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**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:** January 19, 2017; 6:00 – 7:00 PM

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**Meeting Participants:**

**LHAAP/BRAC:** Rose M. Zeiler

**USACE:** Aaron Williams

**USAEC:** Nicholas Smith; Randy Cerar

**AECOM:** Debra Richmann, Elspeth Sharp, Craig Holloway; JoLynn Snow

**USEPA Region 6:** Rich Mayer; Dorelle Harrison

**TCEQ:** April Palmie

**RAB:** **Present:** Paul Fortune, Carol Fortune, Richard LeTourneau, Nigel Shivers, Judy VanDeventer, Tom Walker, Terry Britt  
**Absent:** Charles Dixon, John Pollard, Jr.

**Public:** Dan Murphy, Rick Lowerre, Marwan Salameh, Laurie Rodriguez, Robert Speight

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An agenda for the RAB meeting, three handouts (Groundwater Treatment Plant [GWTP] – Processed Groundwater Volumes, Harrison Bayou and Goose Prairie Creek – Perchlorate Data, and LHAAP Perimeter Well Monitoring – Perchlorate Data), and a color copy of the AECOM slide presentation were provided for meeting attendees. In addition, 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. Fortune asked for introductions of new attendees. Mr. Randy Cerar with USAEC, Mr. Dorelle Harrison with USEPA, and Ms. JoLynn Snow and Mr. Craig Holloway with AECOM were 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 last (October 2016) RAB meeting.

### Minutes

Ms. Richmann said that the draft October 2016 RAB meeting minutes were sent to RAB members along with the January meeting agenda on 1/9/17. Dr. Zeiler asked the RAB members if anyone wanted to make a motion to approve the minutes from the October 2016 RAB meeting. Ms. Judy VanDeventer made a motion to accept the draft October 2016 minutes as written and Mr. Terry Britt seconded the motion. The approved October 2016 RAB minutes will be posted on the LHAAP website.

### Website Update

Ms. Richmann said that the website has been updated since the last RAB meeting to include the agenda for the current RAB, the approved meeting minutes from the July 2016 meeting, and additional sampling activities performed through December. The Administrative Record link has also been updated to include documents added to the Administrative Record through the third quarter of 2016.

### Postpone Next RAB Meeting Until October 2017

Dr. Zeiler asked if the RAB members might want to postpone the next RAB meeting until the new PBR contract has been awarded. Between now and then, relatively few activities will be occurring, so the meeting topics would be limited, primarily to GWTP operations. Ms. VanDeventer said she doesn't want to suspend the meetings and Mr. Terry Britt suggested instead, the members might be interested in a guided tour of the sites to better understand the changes that have taken place. There was general consensus among the group that the site tour should be conducted in lieu of the April RAB meeting. It was agreed that the participants would assemble at the Karnack Community Center at 5:00 PM on Thursday, April 27<sup>th</sup> to go over the agenda, then leave from there for the site tour. Dr. Zeiler encouraged people planning to attend to identify sites and topics of interest. Guests of RAB members and members of the public are welcome to attend, but the Army needs to know in advance, so she asked that this information be provided to Mr. Fortune. She also indicated more information on the tour will be forthcoming.

### Miscellaneous

Mr. Fortune asked about the schedule for the RFP for the next PBR contract and whether the bidding process had started yet. AW said what he can share with the RAB is 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.

### **Site-wide Environmental Restoration Issues – Dr. Zeiler and Ms. Richmann**

#### ***Dispute-Impacted Sites Update***

Ms. Richmann quickly reviewed the dispute-impacted sites listed in slide 9 and shown on the LHAAP sites map on slide 10 of the presentation. Dr. Zeiler told the audience that the Army is now working on post-ROD documents for the formerly disputed sites with signed RODs

(LHAAP-16, LHAAP-17, LHAAP-001-R, and LHAAP-03-R). Ms. Richmann summarized the post-ROD activities that are ongoing or completed at these sites (slide 11).

#### Post-ROD Activities at LHAAP-16, LHAAP-17, LHAAP-001-R, and LHAAP-003-R

Ms. Richmann said that at LHAAP-16, the Remedial Design has been reviewed by EPA and TCEQ, and will be finalized under the current contract. At LHAAP-17, the final post-ROD activity under the current contract is the Final Pre-Design Investigation Work Plan, which is complete. At the two MMRP sites, LHAAP-001-R and -003-R, respectively, limited groundwater monitoring, consisting of three rounds of sampling, and a single round of sampling for perchlorate is required by the ROD. One round of samples was collected from both sites on September 28-29 and analyzed for perchlorate. Slides 12-15 show the monitoring well locations that were sampled and the perchlorate results for each site. Perchlorate concentrations in all but one of the six samples from LHAAP-001-R are below the detection limit, and the only detected concentration is below the TRRP Tier 1 Groundwater Residential PCL (slide 13). Similarly, perchlorate concentrations in two of the three samples from LHAAP-003-R are below the detection limit and the third concentration is below the PCL. A tech memo documenting the results from LHAAP-003-R is in preparation and will be the last deliverable for this site under the current contract.

Slide 16 identifies the post-ROD deliverables for each site that will be included in the new PBR contract. Dr. Zeiler clarified that these are the first actions for the new contractor. Ms. Richmann said that the current AECOM PBR contract ends September 30, 2017, and reviewed the remaining deliverables and activities AECOM will complete or perform for the duration (slides 17 and 18).

#### **Defense Environmental Restoration Program (DERP) Update – AECOM (Debra Richmann)**

##### MNA Site Updates (LHAAP-37, 46, 50, 58, 67)

Ms. Richmann provided an overview of the current status of the MNA sites at LHAAP (Slide 19). Mr. Fortune asked which site is the one where sampling was suspended until the conditions returned to normal. Dr. Zeiler said it is LHAAP-37 (aka 35(B)) where the bio-plug study was performed, and she summarized the study and results. The study did not produce the expected results (accelerate biological degradation of COCs) and was terminated.

Ms. Richmann continued going through the update slides for the other DERP sites:

- LHAAP-04 – The final ROD has been signed by the Army and paper copies of both the ROD and approval/concurrence letters have been sent to EPA and TCEQ for signature.
- LHAAP-29 – The Final RI Addendum is complete. The FS Addendum, which includes a new remedial alternative not evaluated in the FS, has been drafted and provided to the Army.
- LHAAP-18/24 – A Draft Final Revised FS is in preparation, based on responses to EPA and TCEQ comments on the Draft FS. The Revised FS incorporates recent data obtained between February and June 2016, and includes the complete Final Supplemental to the

Updated Post-Screening Investigation Report as an appendix. A contingency remedy for 1,4-dioxane has also been added. Dr. Zeiler said she appreciated the hard work put in by Mr. Mayer, Ms. Palmie, and AECOM to be able to finalize it under the current PBR contract.

- LHAAP-47 – The Final Post-Screening Investigation Work Plan was approved by EPA and TCEQ in September. The work plan will be implemented under the next PBR contract.
- Groundwater Treatment Plant (GWTP) – Mr. Holloway reviewed slide 25, with the updated monthly treated groundwater volumes through September 2016. In September, the volume was almost 806,000 gallons. Next Mr. Holloway went on to describe the incident that occurred at the plant sometime over the weekend of December 10-11, 2016 that resulted in release of approximately 1,200 gallons of hydrochloric acid (HCl). All of the HCl was released within the secondary containment of the acid storage tank, so no acid was released to the environment. The release occurred when the flange bolts on the tank failed. The acid flowed from the tank into a sump, from which it was pumped into the equalization tank, resulting in irreparable damage to the sump pump and acidification of the contents of the equalization tank. The acid solution was pumped through the pre-treatment system, resulting in additional damage to the manway hatch on the ORP tank. The ICTs and extraction wells had to be shut down, because no water met the discharge criteria for perchlorate and the equalization tank was full.

Repairs/replacements have been made for the damaged equipment, and chemicals to neutralize the solution in the ORP tank have been added. However, the pH remains too low and the ORP remains too high for effective removal of perchlorate by the fluidized bed reactor (FBR). So, wastewater continues to be cycled through the pre-treatment system and no water has been discharged to Harrison Bayou or through irrigation.

Mr. Fortune asked about the overall operation of the GWTP, given its age. Dr. Zeiler responded that two of the three units are very effective for removal of metals and VOCs. It is the third unit, the FBR that has been the challenge and it is for removal of perchlorate. She said that frac tanks are scheduled to be delivered and set up outside the GWTP tomorrow to provide some extra capacity and allow some fresh groundwater to be processed through the FBR.

Mr. LeTourneau asked about possibly injecting the acidic water into a well and said chemical companies do this. Mr. Holloway said that he is working on a solution to handle the water on site.

In light of the incident at the GWTP, Mr. VanDeventer said she definitely wants to have a meeting of the RAB members in April to get an update on the situation.

### Surface Water and Perimeter Well Sampling Update

Ms. Richmann showed the slides with the surface water and perimeter well sampling locations (slides 26 and 28, respectively). Surface water samples were collected from locations GPW-1 and GPW-3 on Goose Prairie Creek, and HBW-1, HBW-7, and HBW-10 on Harrison Bayou in

November 2016. All perchlorate concentrations are below the TRRP Tier 1 groundwater residential PCL of 17 µg/L. Two samples had estimated perchlorate concentrations below 1 µg/L, one sample had a detected concentration of 0.563 µg/L, and perchlorate was not detected in the other two samples. The Harrison Bayou and Goose Prairie Creek handout includes the November 2016 sample results.

Groundwater samples were collected from five of the six perimeter wells in November or December 2016. All perchlorate concentrations are below the TRRP Tier 1 groundwater residential PCL of 17 µg/L. Perchlorate was not detected in three of the wells - 110, 111, and 112; and samples from wells 133 and 134 both had perchlorate concentrations below 1 µg/L. Well 108 was not sampled. The Perimeter Well Monitoring handout includes the November/December 2016 sample results.

### **Next RAB Meeting Schedule and Closing Remarks**

As discussed on page 2 of these minutes, a LHAAP site tour will be held in lieu of a regular RAB meeting on **April 27, 2017**. Interested RAB members and their guests should assemble at the **Karnack Community Center at 5:00 p.m.**

RAB members Mr. LeTourneau, Mr. Britt, and Ms. VanDeventer requested that the RAB be notified of what firm is awarded the new PBR contract at the time it is awarded or when the new contractor is given notice to proceed. Dr. Zeiler said she will make sure the RAB receives notification. Mr. George Rice asked if the RFP for the next contract has been published yet; Mr. Williams responded that it has not been published and that he does not have information on when it will be.

### **Adjourn**

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

### **October 2016 Meeting Handouts:**

- Meeting Agenda
- PowerPoint Presentation Slides
- Groundwater Treatment Plant [GWTP] – Processed Groundwater Volumes Handout
- Harrison Bayou and Goose Prairie Creek – Perchlorate Data Handout
- LHAAP Perimeter Well Monitoring – Perchlorate Data Handout

## Acronyms

µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
BRAC	Base Realignment and Closure
COC	Contaminant of Concern
DERP	Defense Environmental Response Program
FS	Feasibility Study
GWTP	Groundwater Treatment Plant
HCl	Hydrochloric Acid
ICT	Interceptor Collection Trench
LHAAP	Longhorn Army Ammunition Plant
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
ORP	Oxygen-Reduction Potential
PBR	Performance-Based Remediation
PCL	Protective Concentration Level
RAB	Restoration Advisory Board
RFP	Request for Proposal
RI	Remedial Investigation
ROD	Record of Decision
TCEQ	Texas Commission on Environmental Quality
TRRP	Texas Risk Reduction Program
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center
USEPA	United States Environmental Protection Agency



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

**AGENDA**

**DATE:** Thursday, January 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 (October 2016 RAB Meeting)  
- Website  
- Postpone next RAB meeting until October 2017

**06:15** Sitewide Environmental Restoration Issues {RMZ}  
- Dispute Impacted Sites Update  
    ▪ Remedial Design for LHAAP-16  
    ▪ Post-ROD Activities at LHAAP-16, LHAAP-17, LHAAP-001-R and LHAAP-003-R  
        ○ Limited LTM (LHAAP-001-R and LHAAP-003-R only)  
- Updated Schedule,  
- Environmental Contract Ending  
- Ongoing Outreach – Public Notification Efforts for the January 2017 RAB  
- Surface Water and Perimeter Wells Sampling Update

**06:35** Defense Environmental Restoration Program (DERP) Update {AECOM}  
- MNA Sites Update  
- LHAAP-29 Update  
- LHAAP-18/24 Update  
- LHAAP-47 PSI Update  
- Groundwater Treatment Plant (GWTP) Update

Next RAB Meeting Schedule and Closing Remarks

**07:00** Adjourn {RMZ}

# **Longhorn Army Ammunition Plant Restoration Advisory Board Meeting January 19, 2017**

AECOM Environment



# Agenda

## AGENDA

**DATE:** Thursday, January 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 (October 2016 RAB Meeting)
  - Website
  - Postpone next RAB meeting until October 2017
- 06:15** Sitewide Environmental Restoration Issues {RMZ}
- Dispute Impacted Sites Update
    - Remedial Design for LHAAP-16
    - Post-ROD Activities at LHAAP-16, LHAAP-17, LHAAP-001-R and LHAAP-003-R
      - Limited LTM (LHAAP-001-R and LHAAP-003-R only)
  - Updated Schedule,
  - Environmental Contract Ending
  - Ongoing Outreach – Public Notification Efforts for the January 2017 RAB
  - Surface Water and Perimeter Wells Sampling Update
- 06:35** Defense Environmental Restoration Program (DERP) Update {AECOM}
- MNA Sites Update
  - LHAAP-29 Update
  - LHAAP-18/24 Update
  - LHAAP-47 PSI Update
  - Groundwater Treatment Plant (GWTP) Update
- Next RAB Meeting Schedule and Closing Remarks
- 07:00** Adjourn {RMZ}

## Open Items

- RAB Administrative Issues
- Minutes from October 2016 RAB Meeting
- Website Update
- Postpone next RAB meeting until October 2017

## Ongoing Outreach - Notifications for October RAB Meeting

- Published RAB meeting announcement in Marshall News Messenger on January 9<sup>th</sup>
- 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 and KTAL Channel 6 TV 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 January 9<sup>th</sup>
- 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](http://www.longhornaap.com)
  - Make suggestions for improving communication – the Army welcomes and appreciates community feedback

## Minutes from Past RAB Meetings

- Discussion of October 2016 RAB Meeting Minutes/Motion to accept



## Website Update



# Longhorn Army Ammunition Plant

Environmental Restoration Program

The next RAB meeting will be Thursday, January 19, 2017 from 6:00-7:30PM at the Karnack Community Center, Karnack, Texas [Click on Calendar for Meeting Agenda and Details.](#)

## Postponed Next RAB Meeting

- Remaining effort on the current PBR contract through the end of the Period of Performance (September 30, 2017) will be mainly continuing GWTP Operations and Maintenance.
- Do the RAB members, therefore, wish to postpone the next RAB meeting until October 2017, when the new PBR contract will be in place?

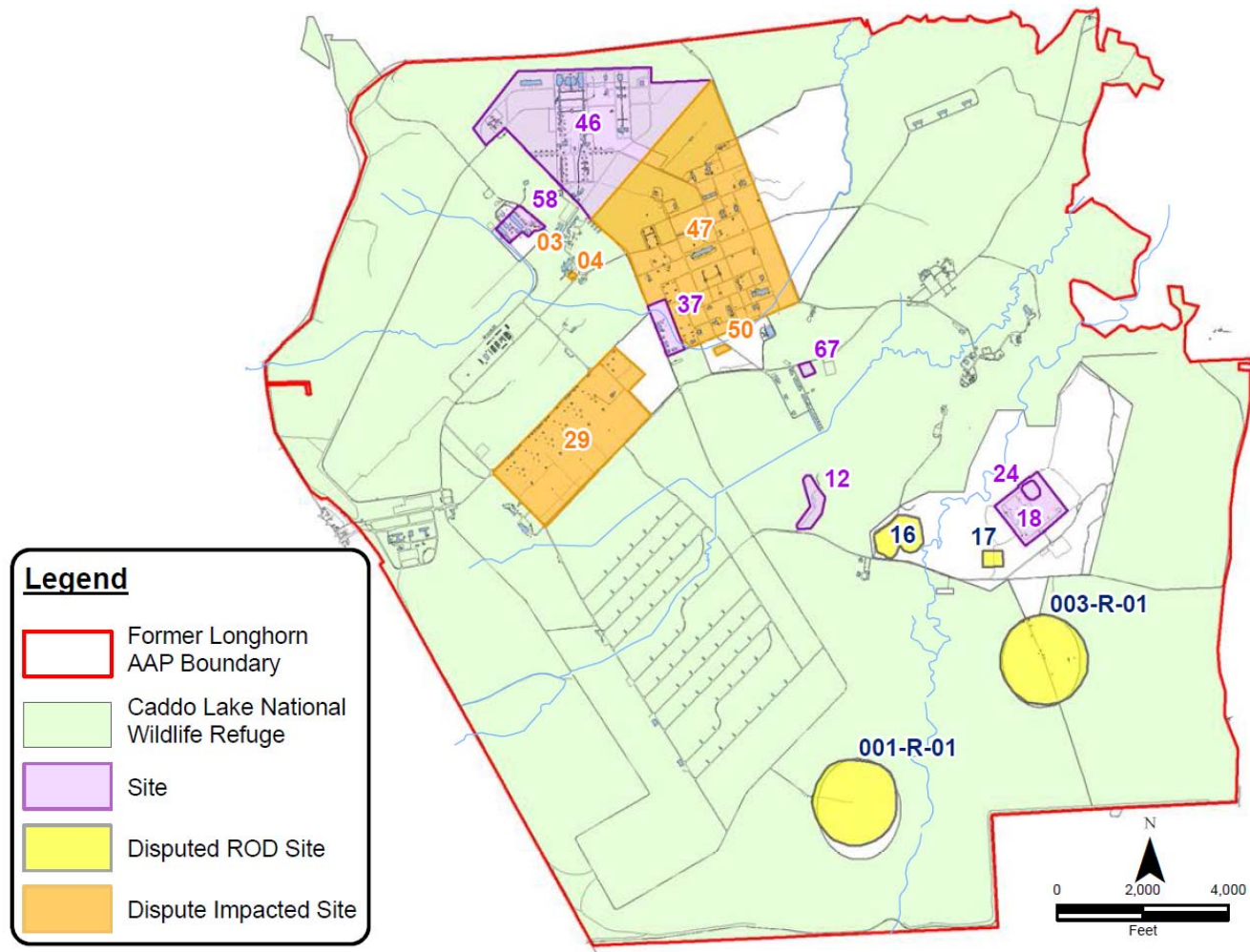
# Site-wide Environmental Restoration Issues

## Active LHAAP Performance-Based Remediation Sites (\* Disputed ROD Site)

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



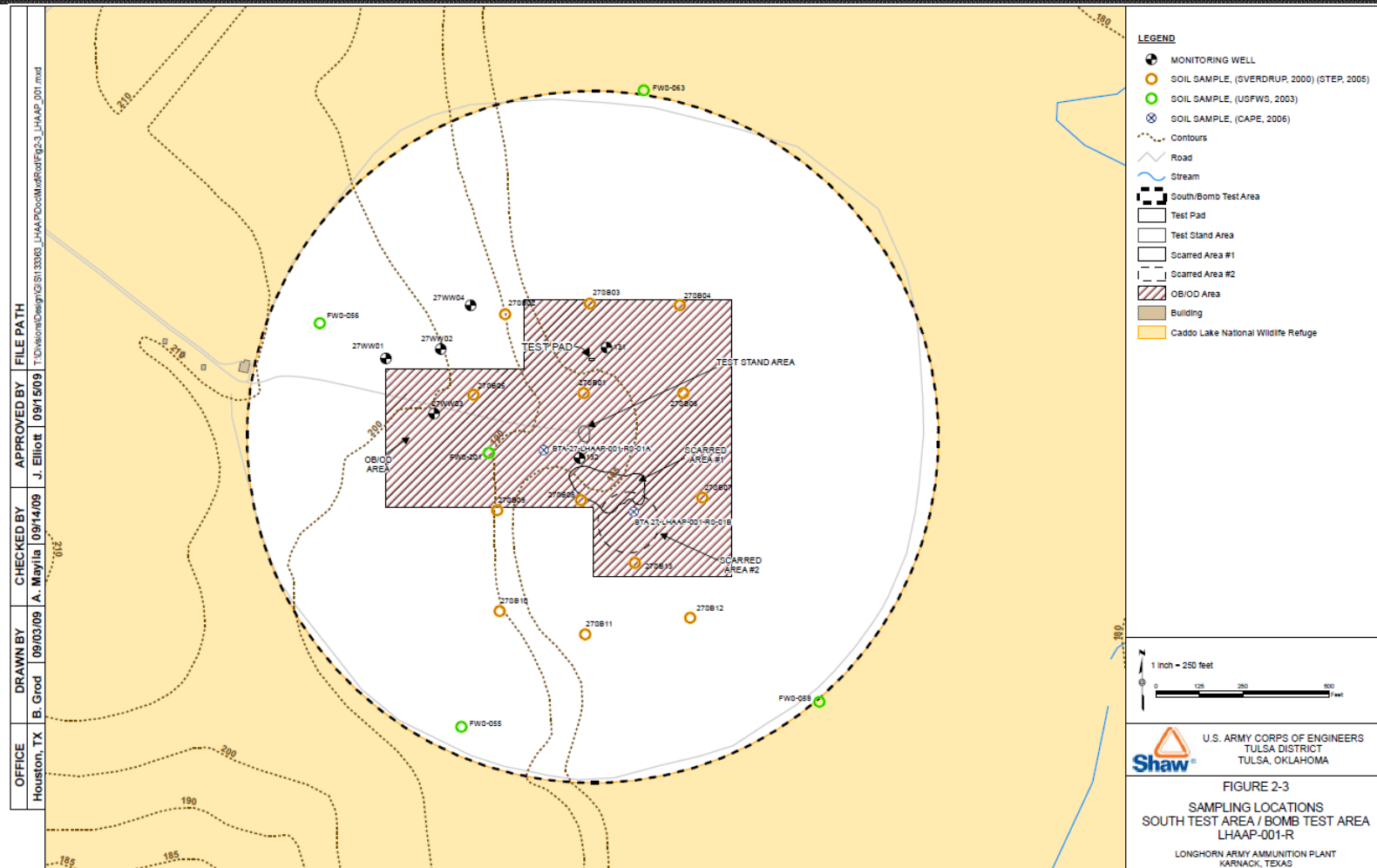
# Longhorn Performance-Based Remediation Sites Map



## Post-ROD Activities at Disputed Sites LHAAP-16, -17, -001-R, and 003-R

- Activity for LHAAP-16
  - In the process of resolving regulatory comment for the Remedial Design, upon which the Remedial Design will be finalized
- Activity for LHAAP-17
  - Completed Pre-Design Investigation Work Plan
- Activities for Military Munitions Response sites LHAAP-001-R and LHAAP-003-R
  - Post-ROD requirements for LHAAP-001-R and LHAAP-003-R include limited groundwater monitoring for perchlorate to confirm levels are below the Texas Risk Reduction Program Tier 1 Groundwater Residential Protective Concentration Level (PCL)
  - Three rounds of sampling from six wells at LHAAP-001-R, and one round of sampling from three wells at LHAAP-003-R are required
  - Sampling at LHAAP-001-R and LHAAP-003-R was performed on 9/28/16 and 9/29/16, respectively

# Post-ROD Limited Groundwater Monitoring Locations at LHAAP-001-R



LHAAP-001-R, South Test Area/Bomb Test Area

SELECTED REMEDY: Land Use Controls and Limited Groundwater Monitoring



# First Post-ROD Round Limited Groundwater Monitoring Results for LHAAP-001-R

## LHAAP-001-R Groundwater Sampling Results - September 2016

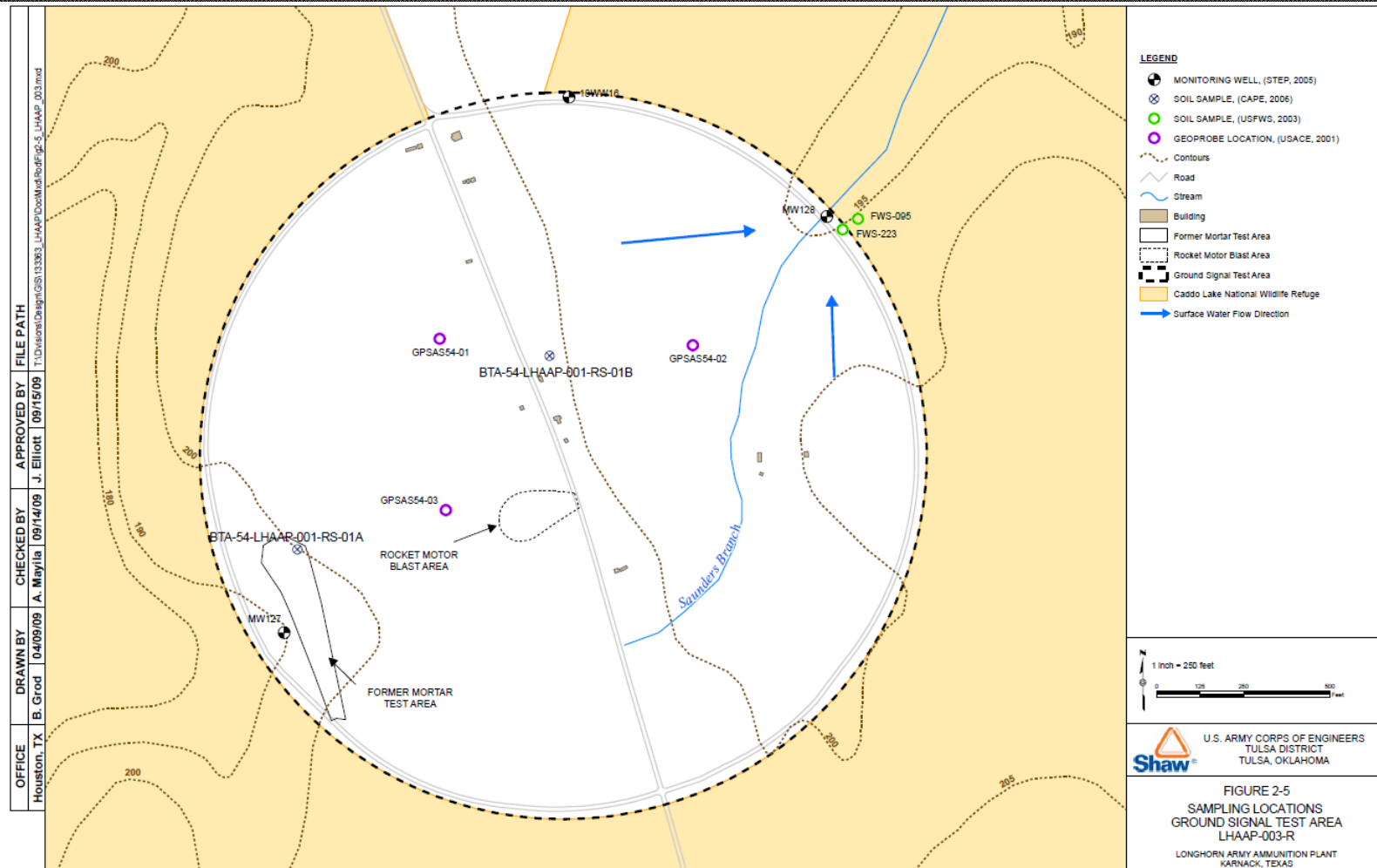
Sample ID: Sample Date:	Units	PCL	131- 092816 9/28/2016	132- 092816 9/28/2016	132FD- 092816 9/28/2016	27WW01- 092816 9/28/2016	27WW02- 092816 9/28/2016	27WW03- 092816 9/28/2016	27WW04- 092816 9/28/2016
Perchlorate (6850)									
PERCHLORATE	ug/L	17	<0.2 U	<0.2 U	<0.2 U	<0.2 U	0.705	<0.2 U	<0.2 U

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

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

ug/L - micrograms per liter

# Post-ROD Limited Groundwater Monitoring Locations at LHAAP-003-R



**LHAAP-003-R, Ground Signal Test Area**

**SELECTED REMEDY: Land Use Controls and Limited Groundwater Monitoring**

# Post-ROD Limited Groundwater Monitoring Results for LHAAP-003-R

## LHAAP-003-R Groundwater Sampling Results - September 2016

Sample ID: Sample Date:	Units	PCL	127- 092916 9/29/2016	128- 092916 9/29/2016	128FD- 092916 9/29/2016	18WW16- 092916 9/29/2016
Perchlorate (6850)						
PERCHLORATE	ug/L	17	<0.2 U	<0.2 U	<0.2 U	5.32

PCL – Texas Risk Reduction Program (TRRP) Tier 1 Groundwater Residential Protective Concentration Level

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

ug/L - micrograms per liter

## Next Deliverables for the Four Disputed ROD Sites Under the New PBR Contract

- LHAAP-16              Draft Remedial Action Work Plan Report
- LHAAP-17              Draft Pre-Design Investigation Report
- LHAAP-001-R        Draft Land Use Control Remedial Design (RD)
- LHAAP-003-R        Draft Land Use Control RD

## Deliverables, Environmental Contract Ending

- Current AECOM PBR contract ends September 30, 2017
- The remaining AECOM contract deliverables (reports and plans) are:
  - Final LHAAP-16 Remedial Design (RD)
  - Final LHAAP-18/24 Revised FS
  - Final LHAAP-37 Remedial Action Completion Report (RACR) – Complete, however EPA is waiting until groundwater rebounds to pre-Bio plug study conditions to issue Certificate of Completion
  - Final LHAAP-50 Year 2 RA-O Report
  - Final LHAAP-67 Year 1 and Year 2 RA-O Reports



## **Deliverables, Environmental Contract Ending (cont.)**

- Groundwater monitoring will continue at LHAAP-18/24; results from each event will be documented in a data validation package
- GWTP Operation and Maintenance, Perimeter Wells and Surface Water Sampling; and Mowing/LUC Monitoring will be performed throughout the remaining contract period of performance (September 30, 2017)

# Defense Environmental Restoration Program (DERP) Update

- **Monitored Natural Attenuation Sites Updates**

- LHAAP-35B (37) – Chemical Laboratory
- LHAAP-46 – Plant Area 2
- LHAAP-50 – Former Sump Water Tank
- LHAAP-35A (58) – Shops Area
- LHAAP-67 – Aboveground Storage Tank Farm

- Land Use Control Boundary Surveys for groundwater use restriction are complete for all sites
- Final Remedial Action Completion Reports (RACRs) are complete for all MNA sites;
  - Certificate of Completion for LHAAP-35B(37) will not be issued until site groundwater rebounds to pre-Bio plug study conditions
- Year 1 and Year 2 Remedial Action Operation (RA-O) report for LHAAP-46 and LHAAP-58 are final
- Year 1 RA-O report for LHAAP-50 is final and Year 2 RA-O report is draft final
- Year 1 and 2 RA-O reports for LHAAP-67 are draft final
- Year 3 RA-O reports for LHAAP-46 and LHAAP-67 have been drafted
- Quarterly/Semi-Annual Groundwater Monitoring under the current PBR contract is complete for all MNA sites

## LHAAP-04 Activities

- Final ROD has received Army signature
- Awaiting EPA signature and TCEQ concurrence

## LHAAP-29 - Former TNT Production Area Update

- To address remedy design and implementation questions at the Draft Final ROD stage, the Remedial Investigation (RI) and Feasibility Study (FS) were re-opened to fill data gaps and a Supplemental Investigation was performed
- An RI Addendum based on the Supplemental Investigation results for LHAAP-29 was submitted to EPA and TCEQ and was approved by EPA with TCEQ concurrence in August 2016. The Final RI Addendum documents achievement of the following objectives:
  - Confirmed the extent of methylene chloride DNAPL in the Intermediate Zone groundwater
  - Confirmed the extent of VOC, perchlorate, and explosives contamination in the Shallow Zone groundwater
  - Determined there is no continuing source of VOC contamination in site soil
  - Characterized physical properties (resistivity, hydraulic conductivity, etc.) and microbial activity in Intermediate Zone to support further FS evaluation of remedial alternatives
- An FS Addendum, which incorporates the supplemental data in the Final RI Addendum to develop and evaluate an additional remedial alternative not included in the previous FS, has been drafted

## LHAAP-18/24 Former Burning Ground No. 3 and Unlined Evaporation Pond Update

- To evaluate remedial alternatives for LHAAP-18/24, a Draft Revised FS was submitted to EPA and TCEQ; the agencies have provided comments, and the Draft Final Revised FS is in preparation
- The FS was revised to address data gaps and incorporate new data, as well as address 1,4-dioxane, for which a contingency remedy was developed
- The Revised FS also uses supplemental data obtained between February and June 2016, which is documented in the Final Supplemental to the Updated Post-Screening Investigation Report, which includes:
  - DPT soil sampling at 17 locations and analysis for VOCs and perchlorate
  - Installation of seven additional monitoring wells (three screened in the Shallow Zone and four in the Wilcox Fm.), with soil samples collected from well borings to create a vertical profile of VOCs and perchlorate in the unsaturated zone



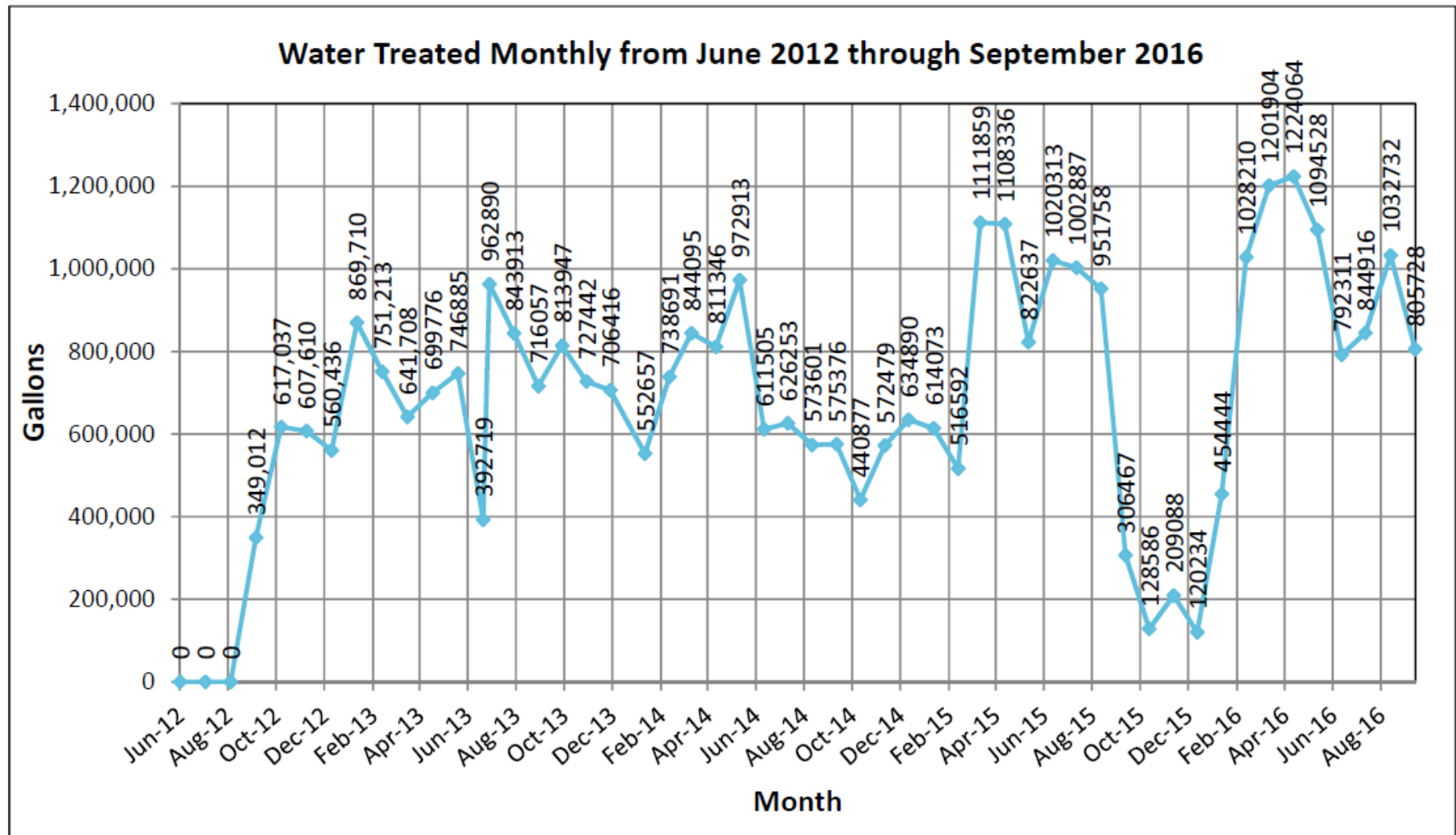
# LHAAP- 47 Plant Area 3 Update

- Final LHAAP-47 Post-Screening Investigation Work Plan was reviewed and approved by EPA with TCEQ concurrence on September 30th
  - Objectives:
    - ✓ Re-assess VOCs and perchlorate in Shallow Zone and Intermediate Zone groundwater, and
    - ✓ Re-assess potential VOC- and perchlorate-contaminated groundwater contribution to surface water in Goose Prairies Creek and tributaries
  - Scope:
    - ✓ Collection of two grab groundwater samples from each of seven Shallow Zone soil borings and six Intermediate Zone soil borings, and analysis for VOCs and perchlorate;
    - ✓ Installation and development of 13 Shallow Zone monitoring wells and 4 Intermediate Zone monitoring wells
    - ✓ Re-development of existing wells and synoptic water level survey of all site wells
    - ✓ Collection and analysis of groundwater samples from the new wells and up to 30 existing Shallow Zone wells and 10 existing Intermediate Zone wells for VOCs, and/or perchlorate, plus additional constituents included in the ROD
    - ✓ Collection and analysis of four surface water samples for perchlorate and VOCs
- Post-Screening Investigation will be implemented under the next PBR contract

## Groundwater Treatment Plant (GWTP) Update

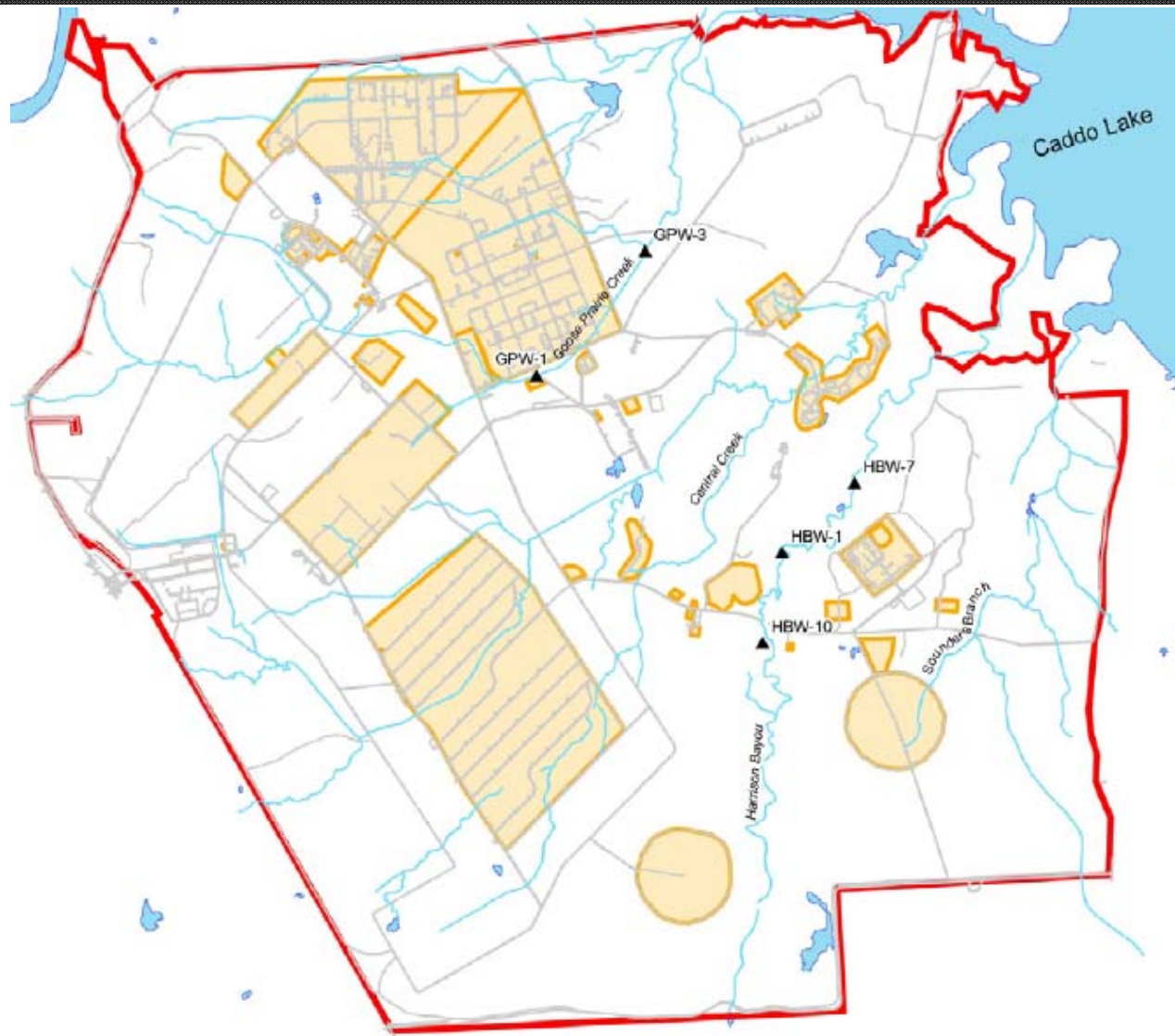
- A failure of the flange bolts on the TK-380 Acid Storage Tank occurred sometime over the weekend between Friday 12/9/16 and Monday 12/12/16
- When the plant operators returned on 12/12/16, they discovered approximately 1,200 gallons of hydrochloric acid (HCl) were released inside the secondary containment; No RELEASE OCCURRED TO THE ENVIRONMENT

# GWTP Update (continued)

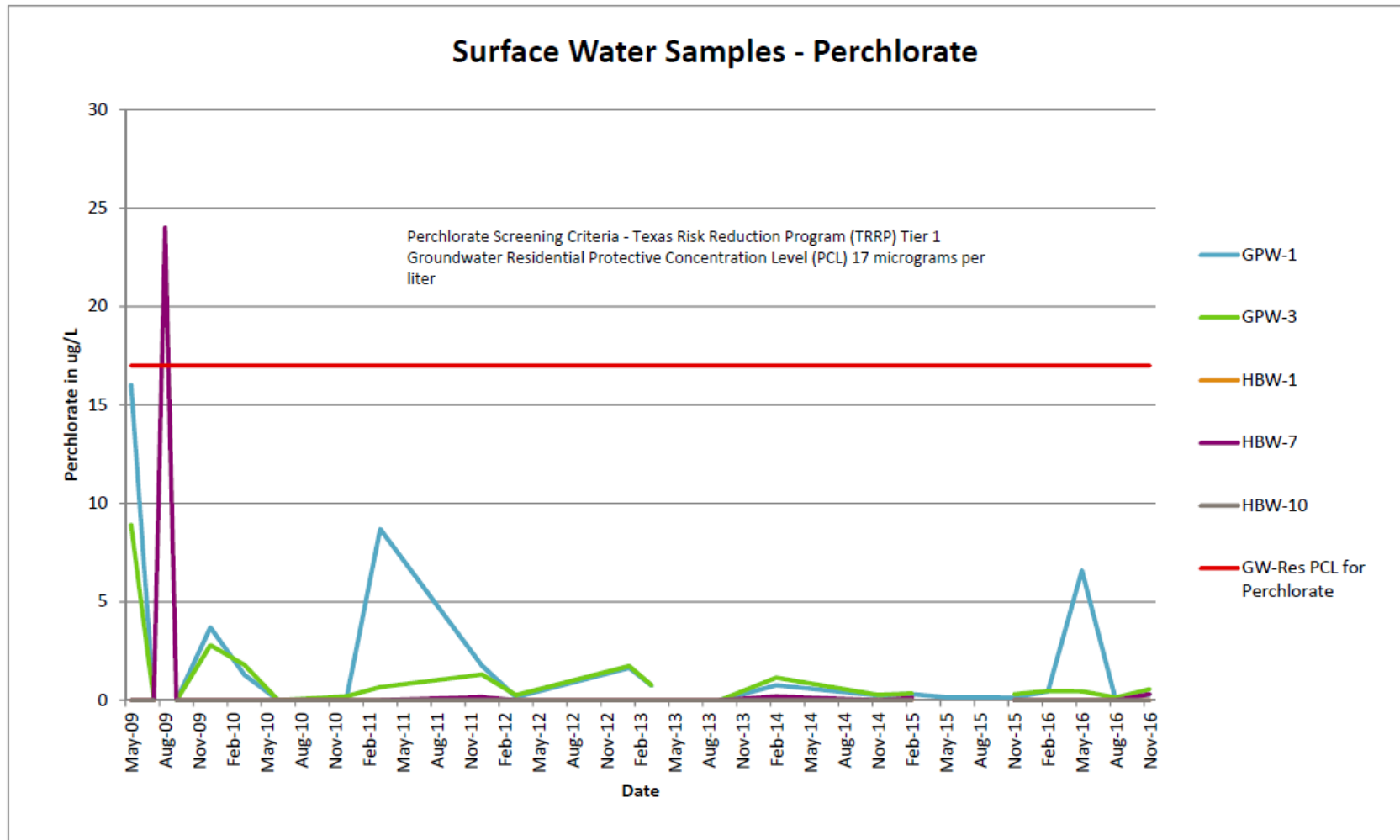




# Surface Water Sampling Locations



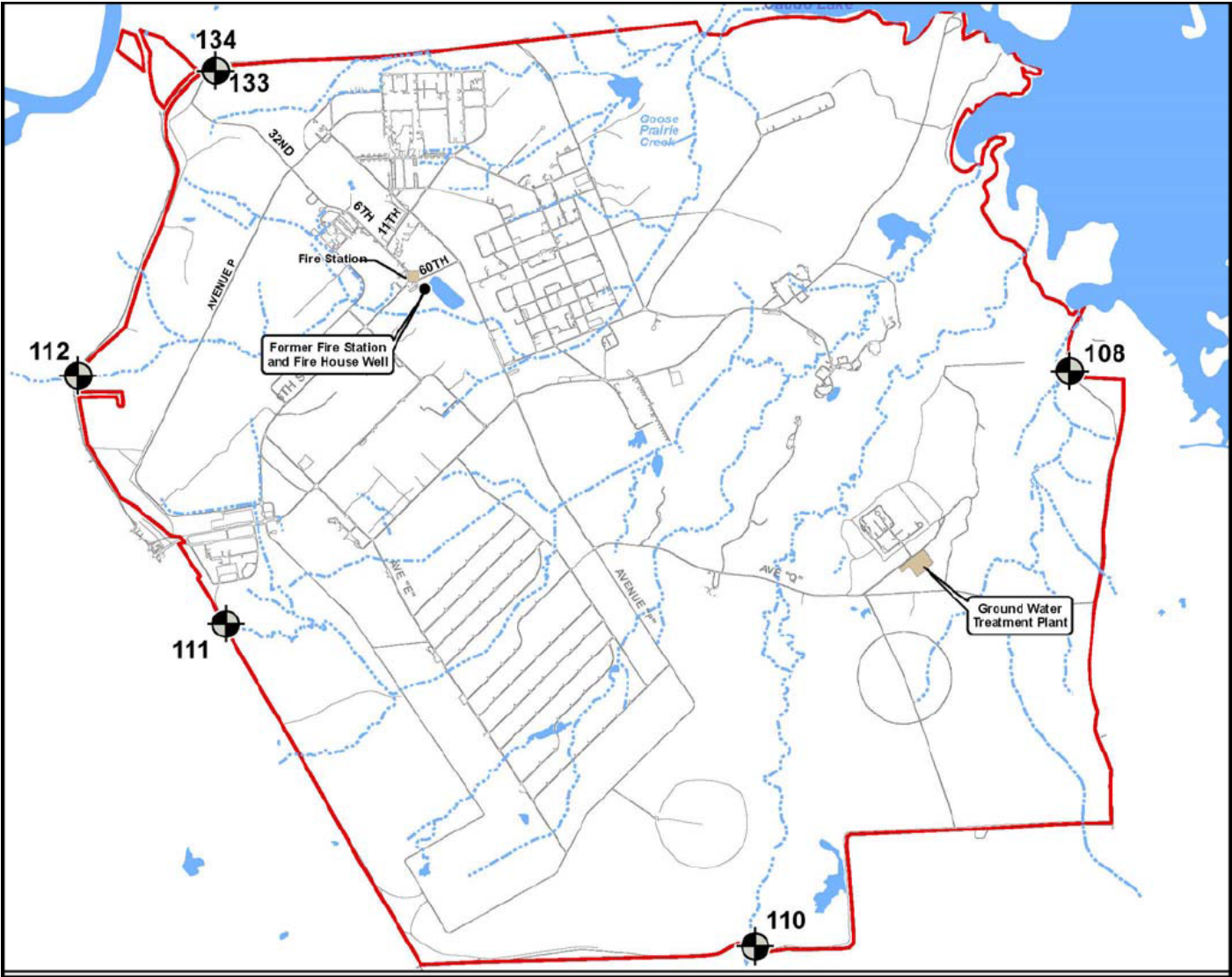
# Surface Water Sampling



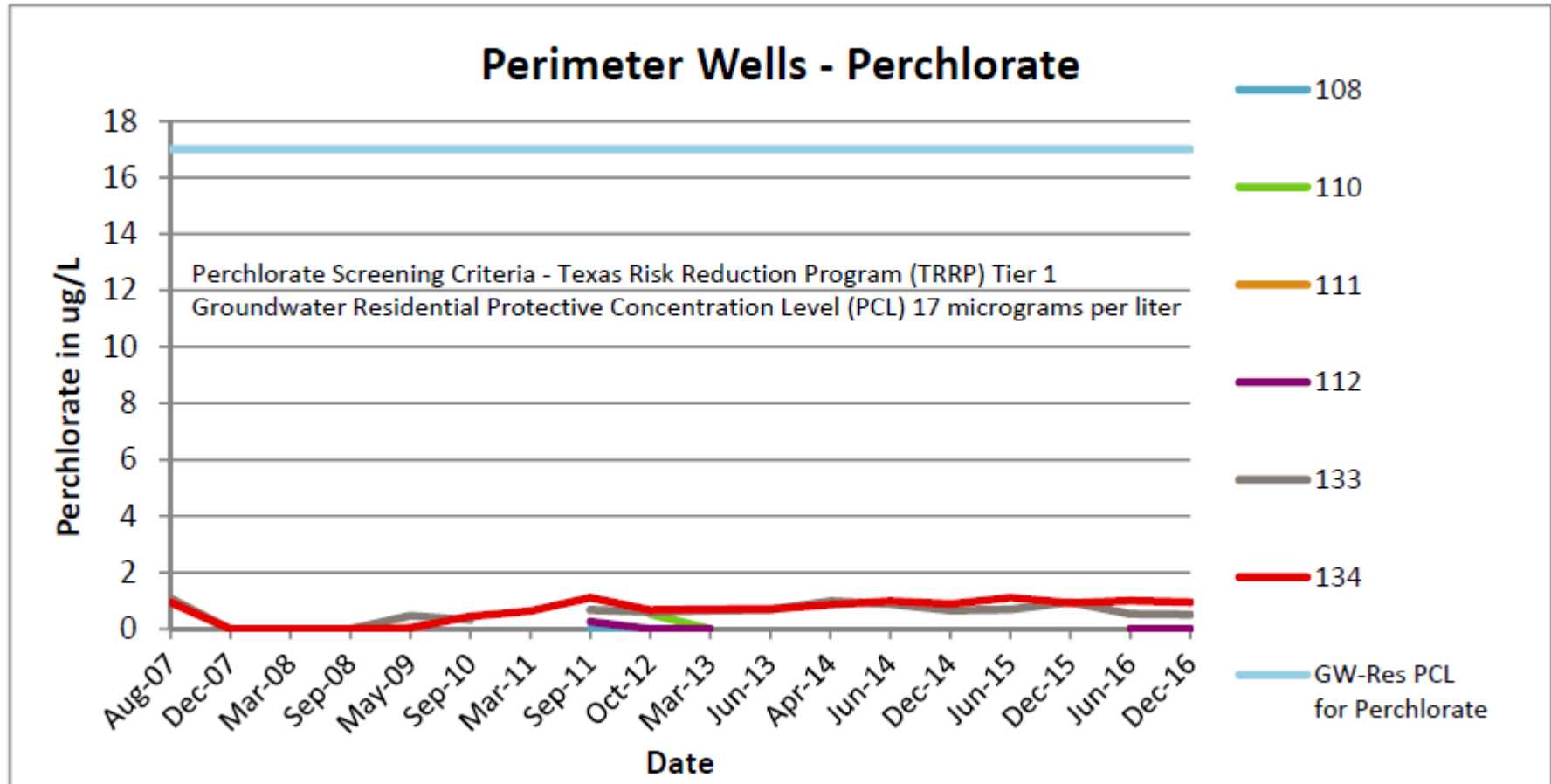
GPW – Goose Prairie Creek  
HBW – Harrison Bayou



## Perimeter Well Locations



# Perimeter Well Sampling Update



## Next RAB Meeting Schedule and Closing Remarks

- Decision on whether to postpone the next RAB meeting until October 2017
- Other Issues/Remarks?

# Questions?





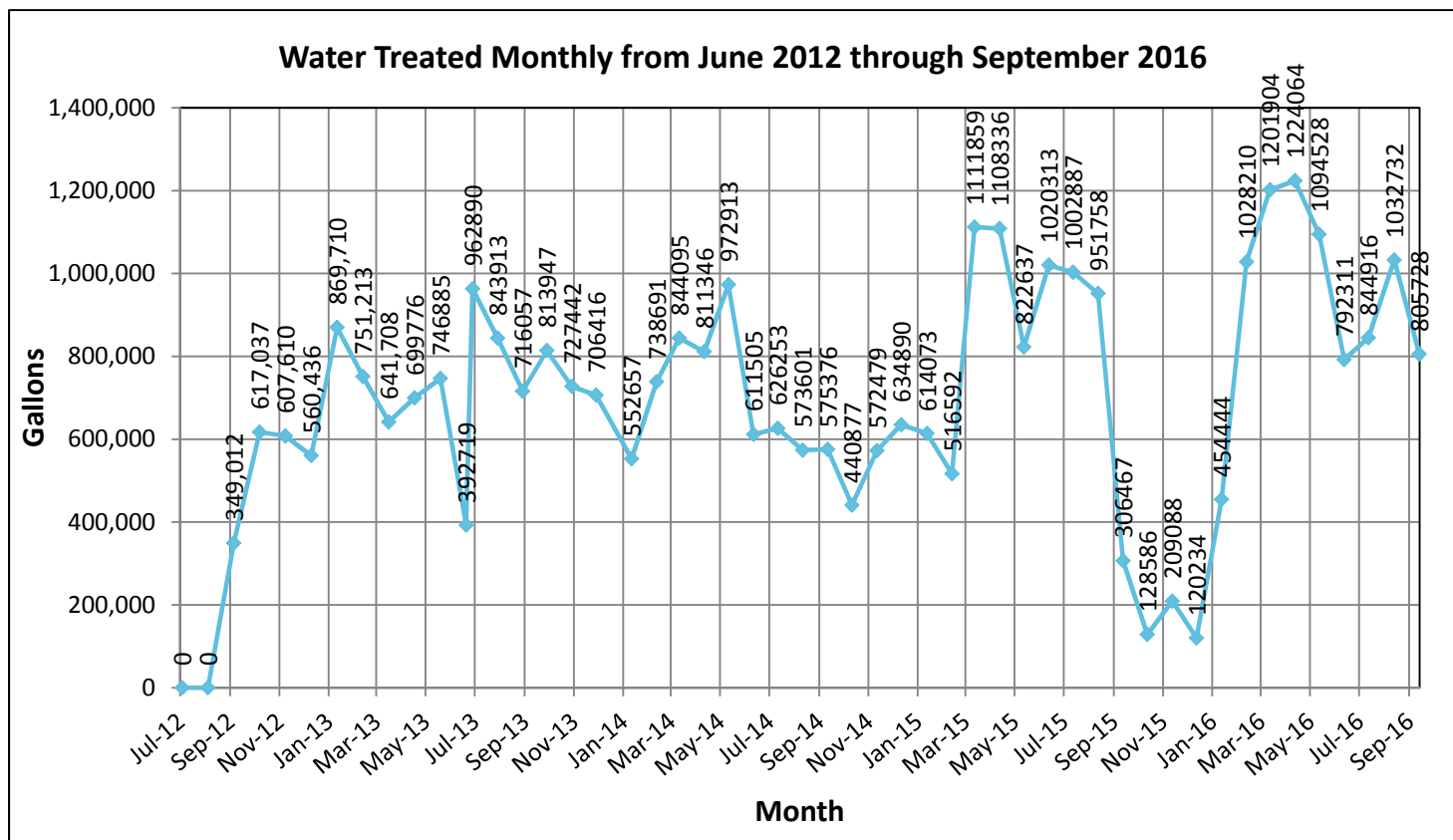
# Groundwater Treatment Plant - Processed Groundwater Volumes

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

## Processed Water Data (in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199
Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716
Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547
Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456
Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012
Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057
Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376
Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467
Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728

\*Indicates Estimate



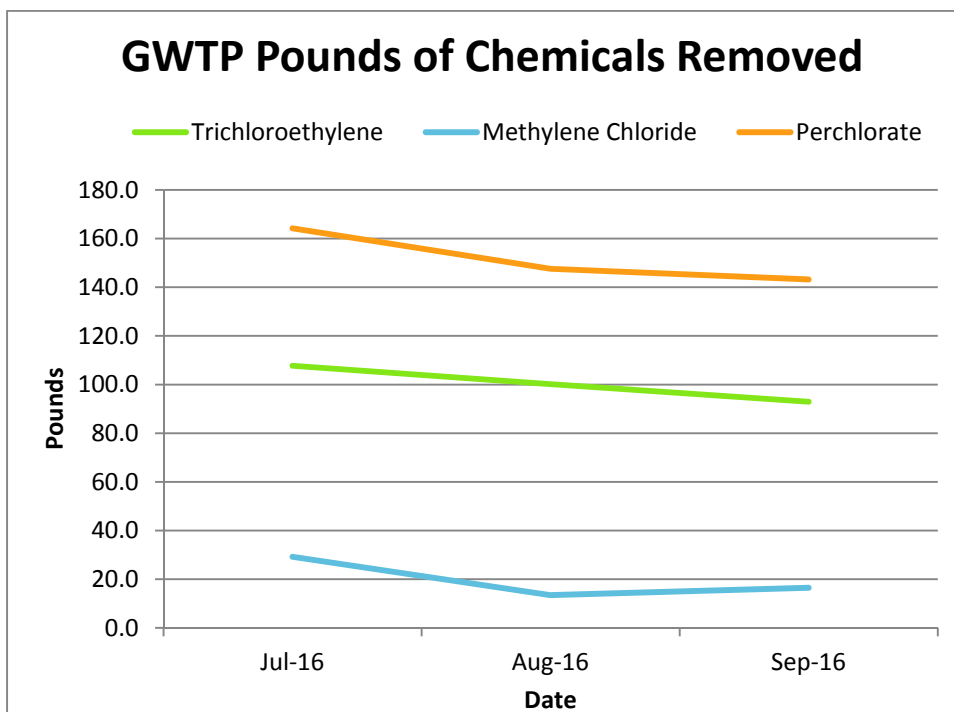
The pounds of chemicals removed for the 3<sup>rd</sup> Quarter of 2016 can be found below and are calculated by the following formula:

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

### Approximate Amount of Pounds of Chemicals Removed From LHAAP-18/24, 3<sup>rd</sup> Quarter 2016

	Trichloroethylene	Methylene Chloride	Perchlorate
Jul-16	108	29	164
Aug-16	100	13	148
Sep-16	93	16	143

ND – no data available



### Water Discharge Location and Volume (Gallons)

Month	Harrison Bayou	LHAAP-18/24 Sprinklers	INF Pond
Jul-16	0	636,230	0
Aug-16	0	984,020	0
Sep-16	0	698,656	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 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>
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 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
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 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>
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 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>
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 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
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 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
Creek Sample ID	Feb 2016	May 2016	Aug 2016	Nov 2016
GPW-1	0.447	6.59	<0.2 U	0.301 J
GPW-3	0.474	0.457	0.141	0.563
HBW-1	<0.2 U	<0.2 U	<0.2 U	<0.2 U
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J
HBW-10	<0.2 U	<0.2 U	<0.2 U	<0.2 U

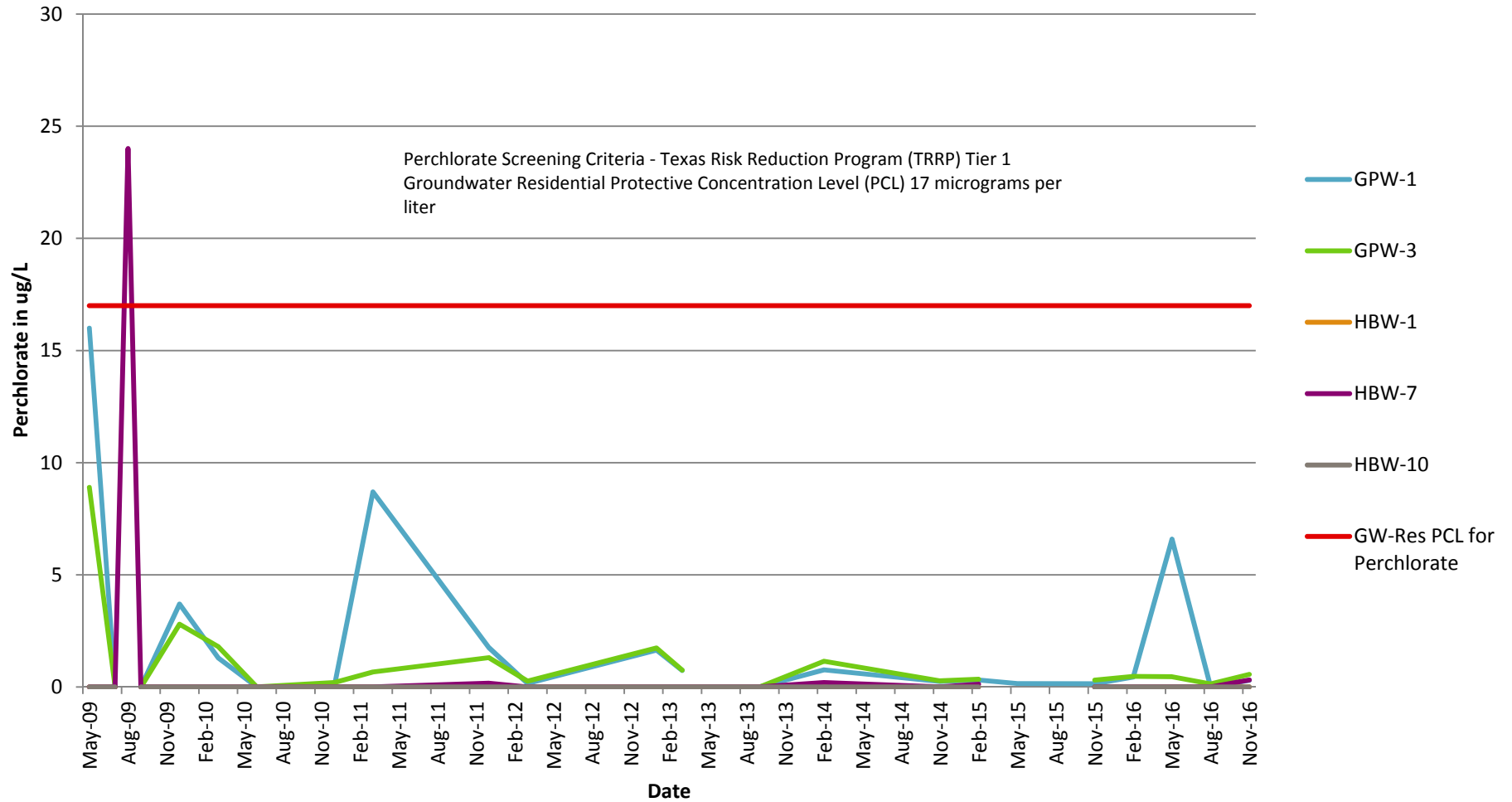
NS – not sampled

U – non-detect

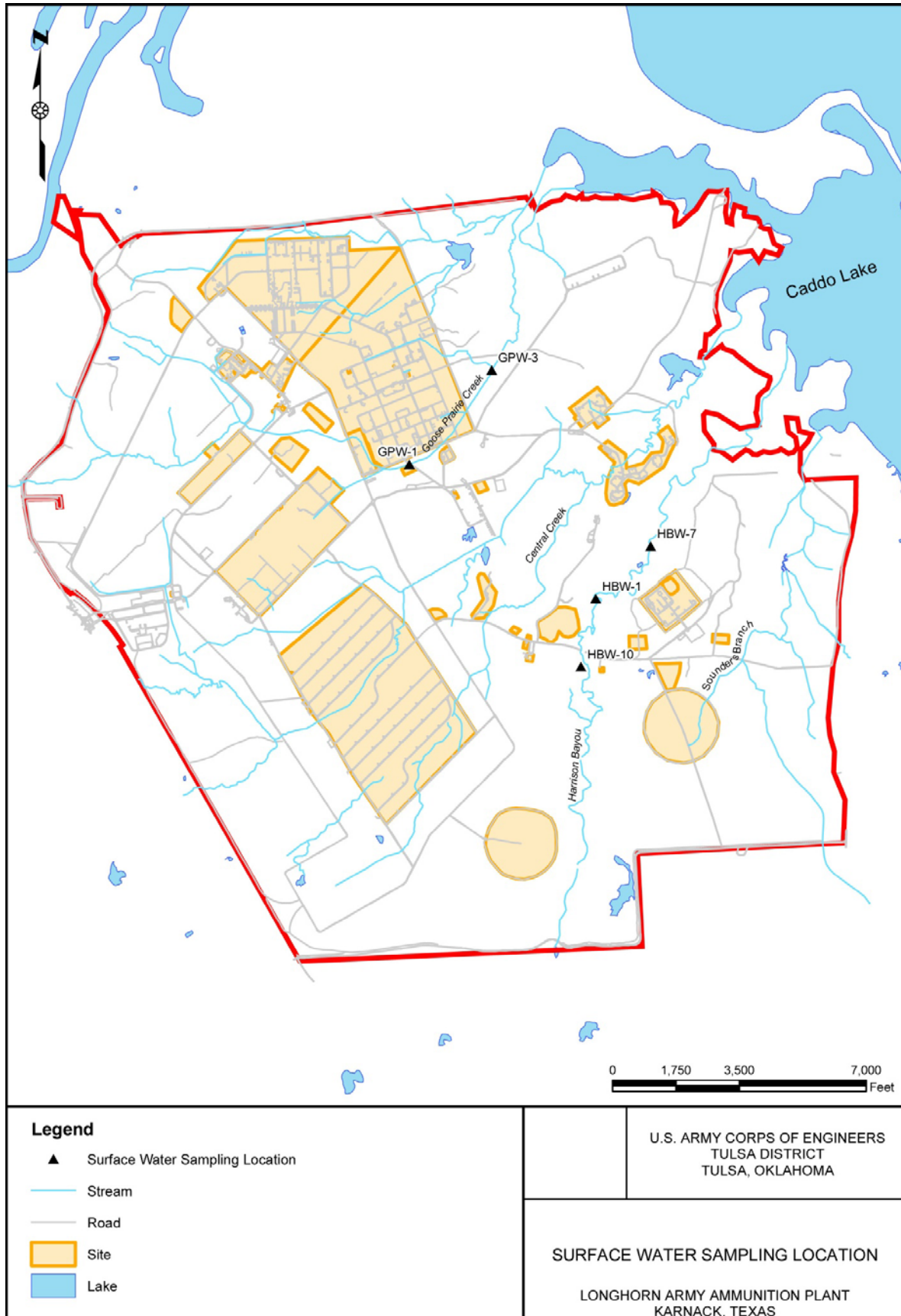
J – Estimated

Dry – no surface water

## Surface Water Samples - Perchlorate



## Longhorn Army Ammunition Plant Creek Sampling Locations



# LHAAP Perimeter Well Monitoring – Perchlorate Data

Groundwater samples are currently collected annually from four wells and semi-annually from two wells on the LHAAP perimeter.

## Perimeter Well Sample Data (in micrograms per liter)

Well ID	Jun 2005	Sep 2005	Sep 2006	May 2007	Aug 2007	Dec 2007	Mar 2008	Sep 2008	May 2009	Sep 2009	Mar 2010
108	NS	NS	10 U	NS	0.5 U	NS	NS	2.5 U	NS	1.2 U	NS
110	NS	NS	10 U	NS	10 U	NS	NS	5.0 U	NS	6 U	NS
111	NS	NS	4 U	NS	0.5 U	NS	NS	0.5 U	NS	0.3 U	NS
112	NS	NS	5 U	NS	3 U	NS	NS	2.0 U	NS	3 U	NS
133	0.541	0.597	1.08	1 U	1.09	0.5 U	0.5 U	0.5 U	0.47 J	0.32	Dry
134	0.881	0.725	0.708 J	1 U	0.949 J	0.5 U	0.5 U	0.829 U	0.04 J	0.3 U	0.3 U

Well ID	Sep 2010	Mar 2011	Sep 2011	Oct 2012	Mar 2013	Jun 2013	Apr 2014	Jun 2014	Dec 2014	Jun 2015	Dec 2015
108	3 U	NS	0.1 U	0.2 U	0.2 U	NS	NS	0.2 U	NS	0.566	NS
110	Dry	NS	Dry	0.535	0.2 U	NS	NS	0.2 U	NS	2U	NS
111	Dry	NS	Dry	Dry	1.32	NS	NS	Dry	NS	0.2U	NS
112	3 U	NS	0.26	0.2 U	0.2 U	NS	NS	0.458	NS	2U	NS
133	0.32	Dry	0.68	0.598	0.655	0.685	0.988	0.887	0.665	0.692	0.952
134	0.45	0.636	1.11	0.671	0.698	0.706	0.863	0.989	0.890	1.11	0.925

Well ID	Jun 2016	Nov/Dec 2016
108	0.2 U	NS
110	0.2 U	0.2 U
111	0.2 U	0.2 U
112	0.2 U	0.2 U
133	0.536	0.513
134	0.997	0.947

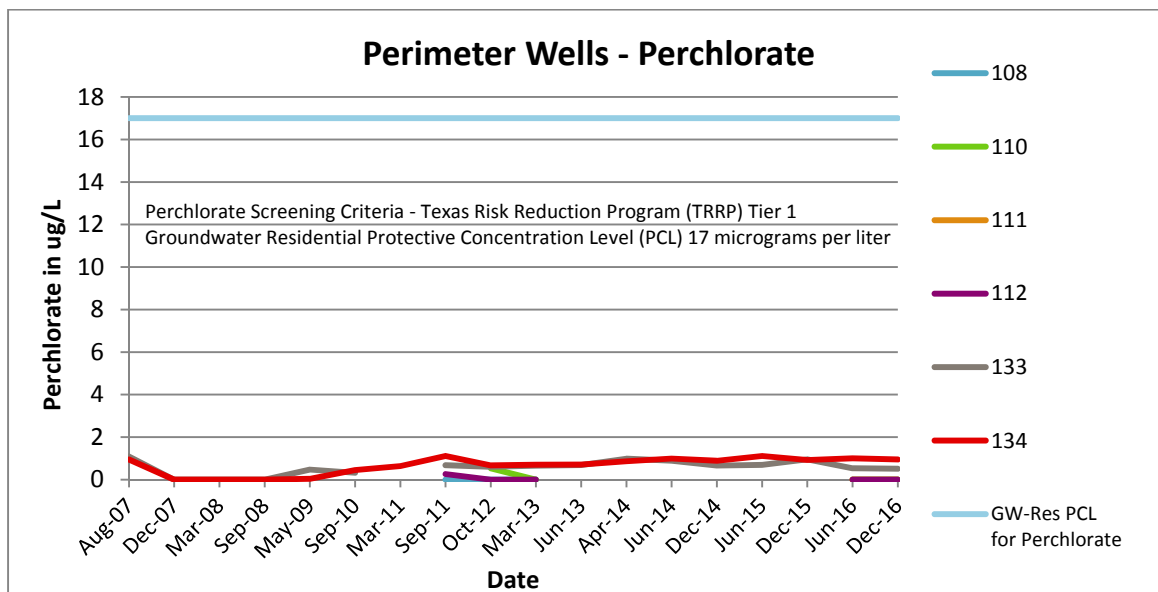
Notes:

J – Estimated

U – Non-Detect

Dry – Well Dry

NS – Not Sampled



## Longhorn Army Ammunition Plant Map with Perimeter Well Locations

