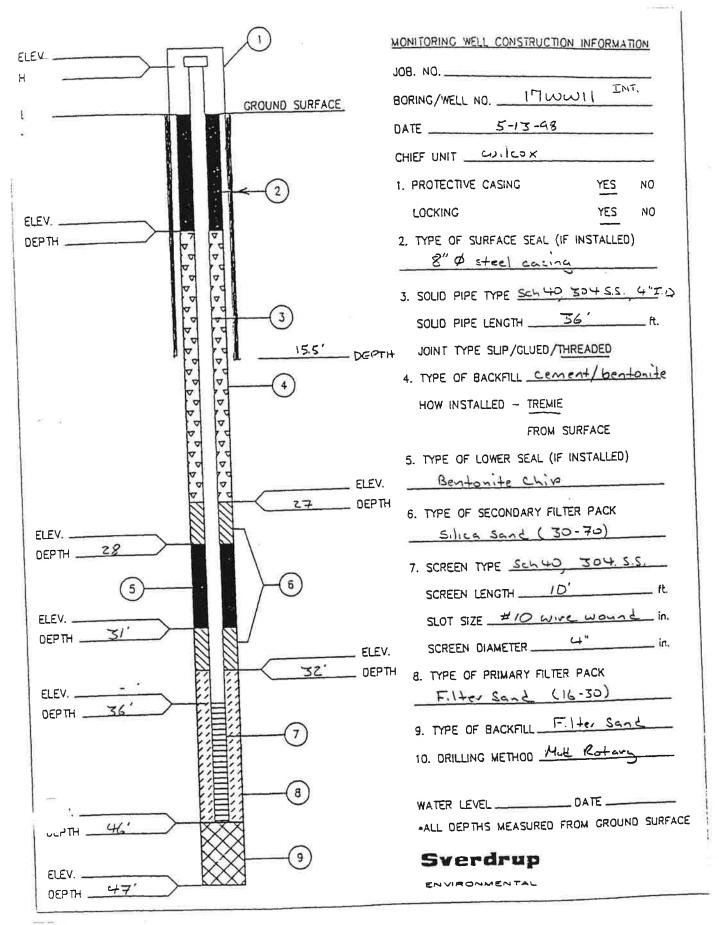
This will result in wells showing in their correct position on maps and results will be associated with the correct well ID/sample zone.





- Well Logs (17WW11 and 17WW12)
- Table 4-2 Monitoring Well Construction Summary
  AR page 025884 Original Survey Coordinates from the 2001 RI

## 



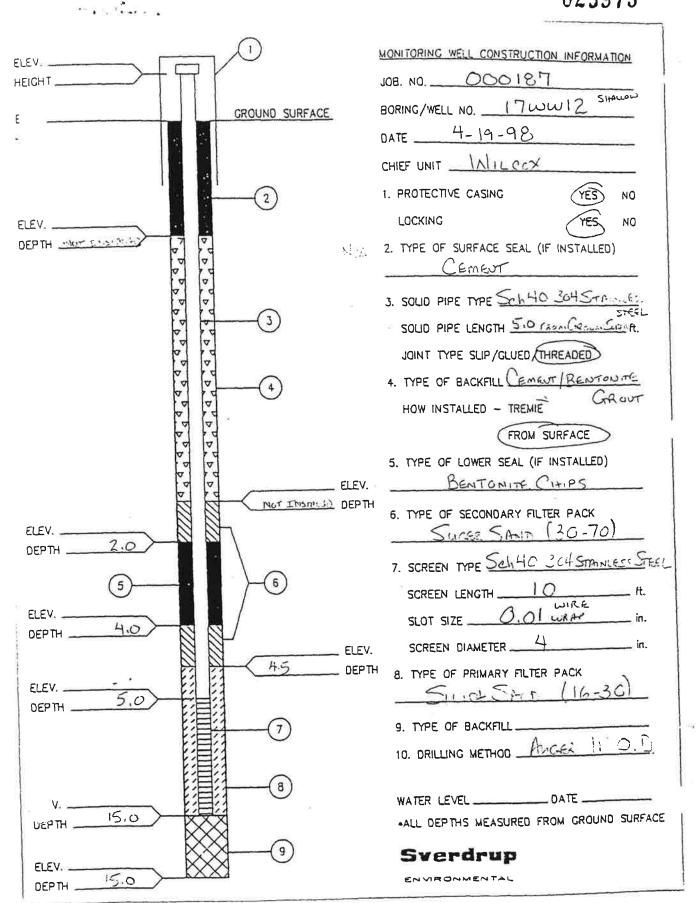


Table 4-2
Monitoring Well Construction Summary

| Commence the second of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the commence of the com | La rache del como del | Total transmission constraints | ,                      | nan action Dai            | and J                          | -                            |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------|------------------------|---------------------------|--------------------------------|------------------------------|---------------------------------------|
| Well<br>Identification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Well Depth 3 (feet)   | Groundwater<br>Zone            | Surface .<br>Elevation | Measuring Point Elevation | Casing<br>Diameter<br>(inches) | Screen<br>Interval<br>(feet) | Hydraulic<br>Conductivity<br>(cm/sec) |
| C-7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 35.00                 | Shallow                        | 195.18                 | 197.69                    | 4.00                           | 20-30                        | 3.03E-04                              |
| (in v130 -,)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 23.00                 | Shallow                        | W174.44                | 177.23                    | 2.00                           | 8-23/66                      | 2.05E-05                              |
| 17WW01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 30.80                 | Shallow                        | 176.62                 | 179.01                    | 4.00                           | 11-31                        | 3.03E-04                              |
| 17WW02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 24.00                 | Shallow, 3                     | 174.27                 | 177.14                    | 4.00                           | ° 12-22 1.13                 | %-3.53E-03                            |
| 17WW03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 32.00                 | Shallow                        | 176.24                 | 179.05                    | 4.00                           | 19-29                        | 2.09E-03                              |
| 17WW04 , 14,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 37.00                 | Shallow-                       | 177,22                 | 180 14 344                | 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                        | 178117                 | 18134                     | ¥4.00 m                        | 521-31                       | 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                         | A 14-20-5                             |
| 17WW13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 32.00                 | Shallow                        | 175.95                 | 179.19                    | 4.00                           | 22-32                        | 3.97E-05                              |
| 7-17WW14-11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 24.00                 | 学#Shallow # //                 | 178:72                 | 181.79                    | 4.00                           | 13-23-19                     | 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.

## 

| Location In | formation of        | Group 2   |        |       | Sample Site |                                       |           |        |       |
|-------------|---------------------|-----------|--------|-------|-------------|---------------------------------------|-----------|--------|-------|
|             |                     | F         |        | BORE  |             | BORE                                  |           |        |       |
| l .         |                     |           |        | DEPTH |             |                                       |           |        | DEPTH |
| SITE        | X                   | Y         | Z      | TOTAL | SITE        | X                                     | Y         | Z      | TOTAL |
| 17SS10      | 3315780.5           | 6952594.3 | 0      | 0     | 17WW08      |                                       | 6952493.5 |        | 34    |
| 178811      |                     | 6952579.2 |        | 0     | 17WW09      |                                       | 6952841.9 |        | 62    |
| 17SS12      |                     | 6952637.9 |        | 0     | 17WW10      |                                       | 6952840.8 |        | 0     |
| 17SS13      | 3315692.1           | 6952568.4 | 0      | 0     | 17WW11      |                                       | 6952972.1 |        | o     |
| 17SS14      | 3316019.9           | 6952590.7 | 0      | 0     | 17WW12      | 1044 104                              | 6952973.2 |        | 49    |
| 178815      |                     | 6952535.0 |        | 0     | 17WW13      |                                       | 6952677.9 |        | 32    |
| 175516      |                     | 6952538.1 | 0      | 0     | 17WW14      |                                       | 6952611.1 | 178.72 | 24    |
| 178817      |                     | 6952541.3 | 0      | 0     | 18SB01      |                                       | 6951303.3 | 0      | 127   |
| 175518      |                     | 6952934.0 |        | 0     | 18SB02      | 11                                    | 6953861.5 | - 1    | 222   |
| 175519      |                     | 6953082.6 |        | 0 1   | 18SB03      |                                       | 6953798.4 |        | 107   |
| 178820      |                     | 6953291.9 |        | 0     | 18SB04      | 2000000000                            | 6955651.3 |        | 85.75 |
| 178821      |                     | 6952765.1 | 0      | 0     | 18SB05      |                                       | 6957023.8 |        | 116.1 |
| 17SS22      |                     | 6952761.5 | 0      | 0     | 18SD01      | 1                                     | 6954289.2 | 0      | 0     |
| 17SS23      | 1 management (1997) | 6952760.0 |        | 0     | 18SD02      | 1                                     | 6954062.9 | 0      | ő     |
| 178824      | FC277990000000      | 6952729.5 |        | 0     | 18SD03      |                                       | 6953720.9 |        | 0     |
| 178825      |                     | 6952727.2 |        | 0     | 18SD04      | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 6953354.7 | 0      | 0     |
| 178826      |                     | 6952796.4 |        | 0     | 18SD05      |                                       | 6953187.5 | 0      | 0     |
| 17SS27      | 3315663.5           | 6952672.0 | 0      | 0     | 18SD06      |                                       | 6953087.6 | 0      | 0     |
| 17SS28      |                     | 6952685.2 |        | 0     | 18SD07      |                                       | 6953013.0 | 0      | 0     |
| 178829      | 100                 | 6952678.4 | 0      | 0     | 18SD08      | 1 1 1 1 1 1 1 1 1                     | 6953193.9 | 0      | 0     |
| 17SS30      |                     | 6948494.5 | 0      | 0     | 18SD09      |                                       | 6952884.0 | 0      | 0     |
| 178831      | 3316017.8           | 6952523.3 | 0      | 0     | 18SD10      | TV41.897 L2002.615.02                 | 6953052.6 | 0      | 0     |
| 17SW01      | 3315759.6           |           | 0      | 0     | 18SD11      |                                       | 6953437.7 | 0      | 0     |
| 17SW02      | 3315608.9           | 6952879.1 | 0      | 0     | 18SD12      | 33.93                                 | 6954073.3 | 0      | 0     |
| 17SW03      |                     | 6952522.9 | 0      | 0     | 18SD13      | 730                                   | 6954453.2 | 0      | 0     |
| 17SW04      | 3316026.0           | 6952841.1 | 0      | 0     | 18SD14      |                                       | 6955478.5 | 0      | 0     |
| 17SW05      | 3315793.0           |           | 0      | 0     | 18SD15      |                                       | 6955518.0 | 0      | 0     |
| 17SW06      | 3315688.1           |           | 0      | 0     | 18SD16      |                                       | 6954608.1 | 0      | 0     |
| 17SW07      | 3315605.1           | 6952803.0 | 0      | 0     | 18SD17      |                                       | 6951976.9 | 0      | 0     |
| 17SW08      | 3315624.1           | 6952951.8 | 0      | 0     | 18SD18      |                                       | 6954673.3 | 0      | 0     |
| 17SW09      | 3315632.8           | 6953103.2 | 0      | 0     | 18SD19      | 1220                                  | 6957042.0 | 0      | 0     |
| 17SW10      | 3316031.3           |           | 0      | 0     | 18SD20      |                                       | 6952869.9 | 0      | 0     |
| 17SW11      | 3315859.1           | 6952815.8 |        | 0     | 18SD21      | 3315470.8                             |           | 0      | 0     |
| 17SW12      | 3315528.5           | 6952700.6 | 0      | 0     | 18SD22      |                                       | 6954568.7 | 0      | 0     |
| 17SW13      |                     | 6953078.8 |        | 0     | 18SD23      | 3316073.4                             | 6954956.4 | 0      | 0     |
| 17SW14      | 3315496.9           | 6952861.3 | 0      | 0     | 18SD24      | 1981                                  | 6955799.3 | 0      | 0     |
| C-7         | 3315826.6           |           |        | 36    | 18SD25      |                                       | 6958190.0 | 0      | 0     |
| 130         | 3315816.3           | 6952831.7 | 174.44 | 23    | 18SD26      |                                       | 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      |                                       | 6949053.5 | 0      | 0     |
| 17WW02      | 3315651.4           | 6952784.8 | 174.27 | 24    | 188801      |                                       | 6954050.7 | 0      | 0     |
| 17WW03      | 3315789.3           | 6952652.1 | 176.24 | 32    | 185502      |                                       | 6954196.2 | 0      | 0     |
| 17WW04      | 3315473.6           | 6952536.5 | 177.22 | 37    | 18SS03      |                                       | 6954176.7 | 0      | 0     |
| 17WW05      | 3315437.1           | 6952644.3 | 178.69 | 152   | 18SS04      |                                       | 6954242.8 | 0      | 0     |
|             | 3315475.2           |           |        | 22    | 18SS05      | 130                                   | 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)





Sheet 1 of 2

| Operable        | Unit/Site II                          | D:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 4P-17           |                                                  |                     | Samplin      | g location II                          | WWF :C                                | ll.                                     |             |
|-----------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------|---------------------|--------------|----------------------------------------|---------------------------------------|-----------------------------------------|-------------|
|                 | lame/#: <u>[[</u>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | AAP             | ·                                                |                     |              |                                        | NI - 0226                             |                                         |             |
| Weather:        | cloudy;                               | 601                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                                                  |                     |              | n Time/Dat                             |                                       |                                         |             |
|                 | · · · · · · · · · · · · · · · · · · · |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | D                                                |                     | -11 -12      |                                        |                                       |                                         |             |
|                 |                                       | Α.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | seal            | Pum                                              | ıp inst             | allation     |                                        |                                       | al a                                    |             |
| <b>3</b> -      | tallation cre                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                                                  | _                   |              |                                        | inning time:                          |                                         | 15:01       |
|                 | eading (we                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 6.0                                              |                     | Installation | on date/con                            | pletion time                          | =: 8/26/03                              | - 15:05     |
|                 | ameter (inc                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | -                                                | _                   |              |                                        | TOC): 8                               |                                         | 18 18 18    |
| Total well      | l Depth (ft. I                        | 3TOC):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 17.96           | <u></u> -                                        | •                   |              |                                        | ft BTOC): _                           |                                         |             |
| Initial (pre    | e-installation                        | n) DTW/time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 12.50           |                                                  | _                   |              |                                        | ///time: <u></u>                      |                                         |             |
| Final (afte     | er pump pri:                          | ning) DTW/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | time: 🔼         | ٨                                                | _                   |              |                                        | mp rate (ml                           |                                         | 28          |
|                 | luct (circle):                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                                                  | <b></b>             |              |                                        | ict: <u>No</u> e                      |                                         |             |
| Volume o        | f water rem                           | oved during                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | priming (m      | L): NA                                           | _                   |              |                                        | eter (3/8" o                          |                                         | 4.          |
|                 | tube lengt                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ~18'            |                                                  | _                   |              |                                        | //N):                                 |                                         | 4           |
| Pneumat         | ic Controll                           | er Tuning:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |                                                  | _                   |              |                                        | · · · · · · · · · · · · · · · · · · · |                                         | ·······     |
| Initial air p   | oressure = l                          | 1 (ft.) X 0.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3 = <u>N</u> N  | psi                                              |                     |              |                                        | 9                                     |                                         |             |
|                 |                                       | Initial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | T -             | <del></del>                                      | <del></del>         | <del></del>  | 1                                      |                                       | <del> </del>                            |             |
| Pressure (ps    | ei)                                   | Hillai                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2               | 3                                                | 4                   | 5            | 6                                      | 7                                     | 8                                       | Final       |
| Refill Setting  |                                       | <del> </del>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -}              |                                                  | <del> </del>        | <del> </del> |                                        |                                       | <del> </del>                            | <del></del> |
| Discharge S     |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <u> </u>        |                                                  | - 1 h               |              | The second spirit in the first street, |                                       | 7                                       | <u> </u>    |
| Flow rate (m    |                                       | <u> </u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |                                                  |                     |              |                                        |                                       |                                         |             |
| k tott rate (ti |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                                                  |                     |              | 1                                      | 1                                     |                                         |             |
|                 |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 |                                                  | Purgin              | ıg           | •                                      |                                       |                                         |             |
|                 | ampling cre                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | <del></del>                                      | _                   | PID/FID re   | eading (wel                            | l head/back                           | ground):                                | 0.0         |
|                 | e/beginning                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 15:15                                            |                     |              | e/completio                            |                                       |                                         |             |
| Initial (pre-   | -purging) D                           | TW (ft. BTÓ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | C): <u>p. l</u> | 4                                                | _                   | Final (pos   | t-purging) [                           | DTW (ft. BT                           | OC): 13                                 | 260         |
| Calculated      | l tubing + p                          | ump volume                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | :               | NA                                               | _                   | No. of tub   | ing + pump                             | volumes pu                            |                                         |             |
|                 | c Controlle                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | •                                                |                     |              |                                        |                                       |                                         |             |
| Initial air p   | ressure = H                           | l (ft.) X 0.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | = <u>NF</u>     | _ psi                                            |                     |              |                                        |                                       | •                                       |             |
| ···             |                                       | Initial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2               | 3                                                | 4                   | 5            | 7                                      | 1 -                                   | T                                       | 1           |
| Pressure (psi   | i)                                    | THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION AND ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS OF THE SECTION ADDRESS | <u> </u>        | <del>                                     </del> | -                   | 3            | 6                                      | <del>  7</del>                        | 8                                       | Final       |
| Refill Setting  | <del></del>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | <del> </del>                                     | 1                   |              |                                        | <del> </del>                          | <u> </u>                                |             |
| Discharge Se    |                                       | <b>p</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |                                                  | MA                  |              |                                        |                                       |                                         | ₽           |
| low rate (mL    |                                       | <u> </u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 | <del> </del>                                     | <del>  ` ` ` </del> |              | ļ <u>.</u>                             |                                       | <u> </u>                                | `           |
| 1010 1010 (1152 | 2761111)                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <del> </del>    | <u></u>                                          | <u></u>             |              | <u> </u>                               |                                       | <u>L </u>                               |             |
|                 |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Water           | r Quality Pa                                     | aramete             | r Measure    | ments                                  |                                       |                                         | •           |
| Time            | DTW                                   | Purge Rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Cumulative      |                                                  |                     | ectrical     | pН                                     | Eh                                    | DO                                      | Turbidity   |
|                 | (ft. BTOC)                            | (mL/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Volume          | (degree C)                                       | ş .                 | ductivity    |                                        | (mv)                                  | (mg/L)                                  | (NTU)       |
|                 |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Purged (L)      | <u> </u>                                         |                     | hos/cm)      |                                        | ,                                     | (,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | (,0)        |
| 5:20            | 13.03                                 | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.5             | 19.36                                            |                     | 32           | 5.94                                   | 112.0                                 | 2.74                                    | 499.7       |
| 15:25           | 13.26                                 | 106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.0             | 18.79                                            |                     | 60           | 5.91                                   | 152.6                                 | 2.12                                    | 146.7       |
| 5:30            | 13.26                                 | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.5             | 65                                               | 5.94                | 187.4        | 2.40                                   | 54.9                                  |                                         |             |
| 15:35           | 13.26                                 | 106                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.0             | 18.59                                            |                     | 68           | 5.95                                   | 200.2                                 |                                         |             |
| 15:40           | 13.26                                 | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2.5             | 170                                              | <del></del>         |              | 2.40                                   | 52.1                                  |                                         |             |
| 1545            |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                 | 18.65                                            |                     |              | 5.95                                   | 217.0                                 | 2.52                                    | 455         |
| 550             | 12.50                                 | 160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 3.6             | 18 · G8                                          | 3.1                 |              | 2.62                                   | 5.016                                 | 2.48                                    | 50.6        |
|                 |                                       | 160<br>160                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3.5             | 18.70                                            | 3.20                |              | 5.96                                   | 703.1                                 | 2.40                                    | 5.3         |
| رور             | 12.50                                 | 760                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 7.0             | 18.58                                            | 3.18                | <u>u</u>     | 5.92                                   | 162.7                                 | 2.27                                    | 40.8        |



Sheet 2 of 2

|                                        |               |              | M-4 ~ .                               | fe m       |                           |             | ······································                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                       |             |
|----------------------------------------|---------------|--------------|---------------------------------------|------------|---------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------|
| <b>T</b> t                             | 571           |              |                                       |            | ter Measurement           | s (continu  | ed)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                       |             |
| Time                                   | DTW           | Purge Rate   |                                       |            | ±3% Electrical            | рН          | Eh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DO                                    | Turbidity   |
|                                        | (ft. BTOC)    | (mL/min)     | Volume                                | (degree C) | Conductivity              | 1.          | (mv)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (mg/L)                                | (NTU)       |
|                                        | <del></del>   |              | Purged (L)                            | ± 10%      | (uMhos/cm)                | 生 0.1       | ± 10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1=10%                                 | ± 10%       |
| 1600                                   | 13.26         | 100          | 4.5                                   | 18.63      | 3.207                     | 5.90        | 1489                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.96                                  | 77.6        |
| 1405                                   | 13.20         | 100          | 5.0                                   | 18.69      | 3005                      | 5.89        | 145                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.94                                  | 73.8        |
| 1410                                   | 13.50         | 100          | 5.5                                   | 18-71      | 3.206                     | 5.89        | 143.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1.91                                  | 73-0        |
| 1011                                   | Sac           | 10 Ce        |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               | -            |                                       | 1          |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        | <u> </u>      |              | 1                                     |            | - AU                      |             | and the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of the same of th |                                       |             |
|                                        | <u> </u>      |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        | <del> </del>  |              |                                       |            | م ا م                     | 1.4         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               | 7 1          |                                       |            | 8/2                       | 6 1         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| _/_                                    | <u> </u>      |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       | ,           |
|                                        | <u> </u>      |              |                                       | i          |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               |              |                                       | Sa         | mpling                    |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| Sampling I                             | beginning til | ne:          | 2//                                   |            | -                         | ompletion t | ime: اله                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 31                                    |             |
|                                        | J             |              |                                       |            |                           |             | ane. 10 .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 01                                    |             |
| Time                                   | DTW           | Purge Rate   |                                       |            | ameter Measure            |             | Γ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                       |             |
| 11110                                  | (ft BTOC)     |              | Cumulative                            | Temp.      | Electrical                | Hq          | Eh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DO                                    | Turbidity   |
|                                        | (10.0100)     | (mL/min)     | Volume                                | (degree C) | Conductivity              |             | (mv)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (mg/L)                                | (NTU)       |
| 16:26                                  | 17.26         | /04          | Purged (L)                            | 18 21      | (uMhos/cm)                | C 10        | 1.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                       |             |
| 10100                                  | <del></del>   | 100          | -1-4-                                 | 18.71      | 3.200                     | 5.89        | 142.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1.90                                  | 72.4        |
|                                        |               |              |                                       |            |                           |             | <u></u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                       |             |
| ······································ |               |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       | <del></del> |
|                                        |               |              |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               | ٠.           | •                                     | Sample     | Information               | •           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| ample ID:                              | h wwil-       | 022669       |                                       |            | Sample coll               | ection date | /time:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                       |             |
| uplicate s                             | ample colle   | cted (Y/N):_ | N                                     |            | Duplicate sa              |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| olit sampl                             | e collected ( | Y/N):        |                                       |            | Split sample              |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | · · · · · · · · · · · · · · · · · · · |             |
| OC No(s)                               |               | 4            | -                                     |            |                           |             | ,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                       |             |
| hatsauna                               | Analysis      | Method       |                                       | A - •      |                           | [           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | · · · · · · · · · · · · · · · · · · · |             |
| Nichel                                 |               | 6020 R       |                                       | tainers    | Requested                 | Analysis    | Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Contai                                | ners        |
| Vocs                                   |               |              |                                       | nl HDPE    |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| 2005                                   | • • •         | 8260         | 3-40 N                                |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| Perchlo                                | NOW C         | 300.1        | 1-250                                 | Mr HDI     | ε                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| <del></del>                            |               | <u> </u>     |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        |               | ·            | · · · · · · · · · · · · · · · · · · · | <u> </u>   |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| mments:                                | D             | . ^          |                                       |            |                           |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
| •                                      | TUN           | Jed ; )      | Hlamo                                 | W Per      | istallic po               | Was .       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | •                                     |             |
|                                        |               |              | 1 1 2                                 |            | - ' ' ' ' ' ' ' ' ' ' ' ' |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |
|                                        | *.            |              | •                                     | 1 *        | 1                         | $T^{*}$     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                       |             |

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - mililiter; L - Liter



Sheet <u>1</u> of <u>2</u>

| Project Name/#: USACE - LIMM Weather:  Pump Installation Pump installation crew: Market Casing diameter (inches): PID/FID reading (well head/background): UA Casing diameter (inches): Pinal (after pump priming) DTW/time: 10.98 Final (after p | Operable               | unit/Site I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | D: Site                                | 17                 |              |             | Samplin                        | g location II | D. 171                                           |                                       |              |  |  |  |
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| Pump Installation   Pump Installation   Pump Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Installation   Inst   | Project N              | lame/#: ∠                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | SACE - C                               | HAAP               |              |             | Sampling location ID: 17 WWA   |               |                                                  |                                       |              |  |  |  |
| Pump Installation Pump installation Pump installation Pump installation crew: A A A A A S S Final Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi) Pressure (psi |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <u> </u>                               |                    |              |             | Collection Time/Date: 02-20-20 |               |                                                  |                                       |              |  |  |  |
| Pump installation crew Managements PID/FID reading (well head/background): Uff Casing diameter (inches): Y' Total well Depth (ft. BTOC): Yellow ft. BTOC): Y | <u> </u>               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    |              |             |                                |               |                                                  |                                       |              |  |  |  |
| Installation date/completion time. 22-20-9/ Screen Interval (ft. BTOC): 3 6 7 to 3/f. 49 Purging/sampling crew                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ,                                      | 1 .                | Pun          | ıp inst     | allation                       |               |                                                  |                                       | _            |  |  |  |
| Installation date/completion time: 27-20-20   Casing diameter (inches): 4   Screen interval (ft. BTOC): 3 \( \frac{8}{2} \) \( \frac{9}{2} \) \( \frac{9}{2} \)   Total well Depth (ft. BTOC):   Total well Depth (ft.    |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    |              | _           | Installatio                    | on date/beg   | inning time                                      | : 02-26-09                            | ·/,          |  |  |  |
| Total well Depth (ft. BTOC): Initial (pre-installation) DTW/time: 10.98 Frie product (circle): LNAPL-FDNAPL Volume of water removed during priming (mL): 11 Discharge tube length (ft.): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discharge tube diameter (3/8° or 1/4°): 1/9′ Inlet reducer used (7/N): 11 Discha | PID/FID                | reading (we                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ll head/bacl                           | kground):_ <u></u> | )A           |             |                                |               |                                                  |                                       |              |  |  |  |
| Total well Depth (ft. BTOC):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Casing d               | liameter (inc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | :hes);                                 | 416                |              | _           |                                |               |                                                  |                                       |              |  |  |  |
| Initial (pre-installation) DTW/time: \( \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \( \lambda \) \(   |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    |              | _           |                                |               |                                                  |                                       | , , , , ,    |  |  |  |
| Final (after pump priming) DTW/final                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Initial (pr            | e-installatio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | n) DTW/time                            | e: <u>10.98</u>    |              |             |                                |               |                                                  |                                       |              |  |  |  |
| Free product (circle): LNAPL+DNAPL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    |              |             |                                |               |                                                  |                                       | <u></u>      |  |  |  |
| Volume of water removed during priming (ml.):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Free prod              | duct (circle):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | LNA                                    | PL/DNAPI           | -            |             |                                | _             | •                                                | ,                                     |              |  |  |  |
| Discharge tube length (ft.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Volume d               | of water rem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | oved during                            | priming (m         | L): 101      |             |                                |               |                                                  |                                       | .7           |  |  |  |
| Pressure   H (ft.) X 0.43 =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        | NA                 |              | <u>-</u>    | Inlet redu                     | cer used ()   | (/N): 📈                                          | 0                                     |              |  |  |  |
| Initial   2   3   4   5   6   7   8   Final                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Pneuma                 | tic Controll                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | er Tuning:                             |                    |              |             |                                |               | /- <u></u> ,                                     | · · · · · · · · · · · · · · · · · · · |              |  |  |  |
| Pressure (psi) Refill Setting Plurging/sampling crew:    Marriage   Purging/sampling crew:   Marriage   Purging/sampling crew:   Marriage   Purging/sampling crew:   Marriage   Purging/sampling crew:   Marriage   Purging/sampling crew:   Marriage   Purging date/beginning time:   02-24-09/   55/8     Purging/sampling crew:   Marriage   Purging date/completion time:   03-24-09/     Purging/sampling crew:   Purging date/completion time:   03-24-09/     Purging date/c | Initial air            | pressure = I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 년 (ft.) X 0.4:                         | 3 =                | psi          |             |                                |               |                                                  |                                       |              |  |  |  |
| Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purg   |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Initial                                | 2                  | 3            | 4           | 5                              | 6             | 7                                                | 8                                     | Final        |  |  |  |
| Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purg   |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <del> </del>                           |                    |              |             |                                |               |                                                  | · ·                                   |              |  |  |  |
| Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purg   |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    |              | <del></del> | 111                            | 211           |                                                  |                                       |              |  |  |  |
| Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purging   Purg   |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    |              | (           | The Ca                         |               |                                                  |                                       |              |  |  |  |
| Purging/sampling crew. M. Mark. 162 Purge date/beginning time: 02-24-09/ 15/8 Initial (pre-purging) DTW (ft. BTOC): 1/1 00 Calculated tubing + pump volume: NA Pneumatic Controller Tuning: Initial air pressure = H (ft.) X 0.43 = 1/1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Flow rate (n           | nL/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                        |                    |              | `           |                                | 1             |                                                  |                                       |              |  |  |  |
| Initial   2   3   4   5   6   7   8   Final                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Calculated<br>Pneumati | d tubing + pe<br>ic Controlle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ump volume<br>e <mark>r Tuning:</mark> | e:                 | NA           | <br>        | Final (pos                     | t-purging) [  | OTW (ft. BT                                      | OC):                                  |              |  |  |  |
| Pressure (psi)   36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        | <del></del>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1                                      |                    | _ ·          | TA          | F                              | T 6           | 1 -                                              | 1 -                                   | T            |  |  |  |
| Conductivity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Pressure (ps           | si)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <del> </del>                           | <del></del>        | <del> </del> |             | - 3                            | 6             | <del>                                     </del> | 8                                     | Final        |  |  |  |
| Discharge Setting   5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Refill Setting         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        |                    | <del> </del> |             |                                | <del> </del>  | -                                                |                                       | <u> </u>     |  |  |  |
| Time   DTW   Purge Rate   (mL/min)   Purge Rate   (mL/min)   Volume   (degree C)   Conductivity   (mv)   (mg/L)   (NTU)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Discharge Se           | etting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        | <b></b>            | 1            |             |                                | <del></del>   | <del>- </del> -                                  |                                       | <del> </del> |  |  |  |
| Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Flow rate (ml          | L/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        |                    |              |             |                                | <del> </del>  | <del> </del>                                     | <del> </del>                          |              |  |  |  |
| Time DTW (ff. BTOC) Purge Rate (mL/min) Volume (degree C) Conductivity (mV) (my) (mg/L) (NTU)  /SQL //./5 Q/O Q O /9.83 /.060 5.93 /7.3 Q.74 324.0  /SQL //.25 Q/O Q O /9.83 /.060 5.93 /7.3 Q.74 324.0  /SQL //.25 Q/O Q O /9.83 /.060 5.93 /7.3 Q.74 324.0  /SQL //.25 Q/O Q O /9.1/ /7.09 /.//7 S.73 -/2.8 6.44 378.2  /SGL //.26 Q/O G.// /9.// /./20 S.73 -/4.6 0.36 Z4Q./  /S42 //.26 Q/O G.// /9.// //./23 S.73 -/7.2 0.24 205.6  /SSQL //.26 Q/O S.21 /8.80 /./27 S.73 -/4.3 0.17 Q.49.4  /SSQL //.26 Q/O S.21 /8.80 /./27 S.73 -/9.3 0.17 Q.49.4  /SSQL //.26 Q/O S.21 /8.80 /./27 S.73 -/9.3 0.17 Q.49.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                        | Water              | Quality Pa   | aramoto     | r Maasura                      | monte         | <u> </u>                                         | <u>.i</u>                             |              |  |  |  |
| (ff. BTOC) (mL/min) Volume (degree C) Conductivity (mv) (mg/L) (NTU)  1522 11.15 210 2.0 19.83 1.060 5.83 17.3 274 324.0  1532 11.25 210 4.1 19.09 1.117 5.73 -12.8 6.44 376.2  1537 11.26 210 5.06 19.11 1.120 5.73 -17.0 0.24 205.6  1542 11.26 210 (1.11 19.13 1.123 5.73 -17.0 0.24 205.6  1547 12.26 210 7.16 18.98 1.124 5.73 -18.3 6.18 272.1  1552 11.26 210 8.21 18.80 1.127 5.73 -19.3 6.17 249.41  1557 11.26 210 9.26 18.81 1.29 5.73 -19.3 6.17 249.41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Time                   | DTW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Purge Rate                             |                    |              | T           |                                | T .           | Eh                                               | DO.                                   | Turbidity    |  |  |  |
| Purged (L)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        | (ft. BTOC)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (mL/min)                               | Volume             | (degree C)   | 1           |                                |               | £                                                | 1                                     | 1 - 1        |  |  |  |
| 1522 11.75 210 2.0 19.83 1.068 5.83 17.3 274 324.0 1522 11.25 210 4.1 19.09 1.117 5.73 -12.8 6.44 378.2 1537 11.26 210 5.06 19.11 1.120 5.73 -14.6 6.36 242.1 1542 11.26 210 6.11 19.13 1.123 5.73 -17.2 0.24 205.6 1547 11.26 216 7.16 18.98 1.124 5.73 -18.3 6.18 272.1 1552 11.26 210 8.21 18.80 1.127 5.73 -19.3 6.17 249.4 1557 11.26 210 9.26 18.81 1.29 5.73 -19.3 0.17 249.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        | State of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state |                                        | Purged (L)         |              | ļ           |                                |               | """                                              | (g)                                   | (1110)       |  |  |  |
| 150 1125 210 4.1 19.09 1.117 5.73 -12.8 644 378.2 1537 1126 210 5.04 19.11 1.120 5.73 -12.8 644 378.2 1542 11.26 210 6.11 19.13 1.123 5.73 -17.2 0.24 205.6 1547 11.24 216 7.14 18.98 1.124 5.73 -18.3 6.18 272.1 1552 11.26 210 8.21 18.80 1.127 5.73 -19.3 6.17 249.4 1557 11.24 216 9.26 18.81 1.124 5.73 -19.7 6.17 206.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1522:                  | 11.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 210                                    | 20                 | 19.83        |             |                                | 5.23          | 17 7                                             | 274                                   | 2007         |  |  |  |
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Sheet 2 of 2

17WW12

|            |              |              |              | ity Paramet                             | ter Measurements              | (continue          | ed)             |        |           |
|------------|--------------|--------------|--------------|-----------------------------------------|-------------------------------|--------------------|-----------------|--------|-----------|
| Time       | WTD          | Purge Rate   | Cumulative   | Temp.                                   | ±3% Electrical                | рH                 | Eh              | DO:    | Turbidity |
|            | (ft. BTOC)   | (mL/min)     | Volume       | (degree C)                              | Conductivity                  |                    | (mv)            | (mg/L) | (NTU)     |
|            |              |              | Purged (L)   | ± 10%                                   | (uMhos/cm)                    | ± 0.1              | ± 10            | 10%    | 10%       |
|            |              |              |              |                                         |                               |                    |                 |        |           |
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|            |              |              |              |                                         | 119                           |                    |                 |        |           |
|            |              |              |              | 7                                       |                               |                    |                 |        |           |
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|            |              |              |              |                                         |                               |                    |                 |        |           |
|            |              |              |              | Sa                                      | ampling                       | <del></del>        |                 |        |           |
| ampling b  | eginning til | me:          | 558<br>Water | Quality Pa                              | Sampling o<br>rameter Measure |                    | ime: <u>/( </u> | ٥٢     |           |
| Time       | DTW          | Purge Rate   | Cumulative   | Temp.                                   | Electrical                    | pH                 | Eh              | DO     | Turbidity |
|            | (ft. BTOC)   | (mL/min)     | Volume       | (degree C)                              | Conductivity                  | <b>.</b>           | (mv)            | (mg/L) | (NTU)     |
|            | , ,          | ` ′          | Purged (L)   | , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | (uMhos/cm)                    |                    | (,              | (g/.2) | (1110)    |
| 1610       | 1120         | 210          |              | 18 88                                   | 1.129                         | 5.74               | 9 دحر-          | 3.15   | 216.6     |
|            | <del></del>  |              |              |                                         |                               |                    |                 |        | 2.50      |
|            |              |              |              |                                         | //W                           | SW/                |                 |        |           |
|            |              |              |              |                                         |                               |                    |                 |        |           |
|            |              |              |              | Sample                                  | Information                   |                    |                 |        |           |
| ample ID:  | 1766         | 112 03       | 2609         |                                         |                               | lection date       | /time: 🐠 ಎ      | (e-09/ |           |
| uplicate s | ample colle  | cted (Y/N):_ | NO           |                                         |                               |                    |                 | 7 .    |           |
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|            | Analysis     | Method       |              | ntainers                                | Requested                     | Analysis           | Method          | Conta  | iners     |
| voc.       |              |              | 3 x 400      | 1 CUOH                                  |                               |                    |                 |        |           |
| Rechla.    |              |              | /x250        | al HOPE                                 |                               |                    |                 | 7      |           |
| Tho//      | ium          |              |              | CHAPE                                   |                               |                    | 1.0             | 7      |           |
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| omments:   |              |              |              |                                         |                               |                    |                 |        |           |
| omments.   | 1            |              |              |                                         |                               |                    |                 |        | `         |
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|            |              |              |              |                                         |                               |                    |                 |        |           |
|            |              |              |              |                                         |                               |                    |                 |        |           |

Abbreviations: BTOC - Below top of casing; DTW - Depth to water; H - head above pump intake; mL - milliliter; L - Liter



Sheet 1 of 2

| 10 · ·                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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X 0.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | = <u>Nh</u>                                       | NA<br>_ psi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ⁴<br> N/                               | Final (post<br>No. of tubir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -purging) E<br>ng + pump                                 | OTW (ft. BT                                                       | OC): <u> 3,14</u><br>urged:         | nv<br>I                                           |
| Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated Calculated  | I tubing + pi<br>c Controlle<br>ressure = H                                                         | ump volume<br>r Tuning:<br>I (ft.) X 0.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | = <u>Nh</u>                                       | NA<br>_ psi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/                                     | Final (post<br>No. of tubir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -purging) E<br>ng + pump                                 | OTW (ft. BT                                                       | OC): <u> 3,14</u><br>urged:         | nv<br>I                                           |
| Calculated Cneumation Cneumation Classification Cla | I tubing + pi<br>c Controlle<br>ressure = H                                                         | ump volume<br>r Tuning:<br>I (ft.) X 0.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | = Nh 2                                            | psi 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | N                                      | Final (post-No. of tubin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -purging) E<br>ng + pump<br>6                            | oTW (ft. BT)<br>volumes pu                                        | OC): 13,14<br>urged:                | nv<br>I                                           |
| Calculated<br>Pneumation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | I tubing + pi<br>c Controlle<br>ressure = H                                                         | ump volume<br>er Tuning:<br>I (ft.) X 0.43<br>Initial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | = NN 2                                            | psi 3 Quality Pa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Maramete                               | Final (post<br>No. of tubin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | purging) Eng + pump  6  nents                            | TW (ft. BT) volumes pu                                            | OC): 13,14<br>urged: 8              | Final                                             |
| Calculated Pneumation itial air properties of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the c | I tubing + pi c Controlle ressure = H i) etting /min)                                               | ump volume<br>er Tuning:<br>I (ft.) X 0.43<br>Initial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | = NN 2 Water                                      | psi 3 Quality Pa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | aramete                                | Final (post No. of tubin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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BT) volumes po                                            | OC): 13,14 urged: 8                 | Final                                             |
| Calculated Pneumation itial air properties of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the c | I tubing + pr c Controlle ressure = H i) etting _/min)                                              | ump volume<br>er Tuning:<br>I (ft.) X 0.43<br>Initial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | = Nh 2 Water Cumulative Volume                    | psi 3 Quality Pa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solut | purging) Eng + pump  6  nents                            | TW (ft. BT) volumes pu                                            | OC): 13,14<br>urged: 8              | Final                                             |
| Calculated Pneumation Initial air properties (psi Iressure (psi Irefill Setting Ilscharge Se Ilscharge Se Ilscharge Mt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | tubing + processure = H  i)  etting  /min)  DTW  (ft. BTOC)                                         | Purge Rate (mL/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | = NN 2 Water Cumulative Volume Purged (L)         | psi 3 Quality Pa Temp. (degree C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ramete<br>Ele<br>Con<br>(uM            | Final (post No. of tubin Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solution Solut | purging) E ng + pump 6 nents pH                          | TW (ft. BT) volumes po                                            | DO (mg/L)                           | Final  Turbidity (NTU)                            |
| Calculated Pneumation Initial air processure (psi Refill Setting Rischarge Se Row rate (mt.) Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | tubing + pi c Controlle ressure = H  i)  etting _min)  DTW (ft. BTOC)                               | ump volume<br>er Tuning:<br>I (ft.) X 0.43<br>Initial                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Water Cumulative Volume Purged (L)                | psi 3 Quality Pa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ramete<br>Con<br>(uM<br>4,00           | Final (post<br>No. of tubin<br>5<br>Fr Measurer<br>ectrical<br>ductivity<br>hos/cm)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | purging) Eng + pump  6  nents pH                         | TW (ft. BT) volumes pu  7  Eh (mv)                                | DO (mg/L)                           | Final  Turbidity (NTU)                            |
| Calculated Pneumatinitial air properties ressure (psi efill Setting ischarge Se low rate (mt.) Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | tubing + processure = H  i)  etting  /min)  DTW  (ft. BTOC)                                         | Purge Rate (mL/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Water Cumulative Volume Purged (L)                | Quality Particular Temp. (degree C)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | aramete<br>Con<br>(uM<br>(4.00)        | Final (post No. of tubin No. of tubin No. of tubin Post No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin N | purging) Eng + pump  6  nents pH  5.0( 5.36              | TW (ft. BT) volumes po  7  Eh (mv)  244.1 272-1                   | DO (mg/L)  2.4( 3,37                | Final  Turbidity (NTU)  432.1 80.1                |
| Calculated Pneumation Itial air processure (psi ressure (psi refill Setting rescharge Se rate (mt.)  Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | tubing + processure = H  c Controller ressure = H  i)  etting  /min)  DTW  (ft. BTOC)  12-94  13-(4 | Purge Rate (mL/min)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Water Cumulative Volume Purged (L) 0.5 1.0        | Quality Particle Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control 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BT) volumes po  7  Eh (mv)  244 1 272-1 202.3             | DO (mg/L)  2.4( 3.33 3.0(           | Final  Turbidity (NTU)  432.1  80.1               |
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                                                                                  | Water Cumulative Volume Purged (L) 0.5 1.0        | Quality Particular (degree C)    17.21   17.06   17.3%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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  (00   (00   (00   (00   (00   (00   (00   (00   (00   (00   (00   (00   (00   ( | Water Cumulative Volume Purged (L)  1.5  1.0  1.5 | Quality Partens (degree C)    1.21   1.39   1.39   1.39   1.39                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Con (uM 4.00                           | Final (post No. of tubin Solution)  Frequency Measurer Measurer ductivity hos/cm)  1  2  3  5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | purging) E  1g + pump  6  nents  pH  5.0( 5.31 5.32 5.33 | TW (ft. BT) volumes pu  7  Eh (mv)  244.1 272-1 202.3 (36.4 131.1 | DO (mg/L)  2.4( 3.33 3.0( (.8) 1.79 | Final  Turbidity (NTU)  433.1 80.1 74.3 77.1 74.3 |
| Calculated Pneumati- nitial air properties of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the c | tubing + pi c Controlle ressure = H  i)  etting  /min)  DTW (ft. BTOC)  12.71  13.14  13.14         | Purge Rate (mL/min)  100 (00 (00 (00))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Water Cumulative Volume Purged (L) 0.5 1.0        | Quality Particular (degree C)    17.21   17.06   17.3%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Con (uM   4.00   3.519   3.16          | Final (post No. of tubin No. of tubin No. of tubin Post No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. of tubin No. 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BT) volumes pu  7  Eh (mv)  244.1 272-1 202.3             | DO (mg/L)  2.4( 3.33  3.0( (.8)     | Final  Turbidity (NTU)  432.1 80.1 74.2           |



Sheet 2 of 2

|               |                |                                                  |                                                   |                                                  |                               |                              |          | 11           | WWIL         |
|---------------|----------------|--------------------------------------------------|---------------------------------------------------|--------------------------------------------------|-------------------------------|------------------------------|----------|--------------|--------------|
|               |                |                                                  | 1                                                 |                                                  | er Measurement                | ė.                           | 1        | ·            | <del>r</del> |
| Time          | DTW            | Purge Rate                                       | ł.                                                | # .                                              | ±3% Electrical                | рН                           | Eh       | DO           | Turbidit     |
|               | (ft. BTOC)     | (mL/min)                                         | Volume                                            | (degree C)                                       | Conductivity                  | L.                           | (mv)     | (mg/L)       | (NTU)        |
|               |                | <u> </u>                                         | Purged (L)                                        | ± 10%                                            | (uMhos/cm)                    | ± 0.1                        | ± 10     | = 10%        | + 100%       |
|               | ļ              |                                                  | <u> </u>                                          |                                                  |                               |                              | <u> </u> |              |              |
|               | <del> </del>   | }                                                | ļ,                                                | ļ                                                |                               |                              | ļ        |              | Ĺ            |
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|               | ļ              | ļ                                                | 1 1 1                                             | <u> </u>                                         |                               |                              |          |              |              |
|               | 1 A            | <del></del>                                      | <del>                                      </del> |                                                  |                               |                              | <u> </u> | ļ            |              |
|               | <del>   </del> | <b> </b>                                         | <del>                                     </del>  |                                                  |                               | <u> </u>                     | <u> </u> |              |              |
|               | 1              | <del>                                     </del> | I V X                                             |                                                  |                               | 11                           |          | ļ            | ·            |
|               | -              | <del>                                     </del> | W V                                               |                                                  | 3/9                           | 0104                         |          |              |              |
| -,            | <del> </del>   | <del>  \</del>                                   | <del></del>                                       |                                                  | 7/                            |                              |          | ļ            |              |
|               |                |                                                  |                                                   |                                                  | 1                             |                              | ļ        |              |              |
|               |                |                                                  | l                                                 |                                                  |                               |                              |          | <u> </u>     | ·            |
|               |                |                                                  |                                                   |                                                  | <del></del>                   |                              |          |              |              |
| <del>//</del> | <del> </del>   |                                                  | `                                                 |                                                  |                               |                              |          |              |              |
|               | <u> </u>       | <u> </u>                                         |                                                   | <u> </u>                                         | ımpling                       |                              |          | <u> </u>     |              |
| ampling l     | peginning tir  | ne: <u>19:30</u>                                 |                                                   | Quality Pa                                       | Sampling o<br>rameter Measure | completion t<br><b>ments</b> | ime: [3  | :35          |              |
| Time          | DTW            | Purge Rate                                       | Cumulative                                        | Temp.                                            | Electrical                    | pН                           | Eh       | DO           | Turbidity    |
|               | (ft. BTOC)     | (mL/min)                                         | Volume                                            | (degree C)                                       | Conductivity                  |                              | (mv)     | (mg/L)       | (NTU)        |
|               |                |                                                  | Purged (L)                                        |                                                  | (uMhos/cm)                    |                              |          |              |              |
| D:31          | 13.14          | 10.0                                             | 5.0                                               | 4.63                                             | 3. 199                        | 5.31                         | 139.1    | 1,78         | 69.4         |
|               |                | <u>.</u>                                         |                                                   |                                                  |                               |                              |          |              |              |
|               |                |                                                  |                                                   |                                                  |                               |                              |          |              |              |
|               |                |                                                  |                                                   |                                                  | F. 6                          |                              |          |              |              |
| ample ID:     | 17WWII-        | 038109                                           |                                                   | Sample                                           | Information<br>Sample coll    | lection date                 | /time:   | A Q:21       | S            |
|               | ample colle    |                                                  |                                                   |                                                  | Duplicate s                   | ample ID:                    | MA       | -            |              |
|               | e collected (  |                                                  | N                                                 | <del></del>                                      | Split sample                  | e ID:                        | NA       |              |              |
|               | Analysis       | Method                                           | Co                                                | ntainers                                         | Requested                     | Anghaig                      | Method   | C            |              |
| Perchlona     |                | 300                                              |                                                   | r HOSE                                           | Ixequested                    | Allalysis                    | Metriou  | Contai       | ners         |
| SEA CATRACE.  | -              | 300                                              | . 030 #                                           | C TUFE                                           |                               |                              |          | <del> </del> |              |
|               |                |                                                  |                                                   |                                                  |                               |                              |          |              |              |
|               | - 1            | 1                                                | ·                                                 |                                                  |                               |                              |          |              |              |
|               |                | ······································           |                                                   |                                                  | 1                             |                              |          |              |              |

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 Longhom

Client Sample ID: 17WW11-022609

Lab Sample ID: 680-45252-8

02/26/2009 16:11 Date Sampled: 03/05/2009 10:15 Date Received:

Client Matrix: Water

| 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   | СВ      |



## **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

Date Sampled:

02/26/2009 15:58

Lab Sample ID: 680-45252-9

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<br>Perchlorate | 14797-73-0 | 0,22   | U |      | 0.11 | 1.0 | 0,22 | ug/L | 132604 | 03/12/2009 21:57   | 2    | СВ      |

23 22 g

## **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

Date Sampled:

03/30/2009 12:20

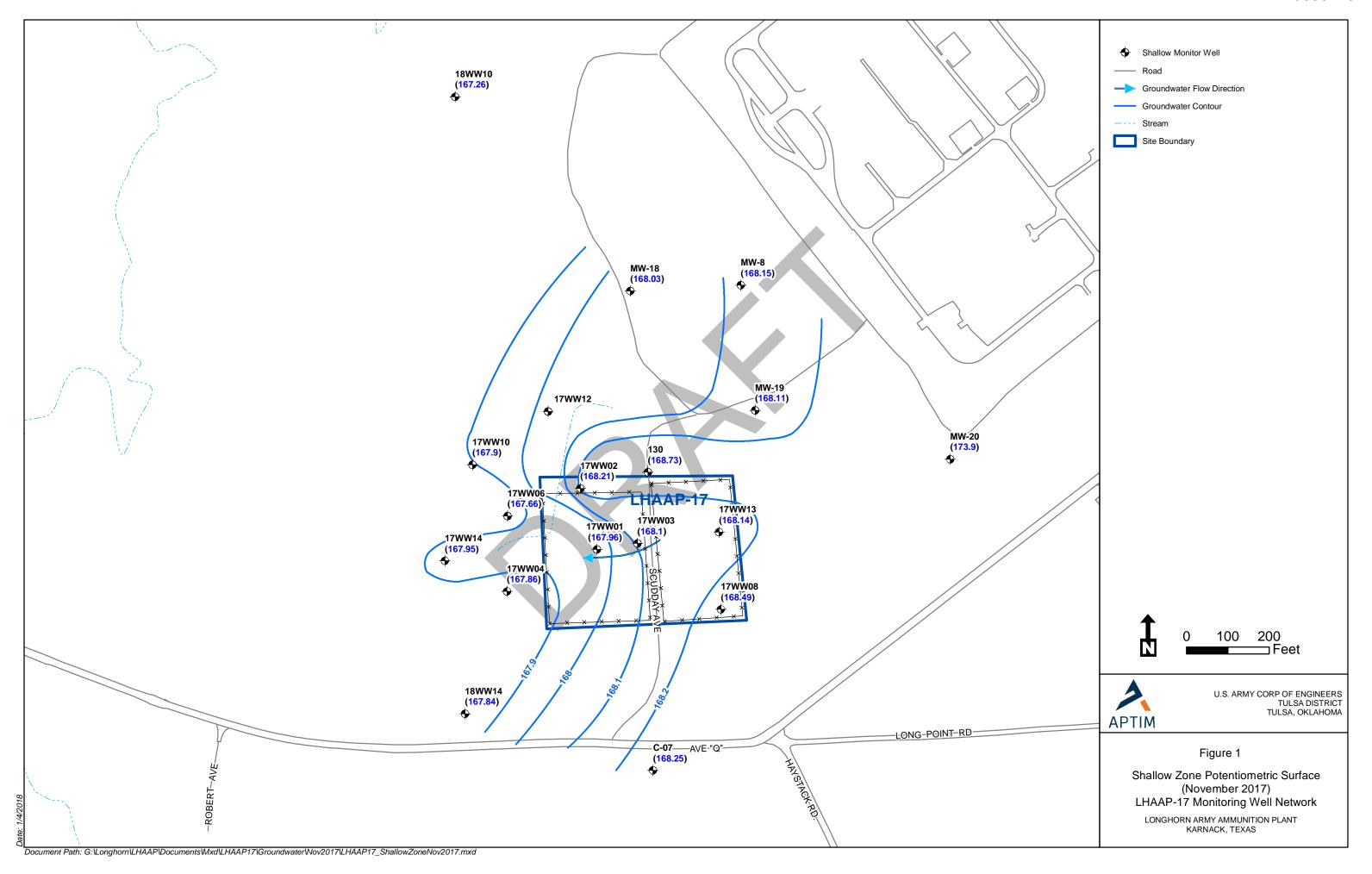
Client Matrix: Water

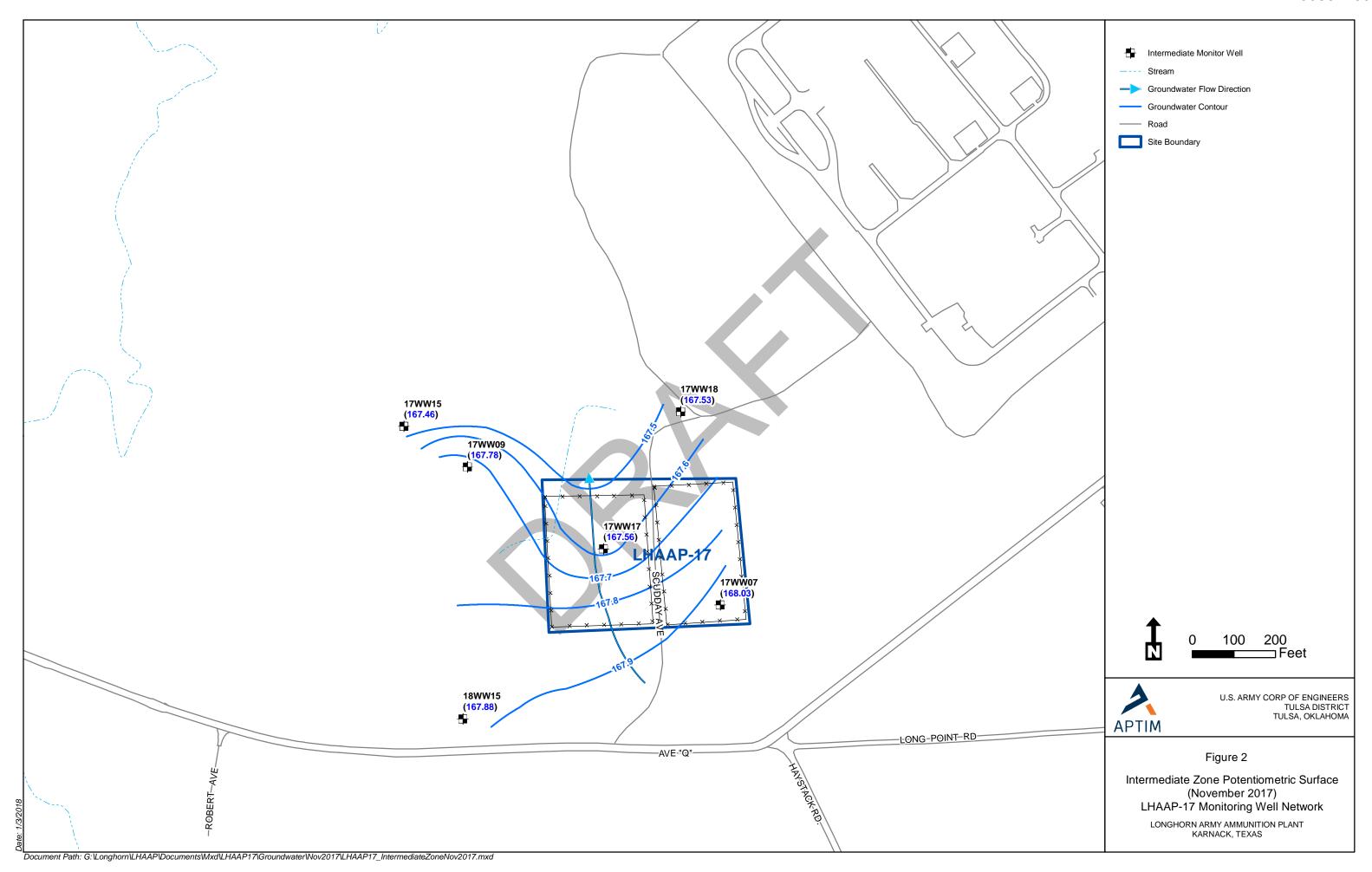
Date Received:

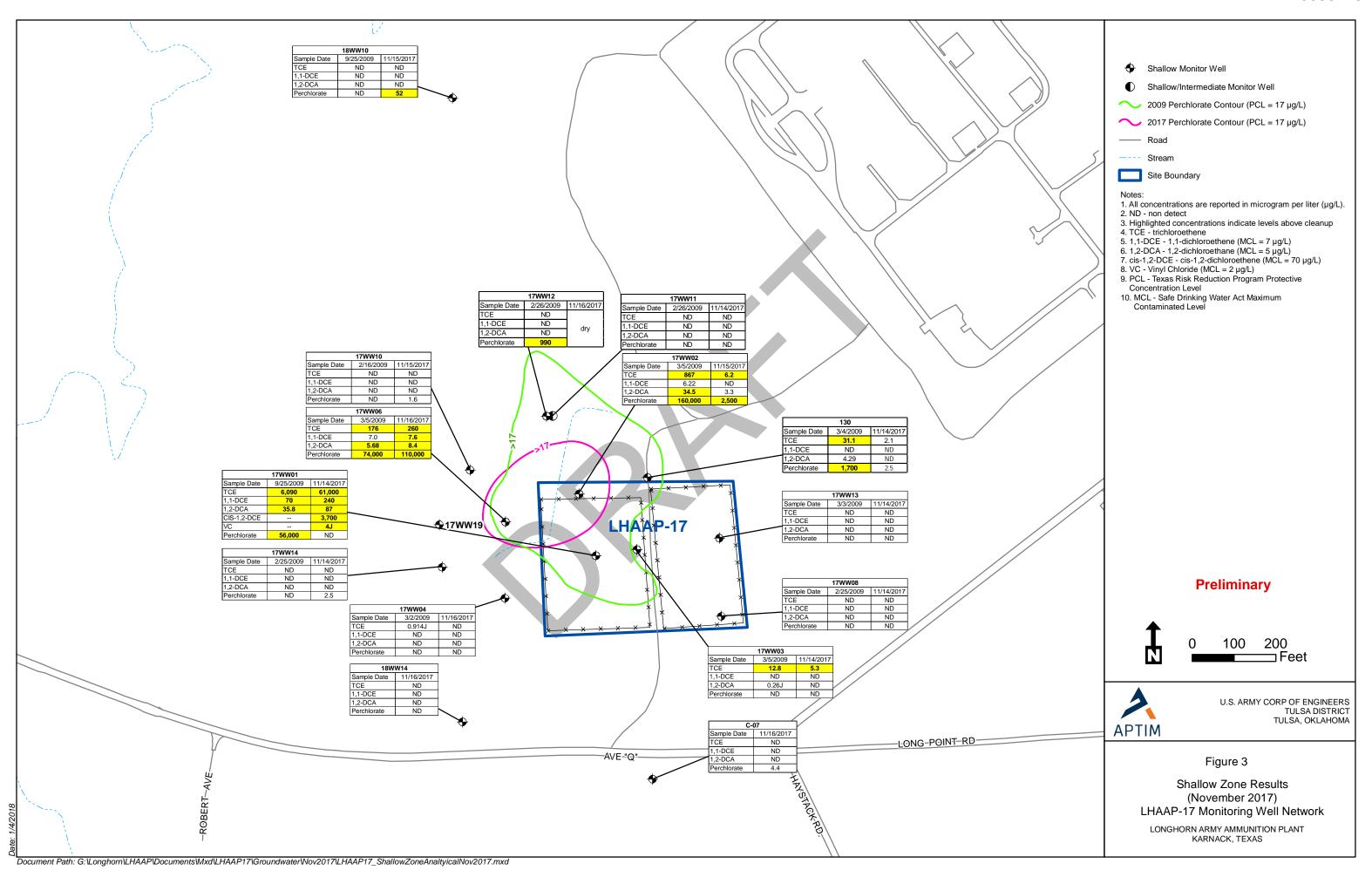
03/31/2009 10:15

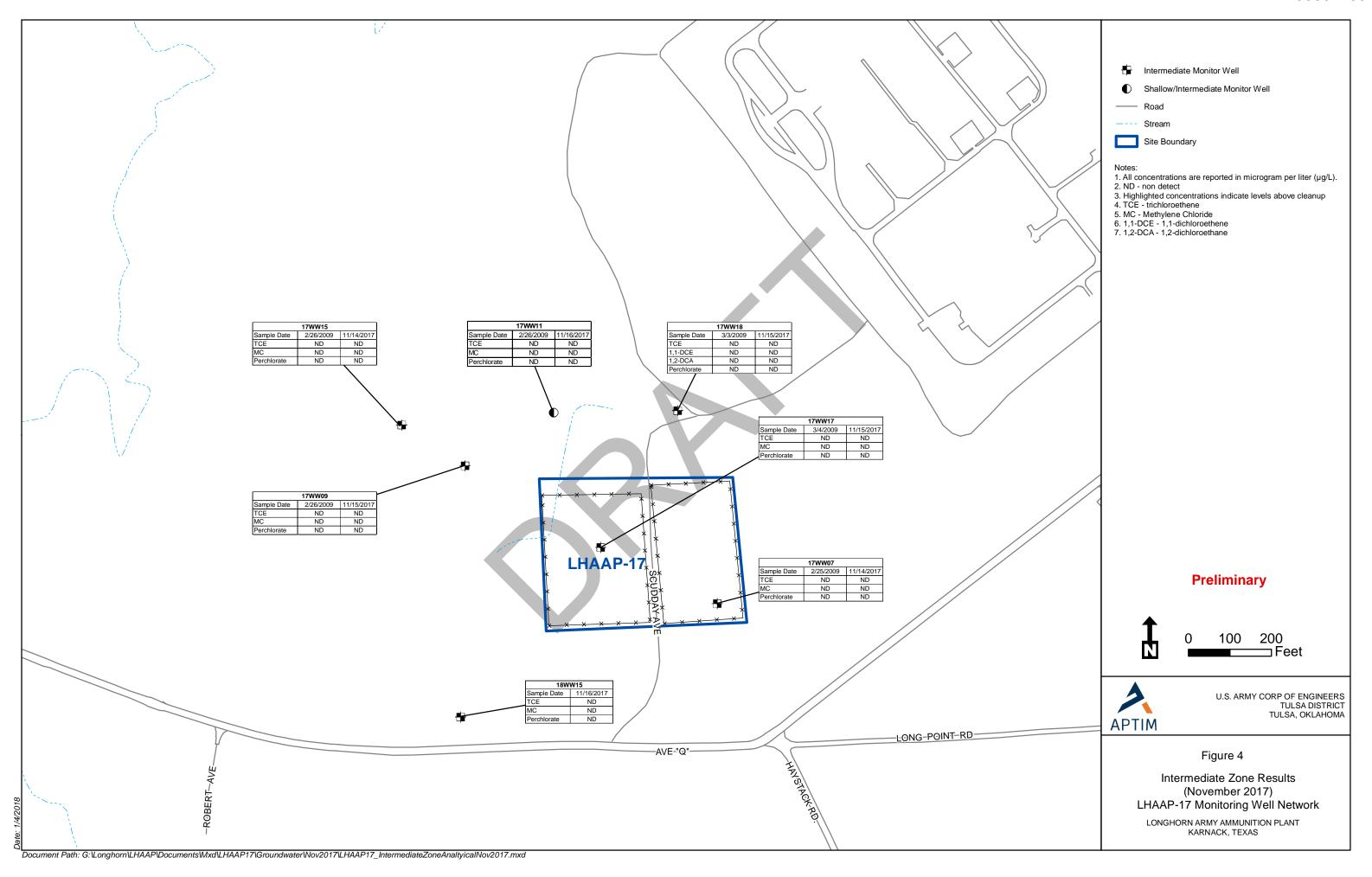
| Lab Sample ID:     | 680-45945-1 |
|--------------------|-------------|
| Client Metalics 14 | I-4         |

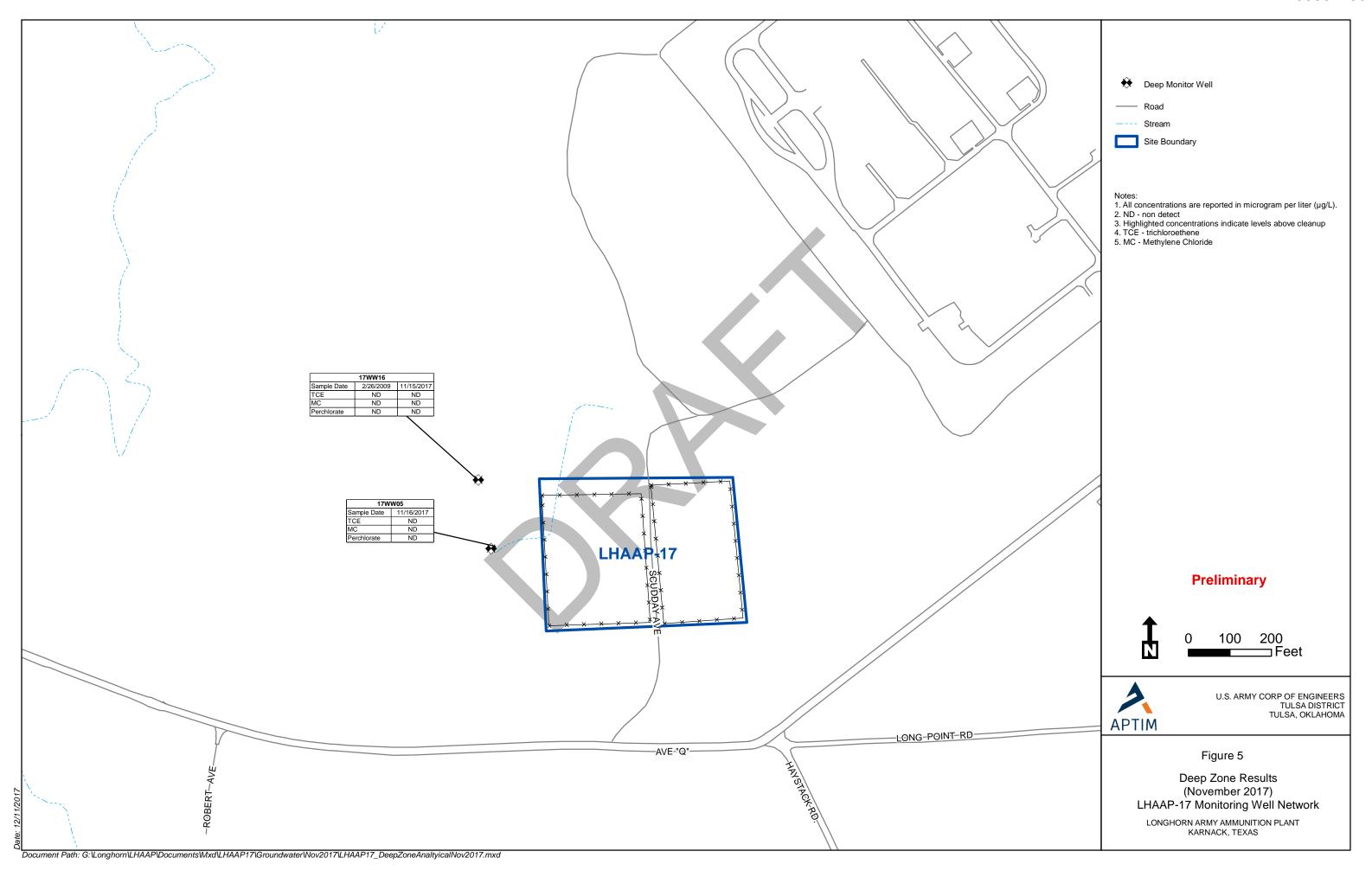
| Test Method                         | CAS Number | Result | Q | Flag | MDL  | MQL | SDL | Unit | Batch  | Analysis Date/Time | D.F. | Analyst |
|-------------------------------------|------------|--------|---|------|------|-----|-----|------|--------|--------------------|------|---------|
| Method: EPA 314.0,Water Perchlorate | 14797-73-0 | 990    |   |      | 0.11 | 1.0 | 1.1 | ug/L | 134126 | 03/31/2009 20:31   | 10   | СВ      |











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 22<sup>nd</sup> 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 4<sup>th</sup> 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)                                      |
| <b>GWTP Effluent</b>  | 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)                                  |
| <b>GWTP Influent</b>  | Monthly Sampling – December 2017                        |
|                       | Metals (6020A)                                          |
|                       | Perchlorate (6850)                                      |
|                       | Hexavalent Chromium (7196A)                             |
| <b>GWTP Quarterly</b> | 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

|            |             | Loca      | tion Code     | 04V           | VW01            | 04W           | /W02          | 04V           | VW03              |               | 04W               | W04           |          |
|------------|-------------|-----------|---------------|---------------|-----------------|---------------|---------------|---------------|-------------------|---------------|-------------------|---------------|----------|
|            |             | Sample ID |               | 04WW01-011018 |                 | 04WW02-010918 |               | 04WW03-010918 |                   | 04WW04-010918 |                   | 04WW04-010918 |          |
|            | Sample Date |           | mple Date     | 1/10/2018     |                 | 1/9/2018      |               | 1/9/2018      |                   | 1/9/2018      |                   | 1/9/          | 2018     |
|            | Location    |           | Shallow Zone, |               | Shallov         | Shallow Zone, |               | Shallow Zone, |                   | w Zone,       | Shallow Zone,     |               |          |
|            |             | De        | Description:  |               | Downgradient of |               | Upgradient of |               | Far Upgradient of |               | Within Plume Area |               | Plume    |
|            |             |           |               | Pl            | ume             | Plι           | ıme           | Pli           | ume               |               |                   | A             | rea      |
|            |             |           |               |               |                 |               |               |               |                   |               |                   |               |          |
| LHAAP Area | Parameter   | Units     | MCL/          | Result        | Val Qual        | Result        | Val Qual      | Result        | Val Qual          | Result        | Val Qual          | Result        | Val Qual |
|            |             |           | PCL           |               |                 |               |               |               |                   |               |                   |               |          |
| LHAAP-04   |             |           |               |               |                 |               |               |               |                   |               |                   |               |          |
| LIIAAF -04 | Perchlorate | μg/L      | 17            | < 4           | U               | < 4           | U             | < 4           | U                 | 31            | J                 | 20            | J        |

# LHAAP-04 Groundwater Sampling January 2018

|            |             | Loca        | tion Code    | 04V           | VW05         | 04W      | /W06              | 04V      | /W07            | 04V      | 80WV           | LHS           | MW01       |
|------------|-------------|-------------|--------------|---------------|--------------|----------|-------------------|----------|-----------------|----------|----------------|---------------|------------|
|            | Sample ID   |             | Sample ID    | 04WW05-010918 |              | 04WW0    | 04WW06-010918     |          | 04WW07-010918   |          | 04WW08-010918  |               | 01-010918  |
|            |             | Sample Date |              | 1/9/2018      |              | 1/9/2018 |                   | 1/9/2018 |                 | 1/9/2018 |                | 1/9/          | 2018       |
|            |             | Location    |              | Shallo        | w Zone,      | Shallov  | Shallow Zone,     |          | Shallow Zone,   |          | nediate        | Shallow Zone, |            |
|            |             | De          | Description: |               | Within Plume |          | Cross-Gradient to |          | Downgradient of |          | Zone, Slightly |               | radient to |
|            |             |             |              | Α             | rea          | Plum     | e Area            | Plum     | e Area          |          | dient of       | Plum          | e Area     |
|            |             |             |              |               |              |          |                   |          |                 | Plum     | ne Area        |               |            |
| LHAAP Area | Parameter   | Units       | MCL/         | Result        | Val Qual     | Result   | Val Qual          | Result   | Val Qual        | Result   | Val Qual       | Result        | Val Qual   |
|            |             | PCL         |              |               |              |          |                   |          |                 |          |                |               |            |
| LHAAP-04   |             |             |              |               |              |          |                   |          |                 |          |                |               |            |
| LIIAAF-V4  | 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 20 | 18              |                     |                       |         |                         |  |
|------------|---------------------------------------------|------------|-----------------|---------------------|-----------------------|---------|-------------------------|--|
|            |                                             |            | Location Code   | 17WW19              |                       |         |                         |  |
|            |                                             |            | Sample ID       | 17WW19              | 9-011518              | 17WW19- | 011518-FD               |  |
|            |                                             |            | Sample Date     | 1/15                | /2018                 | 1/15    | /2018                   |  |
|            |                                             | Location   | on Description: | Shallov             | v Zone,               | Shallov | w Zone,                 |  |
|            |                                             |            |                 | unimpacted,<br>bour | outside site<br>ndary | -       | , outside site<br>ndary |  |
| 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

| LHAAP-18/24 Sampling Eve        |         |                |                                                                            | 18CPTMW01SW                                                                 | 18CPTMW03SW                               | 18CPTMW04_12                                              | 18CPTMW04SW                                                                  | 18CPTMW06_12                                               | 18CPTMW06_12                                                              |
|---------------------------------|---------|----------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------|
| Location ID:                    |         | MCL/MSC/       | AWD3_121817                                                                | _122017                                                                     | _121517                                   | 2017                                                      | _122017                                                                      | 1817                                                       | 1817_a                                                                    |
| Sample Date:                    | Units   | PCL            | 12/18/17                                                                   | 12/20/17                                                                    | 12/15/17                                  | 12/20/17                                                  | 12/20/17                                                                     | 12/18/17                                                   | 12/18/17                                                                  |
|                                 | Locatio | n Description: | Site 18/24- NNW,<br>outside the fence<br>line, along the<br>perimeter road | Site 18/24-NE,<br>inside the fence<br>line, middle region<br>shallow Wilcox | Site 18/24-S,<br>inside the fence<br>line | Site 18/24-NW,<br>inside the fence<br>line, middle region | Site 18/24- NW,<br>inside the fence<br>line, middle region<br>Shallow Wilcox | Site 18/24-SSE,<br>inside the fence<br>line, middle region | Site 18/24-SSE,<br>inside the fence<br>line, middle<br>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 (826 | 50C)    |                |                                                                            |                                                                             |                                           |                                                           |                                                                              |                                                            |                                                                           |
| 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

| LHAAP-18/24 Sampling Eve | 5000.   |                |                                                                            | 18CPTMW01SW                                                                 | 18CPTMW03SW   | 18CPTMW04_12                                              | 18CPTMW04SW                      | 18CPTMW06_12    | 18CPTMW06_12                        |
|--------------------------|---------|----------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------|-----------------------------------------------------------|----------------------------------|-----------------|-------------------------------------|
| Location ID:             |         | MCL/MSC/       | AWD3_121817                                                                | _122017                                                                     | _121517       | 2017                                                      | _122017                          | 1817            | 1817_a                              |
| Sample Date:             | Units   | PCL            | 12/18/17                                                                   | 12/20/17                                                                    | 12/15/17      | 12/20/17                                                  | 12/20/17                         | 12/18/17        | 12/18/17                            |
|                          | Locatio | n Description: | Site 18/24- NNW,<br>outside the fence<br>line, along the<br>perimeter road | Site 18/24-NE,<br>inside the fence<br>line, middle region<br>shallow Wilcox | Site 18/24-S, | Site 18/24-NW,<br>inside the fence<br>line, middle region | Site 18/24- NW, inside the fence | Site 18/24-SSE, | Site 18/24-SSE,<br>inside the fence |
|                          |         | 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

| LHAAP-18/24 Sampling Eve  |         |                | ANADO 404047                                                               | 18CPTMW01SW                                                                 | 18CPTMW03SW                               | 18CPTMW04_12                                              | 18CPTMW04SW                                                                  | 18CPTMW06_12                                               | 18CPTMW06_12                                                              |
|---------------------------|---------|----------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------|
| Location ID:              |         | MCL/MSC/       | AWD3_121817                                                                | _122017                                                                     | _121517                                   | 2017                                                      | _122017                                                                      | 1817                                                       | 1817_a                                                                    |
| Sample Date:              | Units   | PCL            | 12/18/17                                                                   | 12/20/17                                                                    | 12/15/17                                  | 12/20/17                                                  | 12/20/17                                                                     | 12/18/17                                                   | 12/18/17                                                                  |
|                           | Locatio | n Description: | Site 18/24- NNW,<br>outside the fence<br>line, along the<br>perimeter road | Site 18/24-NE,<br>inside the fence<br>line, middle region<br>shallow Wilcox | Site 18/24-S,<br>inside the fence<br>line | Site 18/24-NW,<br>inside the fence<br>line, middle region | Site 18/24- NW,<br>inside the fence<br>line, middle region<br>Shallow Wilcox | Site 18/24-SSE,<br>inside the fence<br>line, middle region | Site 18/24-SSE,<br>inside the fence<br>line, middle<br>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                                                                        |

| Location ID: |         | MCL/MSC/       | AWD3_121817                                                                |                                                                             |                                           | 18CPTMW04_12                                              |                                                                              | _                                                          | _                                                                         |
|--------------|---------|----------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------|
| Location ID: |         |                | _<br>12/18/17                                                              | _122017                                                                     | _121517                                   | 2017                                                      | _122017                                                                      | 1817                                                       | 1817_a                                                                    |
| Sample Date: | Units   | PCL            | 12/10/17                                                                   | 12/20/17                                                                    | 12/15/17                                  | 12/20/17                                                  | 12/20/17                                                                     | 12/18/17                                                   | 12/18/17                                                                  |
|              | Locatio | n Description: | Site 18/24- NNW,<br>outside the fence<br>line, along the<br>perimeter road | Site 18/24-NE,<br>inside the fence<br>line, middle region<br>shallow Wilcox | Site 18/24-S,<br>inside the fence<br>line | Site 18/24-NW,<br>inside the fence<br>line, middle region | Site 18/24- NW,<br>inside the fence<br>line, middle region<br>Shallow Wilcox | Site 18/24-SSE,<br>inside the fence<br>line, middle region | Site 18/24-SSE,<br>inside the fence<br>line, middle<br>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.

 $\mbox{UJ}$  - 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

| LITAAF-10/24 Sampling Lve       |         |                | 18CPTMW07_12                                              | 18CPTMW08SW                                                               | 18CPTMW08DW_                                                        | 18CPTMW10SW-                                                                                  | 18CPTMW10D                                                                                 | 18CPTMW12SW-                                                                                                    | 18CPTMW12D                                                                                                   |
|---------------------------------|---------|----------------|-----------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Location ID:                    |         | MCL/MSC/       | 0617                                                      | _122117                                                                   | 122117                                                              | 121217                                                                                        | W-121217                                                                                   | 121217                                                                                                          | W-121217                                                                                                     |
| Sample Date:                    | Units   | PCL            | 12/6/17                                                   | 12/21/17                                                                  | 12/21/17                                                            | 12/12/17                                                                                      | 12/12/17                                                                                   | 12/12/17                                                                                                        | 12/12/17                                                                                                     |
|                                 | Locatio | n Description: | Site 18/24-NNE,<br>inside the fence<br>line, outer region | Site 18/24-N,<br>inside the fence<br>line, outer region<br>Shallow Wilcox | Site 18/24-N, inside<br>the fence line, outer<br>region Deep Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Shallow Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Deep Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Shallow Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>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 (826 | 0C)     |                |                                                           |                                                                           |                                                                     |                                                                                               |                                                                                            |                                                                                                                 |                                                                                                              |
| 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 Eve |       |                | 18CPTMW07_12                                              | 18CPTMW08SW                                                               | 18CPTMW08DW_                                                        | 18CPTMW10SW                                                                                   | 18CPTMW10D                                                                                 | 18CPTMW12SW-                                                                                                    | 18CPTMW12D                                                                                                   |
|--------------------------|-------|----------------|-----------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Location ID:             |       | MCL/MSC/       | 0617                                                      | _122117                                                                   | 122117                                                              | 121217                                                                                        | W-121217                                                                                   | 121217                                                                                                          | W-121217                                                                                                     |
| Sample Date:             | Units | PCL            | 12/6/17                                                   | 12/21/17                                                                  | 12/21/17                                                            | 12/12/17                                                                                      | 12/12/17                                                                                   | 12/12/17                                                                                                        | 12/12/17                                                                                                     |
|                          |       | n Description: | Site 18/24-NNE,<br>inside the fence<br>line, outer region | Site 18/24-N,<br>inside the fence<br>line, outer region<br>Shallow Wilcox | Site 18/24-N, inside<br>the fence line, outer<br>region Deep Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Shallow Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Deep Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Shallow Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>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                                                                                                      |

| LITAAF-10/24 Sampling Lve |       |                | 18CPTMW07_12                                              | 18CPTMW08SW                                                               | 18CPTMW08DW_                                                        | 18CPTMW10SW-                                                                                  | 18CPTMW10D                                                                                 | 18CPTMW12SW-                                                                                                    | 18CPTMW12D                                                                                                   |
|---------------------------|-------|----------------|-----------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Location ID:              |       | MCL/MSC/       | 0617                                                      | _122117                                                                   | 122117                                                              | 121217                                                                                        | W-121217                                                                                   | 121217                                                                                                          | W-121217                                                                                                     |
| Sample Date:              | Units | PCL            | 12/6/17                                                   | 12/21/17                                                                  | 12/21/17                                                            | 12/12/17                                                                                      | 12/12/17                                                                                   | 12/12/17                                                                                                        | 12/12/17                                                                                                     |
|                           |       | n Description: | Site 18/24-NNE,<br>inside the fence<br>line, outer region | Site 18/24-N,<br>inside the fence<br>line, outer region<br>Shallow Wilcox | Site 18/24-N, inside<br>the fence line, outer<br>region Deep Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Shallow Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Deep Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Shallow Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>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                                                                                                         |

|              |         |                | 18CPTMW07_12                                              | 18CPTMW08SW                                                               | 18CPTMW08DW_                                                        | 18CPTMW10SW-                                                                                  | 18CPTMW10D                                                                                 | 18CPTMW12SW-                                                                                                    | 18CPTMW12D                                                                                                   |
|--------------|---------|----------------|-----------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Location ID: |         | MCL/MSC/       | 0617                                                      | _122117                                                                   | 122117                                                              | 121217                                                                                        | W-121217                                                                                   | 121217                                                                                                          | W-121217                                                                                                     |
| Sample Date: | Units   | PCL            | 12/6/17                                                   | 12/21/17                                                                  | 12/21/17                                                            | 12/12/17                                                                                      | 12/12/17                                                                                   | 12/12/17                                                                                                        | 12/12/17                                                                                                     |
|              | Locatio | n Description: | Site 18/24-NNE,<br>inside the fence<br>line, outer region | Site 18/24-N,<br>inside the fence<br>line, outer region<br>Shallow Wilcox | Site 18/24-N, inside<br>the fence line, outer<br>region Deep Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Shallow Wilcox | Site 18/24-WSW,<br>outside the fence<br>line, along the<br>outer loop road.<br>Deep Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Shallow Wilcox | Site 18/24-SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>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

| LHAAP-18/24 Sampling Eve        |         |                | 18CPTMW14_12                                                                                  | 18CPTMW14_12                                                                                                | 18CPTMW15_12                                 | 18CPTMW16_12                                                          | 18CPTMW18_12                                              | 18CPTMW19_12                                 | 18CPTMW19_12                                                |
|---------------------------------|---------|----------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------|
| Location ID:                    |         | MCL/MSC/       | 0717                                                                                          | 0717_a                                                                                                      | 0617                                         | 1817                                                                  | 0517                                                      | 0617                                         | 0617_a                                                      |
| Sample Date:                    | Units   | PCL            | 12/7/17                                                                                       | 12/7/17                                                                                                     | 12/6/17                                      | 12/18/17                                                              | 12/5/17                                                   | 12/6/17                                      | 12/6/17                                                     |
|                                 | Locatio | n Description: | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line. | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Duplicate. | Site 18/24- NW,<br>outside the fence<br>line | Site 18/24 - NW,<br>outside the fence<br>line, near Harrison<br>Bayou | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-N<br>outside of the<br>fence line | Site 18/24-N<br>outside of the<br>fence line.<br>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 (826 | 0C)     |                |                                                                                               |                                                                                                             |                                              |                                                                       |                                                           |                                              |                                                             |
| 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 Eve |       |                | 18CPTMW14_12                                                                                  | 18CPTMW14_12                                                                                                | 18CPTMW15_12                                 | 18CPTMW16_12                                                          | 18CPTMW18_12                                              | 18CPTMW19_12                                 | 18CPTMW19_12                                                |
|--------------------------|-------|----------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------|
| Location ID:             |       | MCL/MSC/       | 0717                                                                                          | 0717_a                                                                                                      | 0617                                         | 1817                                                                  | 0517                                                      | 0617                                         | 0617_a                                                      |
| Sample Date:             | Units | PCL            | 12/7/17                                                                                       | 12/7/17                                                                                                     | 12/6/17                                      | 12/18/17                                                              | 12/5/17                                                   | 12/6/17                                      | 12/6/17                                                     |
|                          |       | n Description: | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line. | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Duplicate. | Site 18/24- NW,<br>outside the fence<br>line | Site 18/24 - NW,<br>outside the fence<br>line, near Harrison<br>Bayou | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-N<br>outside of the<br>fence line | Site 18/24-N<br>outside of the<br>fence line.<br>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 Eve  |       |                | 18CPTMW14_12                                                                                  | 18CPTMW14_12                                                                                                | 18CPTMW15_12                                 | 18CPTMW16_12                                                          | 18CPTMW18_12                                              | 18CPTMW19_12                                 | 18CPTMW19_12                                                |
|---------------------------|-------|----------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------|
| Location ID:              |       | MCL/MSC/       | 0717                                                                                          | 0717_a                                                                                                      | 0617                                         | 1817                                                                  | 0517                                                      | 0617                                         | 0617_a                                                      |
| Sample Date:              | Units | PCL            | 12/7/17                                                                                       | 12/7/17                                                                                                     | 12/6/17                                      | 12/18/17                                                              | 12/5/17                                                   | 12/6/17                                      | 12/6/17                                                     |
|                           |       | n Description: | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line. | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Duplicate. | Site 18/24- NW,<br>outside the fence<br>line | Site 18/24 - NW,<br>outside the fence<br>line, near Harrison<br>Bayou | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-N<br>outside of the<br>fence line | Site 18/24-N<br>outside of the<br>fence line.<br>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                                                          |

|              |         |                | 18CPTMW14_12                                                                                  | 18CPTMW14_12                                                                                                | 18CPTMW15_12                                 | 18CPTMW16_12                                                          | 18CPTMW18_12                                              | 18CPTMW19_12                                 | 18CPTMW19_12                                                |
|--------------|---------|----------------|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------|-------------------------------------------------------------|
| Location ID: |         | MCL/MSC/       | 0717                                                                                          | 0717_a                                                                                                      | 0617                                         | 1817                                                                  | 0517                                                      | 0617                                         | 0617_a                                                      |
| Sample Date: | Units   | PCL            | 12/7/17                                                                                       | 12/7/17                                                                                                     | 12/6/17                                      | 12/18/17                                                              | 12/5/17                                                   | 12/6/17                                      | 12/6/17                                                     |
|              | Locatio | n Description: | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line. | Site 18/24-SE,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line.<br>Duplicate. | Site 18/24- NW,<br>outside the fence<br>line | Site 18/24 - NW,<br>outside the fence<br>line, near Harrison<br>Bayou | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-N<br>outside of the<br>fence line | Site 18/24-N<br>outside of the<br>fence line.<br>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.
- $\mbox{UJ}$  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 Eve        |         |                | 18CPTMW22R_                                                              | 18CPTMW22SW                                                              | 18CPTMW23_12                                                                                  | 18CPTMW24_12                                                                               | 18WW02_12081                                            | 18WW06_12081                                     | 18WW08_12061                                 |
|---------------------------------|---------|----------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------|----------------------------------------------|
| Location ID:                    |         | MCL/MSC/       | 121417                                                                   | _121417                                                                  | 0717                                                                                          | 0717                                                                                       | 7                                                       | 7                                                | 7                                            |
| Sample Date:                    | Units   | PCL            | 12/14/17                                                                 | 12/14/17                                                                 | 12/7/17                                                                                       | 12/7/17                                                                                    | 12/8/17                                                 | 12/8/17                                          | 12/6/17                                      |
|                                 | Locatio | n Description: | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 -WNW,<br>outside the fence<br>line, near the road<br>surrounding the<br>fence line | Site 18/24 - E,<br>outside the fence<br>line, on the road<br>surrounding the<br>fence line | Site 18/24-NW,<br>outside the fence<br>line Wilcox Well | Site 18/24- W. just<br>outside the fence<br>line | Site 18/24-NNW,<br>outside the fence<br>line |
|                                 |         | Aquifer Zone:  | Shallow                                                                  | Wilcox                                                                   | Shallow                                                                                       | Shallow                                                                                    | Wilcox                                                  | Wilcox                                           | Wilcox                                       |
| erchlorate (6850)               |         |                |                                                                          |                                                                          |                                                                                               |                                                                                            |                                                         | _                                                |                                              |
| Perchlorate                     | μg/L    | 17*            | 8.3                                                                      | 6900                                                                     | 140                                                                                           | 65                                                                                         | < 4.0 U                                                 | < 4.0 U                                          | 2,400                                        |
| Volatile Organic Compounds (826 | OC)     |                |                                                                          |                                                                          |                                                                                               |                                                                                            |                                                         |                                                  |                                              |
| 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 Eve |       |                | 18CPTMW22R_                                                              | 18CPTMW22SW                                                              | 18CPTMW23_12                                                                                  | 18CPTMW24_12                                                                               | 18WW02_12081                          | 18WW06_12081 | 18WW08_12061              |
|--------------------------|-------|----------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------|--------------|---------------------------|
| Location ID:             |       | MCL/MSC/       | 121417                                                                   | _121417                                                                  | 0717                                                                                          | 0717                                                                                       | 7                                     | 7            | 7                         |
| Sample Date:             | Units | PCL            | 12/14/17                                                                 | 12/14/17                                                                 | 12/7/17                                                                                       | 12/7/17                                                                                    | 12/8/17                               | 12/8/17      | 12/6/17                   |
|                          |       | n Description: | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 -WNW,<br>outside the fence<br>line, near the road<br>surrounding the<br>fence line | Site 18/24 - E,<br>outside the fence<br>line, on the road<br>surrounding the<br>fence line | outside the fence<br>line Wilcox Well | line         | outside the fence<br>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 Eve  |         |                | 18CPTMW22R_                                                              | 18CPTMW22SW                                                              | 18CPTMW23_12                                                                                  | 18CPTMW24_12                                                                               | 18WW02_12081                                            | 18WW06_12081                                     | 18WW08_12061                                 |
|---------------------------|---------|----------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------|----------------------------------------------|
| Location ID:              |         | MCL/MSC/       | 121417                                                                   | _121417                                                                  | 0717                                                                                          | 0717                                                                                       | 7                                                       | 7                                                | 7                                            |
| Sample Date:              | Units   | PCL            | 12/14/17                                                                 | 12/14/17                                                                 | 12/7/17                                                                                       | 12/7/17                                                                                    | 12/8/17                                                 | 12/8/17                                          | 12/6/17                                      |
|                           | Locatio | n Description: | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 -WNW,<br>outside the fence<br>line, near the road<br>surrounding the<br>fence line | Site 18/24 - E,<br>outside the fence<br>line, on the road<br>surrounding the<br>fence line | Site 18/24-NW,<br>outside the fence<br>line Wilcox Well | Site 18/24- W. just<br>outside the fence<br>line | Site 18/24-NNW,<br>outside the fence<br>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                                           |

|                  |              |                | 18CPTMW22R_                                                              | 18CPTMW22SW                                                              | 18CPTMW23_12                                                                                  | 18CPTMW24_12      | 18WW02_12081 | 18WW06_12081                                     | 18WW08_12061 |
|------------------|--------------|----------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------------------|--------------|--------------------------------------------------|--------------|
| Location ID:     |              | MCL/MSC/       | 121417                                                                   | _121417                                                                  | 0717                                                                                          | 0717              | 7            | 7                                                | 7            |
| Sample Date:     | Units        | PCL            | 12/14/17                                                                 | 12/14/17                                                                 | 12/7/17                                                                                       | 12/7/17           | 12/8/17      | 12/8/17                                          | 12/6/17      |
|                  | Locatio      | n Description: | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-S.<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 -WNW,<br>outside the fence<br>line, near the road<br>surrounding the<br>fence line | outside the fence |              | Site 18/24- W. just<br>outside the fence<br>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           |
|                  | · .          |                | 0.00530                                                                  | 0.00188 UB                                                               | NA                                                                                            | < 0.00500 U       | 0.00200 J    | NA                                               | NA           |
| Vanadium         | mg/L         | 0.72           | 0.00528                                                                  | 0.00188 0B                                                               | INA                                                                                           | ₹ 0.00500 0       | 0.002003     | INA                                              | INA          |
| Vanadium<br>Zinc | mg/L<br>mg/L | 31             | 0.00528                                                                  | 0.00188 0B<br>0.00427                                                    | NA<br>NA                                                                                      | 0.0126            | 0.002603     | NA<br>NA                                         | NA<br>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.
- $\mbox{UJ}$  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 Eve        |       |                | 18WW17_12051 | 18WW22_12051                                              | 18WW24_12071                                               | 18WW25_12071                                              | 602 420547                                                                  | 600 430547                                                                                  | 600 120517                                                                             |
|---------------------------------|-------|----------------|--------------|-----------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Location ID:                    |       | MCL/MSC/       | 7            | 7                                                         | 7                                                          | 7                                                         | C03_120517                                                                  | C08_120517                                                                                  | C09_120517                                                                             |
| Sample Date:                    | Units | PCL            | 12/5/17      | 12/5/17                                                   | 12/7/17                                                    | 12/7/17                                                   | 12/5/17                                                                     | 12/5/17                                                                                     | 12/5/17                                                                                |
|                                 |       | n Description: |              | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-WNW,<br>outside the fence<br>line, in the woods | Site 18/24-NW,<br>outside the fence<br>line, in the woods | Site 18/24 - NE,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - E,<br>outside the fence<br>line, along the<br>road heading east-<br>northeast. | Site 18/24 - E,<br>outside the fence<br>line to the south,<br>along Long Point<br>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 (826 | 0C)   |                |              |                                                           |                                                            |                                                           |                                                                             |                                                                                             |                                                                                        |
| 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 Eve |       |                | 18WW17_12051                                               | 18WW22_12051 | 18WW24_12071                                               | 18WW25_12071                                              | 602 420547                                                                  | 000 400547                                                                                  | 000 400547                                                                             |
|--------------------------|-------|----------------|------------------------------------------------------------|--------------|------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Location ID:             |       | MCL/MSC/       | 7                                                          | 7            | 7                                                          | 7                                                         | C03_120517                                                                  | C08_120517                                                                                  | C09_120517                                                                             |
| Sample Date:             | Units | PCL            | 12/5/17                                                    | 12/5/17      | 12/7/17                                                    | 12/7/17                                                   | 12/5/17                                                                     | 12/5/17                                                                                     | 12/5/17                                                                                |
|                          |       | n Description: | Site 18/24-NE,<br>outside the fence<br>line. Outer region. |              | Site 18/24-WNW,<br>outside the fence<br>line, in the woods | Site 18/24-NW,<br>outside the fence<br>line, in the woods | Site 18/24 - NE,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - E,<br>outside the fence<br>line, along the<br>road heading east-<br>northeast. | Site 18/24 - E,<br>outside the fence<br>line to the south,<br>along Long Point<br>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 Eve  |       |                | 18WW17_12051                                               | 18WW22_12051                                              | 18WW24_12071                                               | 18WW25_12071                                              | 000 400547                                                                  | 600 400547                                                                                  | 600 400547                                                                             |
|---------------------------|-------|----------------|------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Location ID:              |       | MCL/MSC/       | 7                                                          | 7                                                         | 7                                                          | 7                                                         | C03_120517                                                                  | C08_120517                                                                                  | C09_120517                                                                             |
| Sample Date:              | Units | PCL            | 12/5/17                                                    | 12/5/17                                                   | 12/7/17                                                    | 12/7/17                                                   | 12/5/17                                                                     | 12/5/17                                                                                     | 12/5/17                                                                                |
|                           |       | n Description: | Site 18/24-NE,<br>outside the fence<br>line. Outer region. | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-WNW,<br>outside the fence<br>line, in the woods | Site 18/24-NW,<br>outside the fence<br>line, in the woods | Site 18/24 - NE,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - E,<br>outside the fence<br>line, along the<br>road heading east-<br>northeast. | Site 18/24 - E,<br>outside the fence<br>line to the south,<br>along Long Point<br>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                                                                                   |

|              |         |                | 18WW17_12051                                               | 18WW22_12051                                              | 18WW24_12071                                               | 18WW25_12071      | 202 420547                                                                  | 600 400547                                                                                  | 000 400547                                                                             |
|--------------|---------|----------------|------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Location ID: |         | MCL/MSC/       | 7                                                          | 7                                                         | 7                                                          | 7                 | C03_120517                                                                  | C08_120517                                                                                  | C09_120517                                                                             |
| Sample Date: | Units   | PCL            | 12/5/17                                                    | 12/5/17                                                   | 12/7/17                                                    | 12/7/17           | 12/5/17                                                                     | 12/5/17                                                                                     | 12/5/17                                                                                |
|              | Locatio | n Description: | Site 18/24-NE,<br>outside the fence<br>line. Outer region. | Site 18/24-NE,<br>outside the fence<br>line, in the woods | Site 18/24-WNW,<br>outside the fence<br>line, in the woods | outside the fence | Site 18/24 - NE,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - E,<br>outside the fence<br>line, along the<br>road heading east-<br>northeast. | Site 18/24 - E,<br>outside the fence<br>line to the south,<br>along Long Point<br>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

| Location ID:<br>Sample Date:    | Units   | MCL/MSC/<br>PCL | MW2_122017<br>12/20/17                       | MW3_122117<br>12/21/17                      | MW5_122017<br>12/20/17                        | MW7_121317<br>12/13/17                                                                         | MW8_121217<br>12/12/17                        | MW9_121317<br>12/13/17                                                                          | MW10-121117<br>12/11/17                                                   |
|---------------------------------|---------|-----------------|----------------------------------------------|---------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                                 | Locatio | on Description: | Site 18/24 - NE,<br>inside the fence<br>line | Site 18/24 - N,<br>inside the fence<br>line | Site 18/24 - NNW,<br>inside the fence<br>line | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - SW,<br>outside the fence<br>line | Site 18/24 - WSW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 -W,<br>outside the fence<br>line, along the<br>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 (826 | 0C)     |                 |                                              |                                             |                                               |                                                                                                |                                               |                                                                                                 |                                                                           |
| 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                                                                   |

| Location ID: Sample Date: | Units | MCL/MSC/<br>PCL | MW2_122017<br>12/20/17                       | MW3_122117<br>12/21/17                      | MW5_122017<br>12/20/17                        | MW7_121317<br>12/13/17                                                                         | MW8_121217<br>12/12/17                        | MW9_121317<br>12/13/17                                                                          | MW10-121117<br>12/11/17                                                   |
|---------------------------|-------|-----------------|----------------------------------------------|---------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                           |       | n Description:  | Site 18/24 - NE,<br>inside the fence<br>line | Site 18/24 - N,<br>inside the fence<br>line | Site 18/24 - NNW,<br>inside the fence<br>line | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - SW,<br>outside the fence<br>line | Site 18/24 - WSW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 -W,<br>outside the fence<br>line, along the<br>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                                                                   |

| Location ID:<br>Sample Date: |         | MCL/MSC/<br>PCL | MW2_122017<br>12/20/17                       | MW3_122117<br>12/21/17                      | MW5_122017<br>12/20/17                        | MW7_121317<br>12/13/17                                                                         | MW8_121217<br>12/12/17                        | MW9_121317<br>12/13/17                                                                          | MW10-121117<br>12/11/17                                                   |
|------------------------------|---------|-----------------|----------------------------------------------|---------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                              | Locatio | n Description:  | Site 18/24 - NE,<br>inside the fence<br>line | Site 18/24 - N,<br>inside the fence<br>line | Site 18/24 - NNW,<br>inside the fence<br>line | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - SW,<br>outside the fence<br>line | Site 18/24 - WSW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 -W,<br>outside the fence<br>line, along the<br>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                                                                        |

| Location ID:<br>Sample Date: | Units   | MCL/MSC/<br>PCL | MW2_122017<br>12/20/17                       | MW3_122117<br>12/21/17                      | MW5_122017<br>12/20/17                        | MW7_121317<br>12/13/17                                                                         | MW8_121217<br>12/12/17                        | MW9_121317<br>12/13/17                                                                          | MW10-121117<br>12/11/17                                                   |
|------------------------------|---------|-----------------|----------------------------------------------|---------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                              | Locatio | n Description:  | Site 18/24 - NE,<br>inside the fence<br>line | Site 18/24 - N,<br>inside the fence<br>line | Site 18/24 - NNW,<br>inside the fence<br>line | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - SW,<br>outside the fence<br>line | Site 18/24 - WSW,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 -W,<br>outside the fence<br>line, along the<br>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

| Location ID:<br>Sample Date:    | Units   | MCL/MSC/<br>PCL | MW14_121817<br>12/18/17               | MW14_121817-<br>a<br>12/18/17                        | MW-16_120817<br>12/8/17                                                                     | MW17-121117<br>12/11/17                                                    | MW18-121117<br>12/11/17                                                     | MW19-121217<br>12/12/17                                                    | MW20_121417<br>12/14/17                                                   |
|---------------------------------|---------|-----------------|---------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                                 | Locatio | n Description:  | LHAAP-18/24-<br>inside<br>containment | LHAAP-18/24-<br>inside<br>containment.<br>Duplicate. | Site 18/24-W,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - W,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-SSW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24- S,<br>outside the fence<br>line, along the<br>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 (826 | iOC)    |                 |                                       |                                                      |                                                                                             |                                                                            |                                                                             |                                                                            |                                                                           |
| 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                                                                   |

| Location ID: Sample Date: | Units   | MCL/MSC/<br>PCL | MW14_121817<br>12/18/17               | MW14_121817-<br>a<br>12/18/17                        | MW-16_120817<br>12/8/17                                                                     | MW17-121117<br>12/11/17                                                    | MW18-121117<br>12/11/17                                                     | MW19-121217<br>12/12/17                                                    | MW20_121417<br>12/14/17                                                   |
|---------------------------|---------|-----------------|---------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                           | Locatio | n Description:  | LHAAP-18/24-<br>inside<br>containment | LHAAP-18/24-<br>inside<br>containment.<br>Duplicate. | Site 18/24-W,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - W,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-SSW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24- S,<br>outside the fence<br>line, along the<br>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                                                                   |

| Location ID:              |         | MCL/MSC/       | MW14_121817                           | MW14_121817-                                         | MW-16_120817                                                                                | MW17-121117                                                                | MW18-121117                                                                 | MW19-121217                                                                | MW20_121417                                                               |
|---------------------------|---------|----------------|---------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Sample Date:              | Units   | PCL            | 12/18/17                              | a<br>12/18/17                                        | 12/8/17                                                                                     | 12/11/17                                                                   | 12/11/17                                                                    | 12/12/17                                                                   | 12/14/17                                                                  |
|                           | Locatio | n Description: | LHAAP-18/24-<br>inside<br>containment | LHAAP-18/24-<br>inside<br>containment.<br>Duplicate. | Site 18/24-W,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - W,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-SSW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24- S,<br>outside the fence<br>line, along the<br>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                                                                        |

| Location ID:<br>Sample Date: |         | MCL/MSC/<br>PCL | MW14_121817<br>12/18/17               | MW14_121817-<br>a<br>12/18/17                        | MW-16_120817<br>12/8/17                                                                     | MW17-121117<br>12/11/17                                                    | MW18-121117<br>12/11/17                                                     | MW19-121217<br>12/12/17                                                    | MW20_121417<br>12/14/17                                                   |
|------------------------------|---------|-----------------|---------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------|
|                              | Locatio | n Description:  | LHAAP-18/24-<br>inside<br>containment | LHAAP-18/24-<br>inside<br>containment.<br>Duplicate. | Site 18/24-W,<br>outside the fence<br>line, along the<br>road surrounding<br>the fence line | Site 18/24 - W,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24 - SW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24-SSW,<br>outside the fence<br>line, along the<br>outer loop road | Site 18/24- S,<br>outside the fence<br>line, along the<br>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

| LITAAF-10/24 Sampling Lve       |         | 1               |                                            |                                             |                                           | MW23_121517-                                         | (MW-)                                           | (MW-)                                                    | (MW-)                                                                    |
|---------------------------------|---------|-----------------|--------------------------------------------|---------------------------------------------|-------------------------------------------|------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------|
| Location ID:                    |         | MCL/MSC/        | MW21_121817<br>12/18/17                    | MW22_121817<br>12/18/17                     | MW23_121517<br>12/15/17                   | a                                                    | 109_121417                                      | 120_121417                                               | 123_121417                                                               |
| Sample Date:                    | Units   | PCL             | 12/18/17                                   | 12/18/17                                    | 12/15/17                                  | 12/15/17                                             | 12/14/17                                        | 12/14/17                                                 | 12/14/17                                                                 |
|                                 | Locatic | on Description: | Site 18/24 - E,<br>along the fence<br>line | Site 18/24-ESE,<br>inside the fence<br>line | Site 18/24-S,<br>inside the fence<br>line | Site 18/24-S,<br>inside the fence<br>line. Duplicate | Site 18/24-NE, just<br>inside the fence<br>line | Site 18/24- W,<br>inside the fence<br>line, outer region | Site 18/24-NW,<br>outside the fence<br>line, long the<br>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 (826 | iOC)    |                 |                                            |                                             |                                           |                                                      |                                                 |                                                          |                                                                          |
| 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                                                                  |

| LITAAF-10/24 Sampling Eve |         |                 |                         |                         |                         | MW23_121517-     | (MW-)               | (MW-)              | (MW-)                            |
|---------------------------|---------|-----------------|-------------------------|-------------------------|-------------------------|------------------|---------------------|--------------------|----------------------------------|
| Location ID:              |         | MCL/MSC/        | MW21_121817<br>12/18/17 | MW22_121817<br>12/18/17 | MW23_121517<br>12/15/17 | a                | 109_121417          | 120_121417         | 123_121417                       |
| Sample Date:              | Units   | PCL             | 12/10/17                | 12, 10, 17              | 12, 13, 17              | 12/15/17         | 12/14/17            | 12/14/17           | 12/14/17                         |
|                           |         |                 |                         |                         |                         |                  |                     |                    | St. 40 (0.4 h)                   |
|                           |         |                 | Site 18/24 - E,         | Site 18/24-ESE,         | Site 18/24-S,           | Site 18/24-S,    | Site 18/24-NE, just | Site 18/24- W,     | Site 18/24-NW, outside the fence |
|                           |         |                 | along the fence         | inside the fence        | inside the fence        | inside the fence | inside the fence    | inside the fence   | line, long the                   |
|                           |         |                 | line                    | line                    | line                    | line. Duplicate  | line                | line, outer region | outer loop road                  |
|                           | Locatio | on Description: |                         |                         |                         |                  |                     |                    |                                  |
|                           |         | 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 Eve  |              |                |                 |                  |                  | MW23 121517-     | (MW-)               | (MW-)              | (MW-)                          |
|---------------------------|--------------|----------------|-----------------|------------------|------------------|------------------|---------------------|--------------------|--------------------------------|
| Location ID:              |              | MCL/MSC/       | MW21_121817     | MW22_121817      | MW23_121517      | a                | 109_121417          | 120_121417         | 123_121417                     |
| Sample Date:              | Units        | PCL            | 12/18/17        | 12/18/17         | 12/15/17         | 12/15/17         | 12/14/17            | 12/14/17           | 12/14/17                       |
|                           |              |                |                 |                  |                  |                  |                     |                    |                                |
|                           |              |                | Site 18/24 - E, | Site 18/24-ESE,  | Site 18/24-S,    | Site 18/24-S,    | Site 18/24-NE, just | Site 18/24- W,     | Site 18/24-NW,                 |
|                           |              |                | along the fence | inside the fence | inside the fence | inside the fence | inside the fence    | inside the fence   | outside the fence              |
|                           |              |                | line            | line             | line             | line. Duplicate  | line                | line, outer region | line, long the outer loop road |
|                           | Locatio      | n Description: |                 |                  |                  |                  |                     |                    | 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<br>μg/L | 980            | < 1.0 U         | < 1.0 U          | < 10 U           | < 10 U           | < 1.0 U             | < 50 U             | < 1.0 U                        |
| Tetrachloroethene         |              | 5              | < 1.0 U         | < 1.0 U          | < 10 U           | < 10 U           | < 1.0 U             | < 50 U             | < 1.0 U                        |
|                           | μg/L         |                |                 | < 1.0 U          |                  | < 10 U           | 1                   |                    |                                |
| Toluene                   | μg/L         | 1,000          | < 1.0 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                             |

| Location ID:<br>Sample Date: |         | MCL/MSC/<br>PCL | MW21_121817<br>12/18/17                    | MW22_121817<br>12/18/17                     | MW23_121517<br>12/15/17                   | MW23_121517-<br>a<br>12/15/17                        | (MW-)<br>109_121417<br>12/14/17                 | (MW-)<br>120_121417<br>12/14/17                          | (MW-)<br>123_121417<br>12/14/17                                          |
|------------------------------|---------|-----------------|--------------------------------------------|---------------------------------------------|-------------------------------------------|------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------|
|                              |         |                 | Site 18/24 - E,<br>along the fence<br>line | Site 18/24-ESE,<br>inside the fence<br>line | Site 18/24-S,<br>inside the fence<br>line | Site 18/24-S,<br>inside the fence<br>line. Duplicate | Site 18/24-NE, just<br>inside the fence<br>line | Site 18/24- W,<br>inside the fence<br>line, outer region | Site 18/24-NW,<br>outside the fence<br>line, long the<br>outer loop road |
|                              | Locatio | n Description:  |                                            |                                             |                                           |                                                      |                                                 |                                                          |                                                                          |
|                              |         | 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                                                                       |
| 21110                        | 5,      |                 |                                            |                                             |                                           |                                                      |                                                 |                                                          |                                                                          |

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

|                                 |                |               | (MW-)                           |
|---------------------------------|----------------|---------------|---------------------------------|
| Location ID:                    |                | MCL/MSC/      | 126_120517                      |
| Sample Date:                    | Units          | PCL           | 12/5/17                         |
|                                 |                | •             |                                 |
|                                 |                |               | Site 18/24 0                    |
|                                 |                |               | Northwest of the<br>Groundwater |
|                                 |                |               | Treatment Plant,                |
|                                 |                |               | along the road                  |
|                                 | n Description: |               |                                 |
|                                 |                | Aquifer Zone: | Shallow                         |
| Perchlorate (6850)              | /1             |               |                                 |
| Perchlorate                     | μg/L           | 17*           | < 4.0 U                         |
| Volatile Organic Compounds (826 | 60C)           |               |                                 |
| 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                         |

| LITAAF-10/24 Sampling Lve |         | 11061 2017     | (MW-)                                                                                 |
|---------------------------|---------|----------------|---------------------------------------------------------------------------------------|
| Location ID:              |         | MCL/MSC/       | 126_120517                                                                            |
| Sample Date:              | Units   | PCL            | _<br>12/5/17                                                                          |
|                           | Locatio | n Description: | Site 18/24 0<br>Northwest of the<br>Groundwater<br>Treatment Plant,<br>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                                                                               |

| LITAAF-10/24 Sampling Eve |                |               | (MW-)                            |
|---------------------------|----------------|---------------|----------------------------------|
| Location ID:              |                | MCL/MSC/      | 126_120517                       |
| Sample Date:              | Units          | PCL           | 12/5/17                          |
|                           |                |               | C:t = 40/240                     |
|                           |                |               | Site 18/24 0<br>Northwest of the |
|                           |                |               | Groundwater                      |
|                           |                |               | Treatment Plant,                 |
|                           |                |               | along the road                   |
|                           | 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                             |

|          |              |         |                | (MW-)            |
|----------|--------------|---------|----------------|------------------|
|          | Location ID: |         | MCL/MSC/       | 126_120517       |
|          | Sample Date: | Units   | PCL            | 12/5/17          |
|          |              |         |                |                  |
|          |              |         |                | Site 18/24 0     |
|          |              |         |                | Northwest of the |
|          |              |         |                | Groundwater      |
|          |              |         |                | Treatment Plant, |
|          |              |         |                | along the road   |
|          |              | Locatio | n Description: |                  |
|          |              |         | 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:<br>Sample Date: |      | PCL | HBW7_122617<br>12/26/17 | HBW10_122617<br>12/26/17 | HBW1_122617<br>12/26/17 | GPW1_122617<br>12/26/17 | GPW3_1222617<br>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  $\mu$ g/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:<br>Sample Date: | Units       | Daily Maximum<br>Conc | LH18/24-<br>SP650_120617<br>12/6/17 | LH18/24-<br>SP650_121317<br>12/13/17 | LH18/24-<br>SP650_122017<br>12/20/17 | LH18/24-<br>SP650_122717<br>12/27/17 |
|------------------------------|-------------|-----------------------|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Location                     | Description |                       | GWTP-Collecte                       | ed from a spigot on s<br>Sampled V   | =                                    | luent TK-650.                        |
| 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:                  | -           | Daily Maximum | LH18/24-<br>SP650_121317                                                                    | LH18/24-<br>SP650_122717 |  |
|-------------------------------|-------------|---------------|---------------------------------------------------------------------------------------------|--------------------------|--|
| Sample Date:                  | Units       | Conc          | 12/13/17                                                                                    | 12/27/17                 |  |
| Location                      | Description |               | GWTP – Collected from a spigot on<br>the discharge of effluent TK-650.<br>Sampled Biweekly. |                          |  |
| Volatile Organic Compounds (8 | 260C)       |               |                                                                                             |                          |  |
| 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

 $<sup>\</sup>mu g/L$  - 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** 

|                                             | er 2017<br>LH18/24-                                                                                   |               |              |  |  |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------|--------------|--|--|
| Location ID:                                |                                                                                                       | Daily Maximum | SP650_120617 |  |  |
| Sample Date:                                | Units                                                                                                 | Conc          | 12/6/17      |  |  |
| Location                                    | GWTP – Collected<br>from a spigot on<br>the discharge of<br>effluent TK-650.<br>Sampled<br>Quarterly. |               |              |  |  |
| Volatile Organic Compounds (8               | 260C)                                                                                                 |               |              |  |  |
| 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          |  |  |

 $\mu\text{g/L}$  - micrograms per liter

mg/L - milligrams per liter

 $<sup>\</sup>ensuremath{\mathrm{J}}$  - 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:<br>Sample Date: | Units                                                                               | LH18/24-<br>SP140_120617<br>12/6/17 |  |  |
|------------------------------|-------------------------------------------------------------------------------------|-------------------------------------|--|--|
| Location Descriptio          | GWTP – Collected<br>from a spigot on the<br>influent to TK-140.<br>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

 $\mu g/L$  - micrograms per liter

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

## **GWTP Weekly/Effluent Perchlorate Sampling - December 2017**

| Location ID:<br>Sample Date: |                    | Dally<br>Maximum<br>Conc | LH18/24-<br>SP650_120617<br>12/6/17                               | LH18/24-<br>SP650_120617<br>12/6/17 | LH18/24-<br>SP650_121317<br>12/13/17 | LH18/24-<br>SP650_122017<br>12/20/17 | LH18/24-<br>SP650_122017<br>12/20/17 | LH18/24-<br>SP650_122717<br>12/27/17 |
|------------------------------|--------------------|--------------------------|-------------------------------------------------------------------|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| Locat                        | ion Descriptio     | on                       | GWTP-Collected from a spigot on the discharge of effluent TK-650. |                                     |                                      |                                      |                                      |                                      |
|                              |                    |                          | Weekly                                                            | Monthly EFF                         | Weekly                               | Weekly                               | Quarterly EFF                        | Weekly                               |
| Perchlorate (6850            | 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** 

| GW IP Quarterly influe        | nt Samping          | LH18/24-                     |
|-------------------------------|---------------------|------------------------------|
| Location ID:                  | Location ID:        |                              |
| Sample Date:                  | Sample Date: Units  |                              |
|                               |                     | 12/20/17<br>GWTP – Collected |
|                               | from a spigot on    |                              |
| Location Descripti            | the influent to TK- |                              |
|                               | 140. Sampled        |                              |
|                               | Quarterly.          |                              |
| Oil and Grease (1664A)        |                     | Quarterry                    |
| Oil & Grease                  | mg/L                | < 2.00 U                     |
| Chemical Oxygen Demand (410   |                     |                              |
| Chemical Oxygen Demand        | mg/L                | 35.0 J                       |
| Perchlorate (6850)            |                     |                              |
| Perchlorate                   | μg/L                | 8100 J                       |
| Volatile Organic Compounds (8 | 260C)               |                              |
| 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        |                     |                              |
| 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** 

| GWTP Quarterly influe     |                    | LH18/24-                     |  |  |
|---------------------------|--------------------|------------------------------|--|--|
| Location ID:              | Location ID:       |                              |  |  |
| Sample Date:              | Sample Date: Units |                              |  |  |
|                           |                    | 12/20/17<br>GWTP – Collected |  |  |
|                           |                    | from a spigot on             |  |  |
| Location Descripti        | 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** 

| · · · · · · · · · · · · · · · · · · ·       |                     | December 2017    |  |  |
|---------------------------------------------|---------------------|------------------|--|--|
| Location ID:                                |                     | LH18/24-         |  |  |
| Sample Date:                                | Units               | SP140_122017     |  |  |
| Jampie Date.                                | Units               | 12/20/17         |  |  |
|                                             |                     | GWTP – Collected |  |  |
|                                             |                     | from a spigot on |  |  |
| Location Descripti                          | 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                |  |  |

 $\mu g/L$  - 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** 

| GWTP Quarterly Effluent Sampling - December 2017 |                                                                                                       |                       |                                      |  |  |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------|--|--|
| Location ID:<br>Sample Date:                     |                                                                                                       | Daily Maximum<br>Conc | LH18/24-<br>SP650_122017<br>12/20/17 |  |  |
| Location                                         | GWTP – Collected<br>from a spigot on<br>the discharge of<br>effluent TK-650.<br>Sampled<br>Quarterly. |                       |                                      |  |  |
| Oil and Grease (1664A)                           |                                                                                                       |                       |                                      |  |  |
| Oil & Grease                                     | mg/L                                                                                                  | 15                    | < 2.0 U                              |  |  |
| Chemical Oxygen Demand (41                       | 0.4)                                                                                                  |                       |                                      |  |  |
| Chemical Oxygen Demand                           | mg/L                                                                                                  | 200                   | 105                                  |  |  |
| Volatile Organic Compounds (                     |                                                                                                       | •                     | •                                    |  |  |
| 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:<br>Sample Date:<br>Location    | Units<br>Description | Daily Maximum<br>Conc | LH18/24- SP650_122017 12/20/17  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                                                                                                                  |  |

 $\mu g/L$  - 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

Commander's Representative