



**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 16, 2020, 6:00 PM Central Standard Time (CST)**

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**Meeting Participants:**

Army BRAC:	Rose M. Zeiler
USACE:	Aaron Williams and Scottie Fiehler
USAEC:	Andrew Maly
Bhate:	Kim Nemmers, Scott Beesinger, and Sally Smith
APTIM:	Bill Foss
USEPA Region 6:	Janetta Coats, Bill Rhotenberry, and Kent Becher-USGS Liaison
TCEQ:	April Palmie
USFWS:	Paul Bruckwicki
RAB:	Present: Judy VanDeventer, Deon Hall, John Fortune, Charles Dixon, Richard LeTourneau, Tom Walker, Nigel R. Shivers, and Sharron McAvoy Absent: Terry Britt; John Pollard, Jr.
Public:	Laura-Ashley Overdyke (Executive Director of the Caddo Lake Institute [CLI]); George Rice (CLI); Joell Beesinger; Jack Richards, Sr; James Pratt

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An agenda for the RAB meeting, a color copy of the Bhate Environmental Associates, Inc. (Bhate) slide presentation, and handouts (see list at end of meeting minutes) were provided for meeting attendees.

**Welcome and Introduction**

Ms. Judy VanDeventer, the RAB Co-Chair, called the meeting to order at 6:00 pm. Ms. VanDeventer asked new RAB attendees to stand up. Mr. Jack Richards is a first time attendee and he lives by the lake. Mr. James Pratt said he worked at LHAAP early on in the remediation process and has been away for a while but he wanted to stop in and see how things are going. Mr. Scottie Fiehler said that he is with United States Army Corps of Engineers (USACE) and that he had been to a RAB meeting years ago and is Aaron William's supervisor. Mr. Andrew Maly said that he is with the United States Army Environmental Command (USAEC) and has been to the RAB many times for the USAEC, but was attending this meeting because Ms. Amanda Sherman, who had been assigned the project for USAEC, was being promoted. Ms. Rose M. Zeiler introduced Mr. Bill Rhotenberry with the United States Environmental Protection Agency (USEPA) as the person who is replacing Mr. Rich Mayer, who retired in December 2019. Ms. Sally Smith, the Bhate Safety Director, then gave out Bhate's 2019 Safety Excellence award to Mr. Scott Beesinger, Site Manager for LHAAP.

Ms. Zeiler explained the purpose of the RAB is to promote community awareness and obtain constructive community review and comments on environmental restoration activities. Ms. Zeiler stated the importance of informing the community and that there is a website ([www.longhornaap.com](http://www.longhornaap.com)) where information is available such as activities and links for the sites.



Ms. Zeiler explained that the final LHAAP documents are placed into the AR quarterly, but critical documents will be available on the website by site once finalized for public access going forward. Ms. Janetta Coats asked if the Army is still sending documents to the information repository at the Marshall library. Ms. Zeiler confirmed that finalized documents are sent to the library but that the library only wants compact discs (CDs). Ms. Zeiler asked that she be notified if a Technical Assistance Grant (TAG) or RAB member needs a copy of a document.

Ms. Zeiler announced that Ms. Carol Fortune had resigned from the RAB and asked that names of persons interested in joining the RAB be passed along. Ms. VanDeventer said she had spoken with Mr. Terry Britt and that he still wanted to be on the RAB but that he was having trouble getting to the meeting due to personal issues.

Ms. Zeiler asked if there were any questions or concerns about the October 2019 RAB meeting minutes. Mr. John Fortune made a motion to accept the October 2019 meeting minutes. Ms. Sharron McAvoy seconded the motion.

## **Defense Environmental Restoration**

### Overview of Sites

Ms. Kim Nemmers discussed the field work completed since the previous RAB Meeting. Ms. Nemmers said that the remedial action for the soil excavation at LHAAP-03 was on hold due to rainfall events and that one side wall required additional excavation and then the site would be backfilled. Ms. Nemmers explained that remedial action operation (RA-O) sampling was completed at two sites (LHAAP-58 and LHAAP-18/24) in December and that RA-O sampling is completed to evaluate remedies that are in place. Ms. Nemmers said that in-situ bioremediation (ISB) injections were completed at LHAAP-04 and LHAAP-16 and that Mr. Bill Foss would discuss further on the next slides.

### LHAAP-04

Mr. Foss provided an update on the injection at LHAAP-04. Mr. Foss explained that injections were completed at 25 locations at the site, which started in October and finished in November 2019. Mr. Foss said that a total of 37,100 gallons of emulsified vegetable oil (EVO), nutrients, and water solution were injected into the locations at LHAAP-04. Mr. Foss said that the injections were shallow (from 6 to 20 feet below ground surface [bgs]) and some daylighting occurred. Mr. Foss explained that the injection pressure and flow was lowered, which stopped the daylighting. Mr. Foss explained that daylighting is when the injectate comes back up to the surface. Mr. Foss explained that this was often observed around tree roots at LHAAP-04.

Mr. Foss stated that the first round of design effectiveness monitoring was completed. Mr. Foss explained that this monitoring was to evaluate total organic carbon (TOC) in the aquifer around the wells in the treatment area (distribution of the injectate). Mr. Foss explained that the first round of performance monitoring would be completed in February 2020 to evaluate the effect of the injectate from the contaminants. Mr. Richards asked if the grey buildings shown on the map were still present. Mr. Foss said that with the exception of the building to the south, which is the fire station, buildings are not present except for the foundations. Mr. Pratt asked about



the statement in the slides that says injected solution reached several of the most contaminated wells during injection, confirming radius of influence. Mr. Foss said that the solution actually rose up and popped off well caps on a couple of the monitoring wells, which was verification and required slowing of flow. Mr. Foss said that milky white material was also observed in many of the wells, which also confirmed distribution. Mr. Nigel Shivers asked if this site is where the power plant was located. Mr. Foss confirmed that the site is just on the south side of where the power plant was located.

#### LHAAP-16

Mr. Foss then discussed LHAAP-16 and explained that this is the site where installation of monitoring wells took place across the creek, which was completed last summer. Mr. Foss said that the injections started in September 2019 and were completed a few days before Christmas. Mr. Foss said that a little over 84,000 gallons of EVO, nutrients, and bio-augmentation culture (added bacteria) were injected at LHAAP-16. Mr. Foss explained that the injections included bio-augmentation to help degrade the contaminants in the groundwater. Mr. Foss said that this material was placed into 78 direct push injection locations as well as 22 injection wells across the site. Mr. Foss mentioned that a couple of areas had injections with recirculation by pumping to make sure there was distribution of the injectate. Mr. Foss stated that there were no real issues with daylighting because the injections were deeper. Mr. Foss said that the bayou was monitored throughout the injection event. Mr. Foss said that the first round of samples to evaluate design effectiveness had been completed except for Landfill Biobarrier #2 and that the results were being evaluated. If necessary, Mr. Foss said another round of sampling would be completed to evaluate the distribution of the injectate. Mr. Foss said that the first quarterly performance sampling event to evaluate the effect of the injection on the contamination will be in March 2020.

#### LHAAP-67

Mr. Foss explained that two new monitoring wells were installed, per the Five Year Review (FYR) to define the edge of the plume. Mr. Foss said that these two new wells were sampled in the latest sampling round completed in October 2019 and no contamination was detected. Mr. Foss concluded that this sampling met the intent of the FYR comment and that the plume was fully delineated.

#### Documents in Process

Ms. Nemmers reiterated what Ms. Zeiler had said about the documents being placed into the AR when final and that critical documents will be placed on the website under the site link. Ms. Nemmers discussed that the Response Action Completion Report (RACR) was being prepared for LHAAP-04 to document the injections completed and evaluate the distribution as Mr. Foss had discussed. Ms. Nemmers explained that the other reports listed are for performance monitoring (RA-O) over the course of the year for those sites. Also, the quarterly groundwater treatment plant (GWTP) reports document the field work and activities and that is in process. Ms. Nemmers explained that the quarterly GWTP reports often include the groundwater data from LHAAP-18/24 because this is the water that is extracted and treated at the GWTP.

#### LHAAP-50



Mr. Foss explained that LHAAP-50 has plumes of perchlorate and trichloroethylene (TCE) and the remedy in place is monitored natural attenuation (MNA). Mr. Foss stated that the MNA evaluations indicated that the remedy was not effective, so the Contingency Remedy from the ROD is being implemented. Mr. Foss said that an Explanation of Significant Difference (ESD) was then prepared to implement the contingency remedy to kick-start degradation. Ms. Zeiler explained that the ROD had the contingency remedy of ISB included to ensure there was an approved remedy if MNA did not work so that a whole new ROD was not required. However, the ROD did require an ESD be written once the contingency remedy was determined to be needed. Mr. Foss pointed out the proposed injection locations on Slide 17. Mr. Foss said that the targeted wells were 50WW12, 50WW13, and 50WW14 as the source for the broader plume. Mr. Foss said the injectate will be the same as discussed for the other sites using ISB. Mr. Foss explained that the goal is to knock down levels in that area for MNA to continue on and take over from there.

#### Look Ahead

Ms. Nemmers then discussed the 3-month look ahead for LHAAP field work. Ms. Nemmers explained that LHAAP-03 required some additional excavation and then backfilling to be completed once weather allowed. Ms. Nemmers said that LHAAP-17 had the same issue where it required backfilling, weather allowing. Ms. Nemmers said that performance monitoring was required at LHAAP-04 and LHAAP-16, as previously presented by Mr. Foss. RA-O sampling was required at LHAAP-46 and LHAAP-58, where remedies were already in place. Ms. Nemmers said that the remedy implementation for LHAAP-50 is planned to be completed prior to the next RAB meeting.

Ms. Nemmers discussed the document look-ahead. Ms. Nemmers explained that finalization of documents follows a process whereby the Army review and the Regulators review the documents, which takes time.

#### Groundwater Treatment Plant

Ms. Nemmers stated that the outflow presented is a little lower than shown in previous months, which is primarily due to little water being discharged from the INF Pond. Ms. Nemmers also said that some lines were repaired at LHAAP-18/24. Ms. Nemmers said that the graph shows discharge to Harrison Bayou. Ms. Nemmers said that with the storm over the weekend that the GWTP is still down for remaining repairs. Ms. Nemmers reported no major issues at the GWTP.

#### Surface Water Sampling

Ms. Nemmers said that a quarterly sample was collected in October 2019 and that there were no exceedances from that sample. Ms. Nemmers said that the exceedance shown on the chart provided is from July 2019 and that the sample location was resampled and did not have an exceedance. Ms. Nemmers directed the public to the handouts for the actual data from these sampling events. Mr. George Rice asked about the reason for the spike of perchlorate detected in surface water in the one sample. Ms. Nemmers said that groundwater data near the surface water was evaluated and that no source for the spike was found. Ms. Nemmers said that the location where the spike occurred was resampled on July 30, 2019, and while perchlorate was detected that the detection was well below the screening criteria. Ms. Zeiler said that the Army



asked Bhate to see if there was an extraction well or interceptor trench (ICT) down that could have resulted in the exceedance and that no reason for the spike was identified. Mr. Rice confirmed that the location was resampled and Ms. Nemmers pointed out the note at the bottom of the graph with the details of the resampling.

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

Mr. Aaron Williams said that he was presenting the three sites currently contracted to HDR, Inc. (LHAAP-18/24, LHAAP-29, and LHAAP-47) that required a ROD. Mr. Williams said that the final ROD for LHAAP-18/24 was close because the ROD had been signed by the Army and it was sent to the Regulators for their signature and concurrence. Mr. Williams said that a notice will be placed in the paper once it is signed letting the public know that the ROD is in the Marshall Library as well as on the website. For LHAAP-29, the ROD is signed and available for public review at the Marshall Library.

Mr. Williams said that the presence of dry wells and aging data at LHAAP-47 required that additional data be collected prior to finalization of the ROD and that additional investigation had been completed. Mr. Williams explained that during the additional sampling there was a detection of TCE of 120,000 micrograms per liter ( $\mu\text{g/L}$ ) near one of the buildings and stated that the remedy previously selected would not be effective for TCE at that concentration. Mr. Williams said that the Army is in the process of defining the area and will then have to go back to the Feasibility Study to evaluate new remedies that would effectively treat this area. Ms. Zeiler said that the Army had taken a step back in the process from the ROD phase. Mr. Williams discussed the field work completed as outlined on the slide. Mr. Williams showed the area of concern at LHAAP-47 by Building 46A. Mr. Williams explained that clean soil results were collected to the north but not defined to the south, east, and west for groundwater protection. Mr. Williams said that the same is true for groundwater which is not fully defined to the north. Mr. Williams explained that the contamination has to be defined for remedy selection so additional investigation is going to be completed.

Mr. Williams gave an update on the FYR regarding additional well installations to define plumes at two sites as well as implement the contingency remedy at LHAAP-50, which Mr. Foss had previously covered. Mr. Williams pointed out the LHAAP-12 well location, which has been installed, intended to define the plume. Mr. Williams explained that the Army is awaiting validated laboratory results from groundwater samples collected in December 2019. Mr. Williams said that the new well at LHAAP-50 and the two new wells at LHAAP-67 didn't contain detectable contaminants of concern. Ms. Zeiler pointed out that the plume for LHAAP-50 is smaller than originally thought based upon the additional well installed.

**RAB Questions**

Prior to wrapping up the meeting, Ms. Zeiler welcomed questions. Mr. Fortune asked for information on injecting EVO. Mr. Foss explained that there is a trailer system that is mobilized to the site that has a manifold that allows for injection into multiple injection points or wells with a tank for mixing and a pressure gauge, valve, and flow meter on each line to control flow of the materials. Mr. Foss explained that the trailer has a generator and variable speed pump. Mr. Foss



said that there is usually a design flow or pressure that is not to be exceeded. Each injection point is set up and then the injections start. Ms. Zeiler pointed out that the injections require a long time to complete.

Mr. Deon Hall asked if there are metals, like mercury, that exceed at the sites. Ms. Zeiler said there are a few sites that have arsenic but that no sites have mercury. Mr. Foss mentioned the soil removal of metals at LHAAP-03. Ms. Zeiler pointed out that the LHAAP-03 site had been a paint shop previously, which is why metals were present. Ms. April Palmie stated that the effluent from the GWTP is monitored for metals. Ms. Laura-Ashley Overdyke asked if that means that the water going to the bayou is tested for metals. Ms. Palmie said that certain metals are present within LHAAP-18/24 but are sporadic. So the effluent is tested to ensure that Texas Commission on Environmental Quality (TCEQ) limits are met even though the metals present are not site wide. Mr. Hall asked if arsenic was the main concern to which Ms. Zeiler confirmed and stated that arsenic is often naturally occurring at levels that exceed screening levels.

Ms. Overdyke asked for confirmation that the bayou is being visually inspected for the white milky material. Mr. Foss confirmed and then explained that dissolved oxygen (DO) readings are also collected after a rain event. Mr. Foss explained that the material injected causes DO to deplete so this allowed further evaluation of the bayou beyond just visual. Ms. Zeiler pointed out that part of the remedy at LHAAP-16 included a barrier which was very close to the bayou. Ms. Palmie explained that DO is a good thing to use for field screenings because it can be tested in the field real time to see if there are any issues. Ms. Overdyke asked if the removal of DO is required for the bacteria used to reduce the chlorinated compounds. Mr. Foss said that the injection solutions are low DO for this reason and that the remedial process should reduce the DO even further. Mr. Foss said that low oxygen in surface water is also a bad thing for the environment, particularly the fish. Mr. Foss said that all of the DO readings measured during and after the injections in the bayou were above 5 mg/L.

Mr. Richard LeTourneau confirmed that samples are not tested onsite. Mr. Zeiler said that all samples requiring laboratory testing are sent offsite.

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

Ms. Zeiler then discussed the next meeting with the RAB members. It was decided that the next RAB Meeting will be held on **Wednesday, April 15, 2020**, with the **meeting starting at 6:00 pm CDT** at the Karnack Community Center.

#### **Adjourn**

Mr. Hall made the motion to adjourn and Mr. LeTourneau seconded the motion. The meeting adjourned at 6:45 pm CDT.

#### **January 2020 Meeting Attachments and Handouts:**

- Color Copy of Bhate Presentation Slides
- GWTP – Processed Groundwater Volumes Handout
- Surface Water Sampling Handout



# **Longhorn Army Ammunition Plant Quarterly Restoration Advisory Board Meeting**

**Karnack Community Center  
January 16, 2020  
6:00 PM CST**





# Restoration Advisory Board Meeting

## Abbreviations and Acronyms

µg/L	Micrograms per liter
COC	Chemical of Concern
DERP	Defense Environmental Restoration Program
DPT	Direct Push Technology
GPW	Goose Prairie Creek Water Sample
GW-Ind	Industrial Groundwater
GWTP	Groundwater Treatment Plant
HBW	Harrison Bayou Water Sample
ISB	In-situ bioremediation
LHAAP	Longhorn Army Ammunition Plant

MSC	Medium-Specific Concentration
PCL	Protective Concentration Level
PSI	Pre-Screening Investigation
RAB	Restoration Advisory Board
RA(O)	Remedial Action Operation
RAWP	Remedial Action Work Plan
ROD	Record of Decision
RRR	Risk Reduction Rule
TCE	Trichloroethylene
TRRP	Texas Risk Reduction Program



# Restoration Advisory Board Meeting

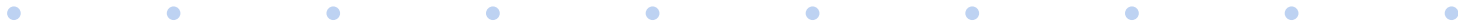
## Agenda

- 06:00 Welcome and Introduction
- 06:05 Open Items {RMZ}
  - Purpose of the Restoration Advisory Board (RAB) Meeting
  - Ongoing Outreach/Website
  - RAB Administrative Issues
    - o Membership Update
    - o Minutes (October 2019 RAB Meeting)
- 06:15 Defense Environmental Restoration Program (DERP) Update {Bhate}
  - Documents and Field Work Completed since last RAB
    - o Remedial Action at LHAAP-04
    - o Remedial Action at LHAAP-16
    - o Remedial Action Operation [RA(O)] Sampling at LHAAP- 67
  - Three Month Look ahead
  - Groundwater Treatment Plant (GWTP) Update
- 06:45 Other DERP Update {RMZ}
  - LHAAP-18/24, -29, and -47 Document Status
  - LHAAP-47 Additional Pre-Screening Investigation (PSI) Data and Revised Schedule for the Record of Decision (ROD)
  - Five Year Review Update – LHAAP-12, -50, and -67
- 06:55 Next RAB Meeting Schedule and Closing Remarks {RMZ}

# Restoration Advisory Board Meeting

## Purpose of the RAB Meeting

- Held every 3 months
- The mission of the Longhorn Army Ammunition Plant (LHAAP) RAB is to promote community awareness and obtain constructive community review and comments on environmental restoration activities at the former LHAAP



# Restoration Advisory Board Meeting

## 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). The website is regularly updated to indicate the upcoming field events at each site including groundwater sampling, monitoring well installations, soil sampling, or remediation activities.
  - Make suggestions for improving communication – the Army welcomes and appreciates community feedback



# Restoration Advisory Board Meeting

## RAB Administrative Issues

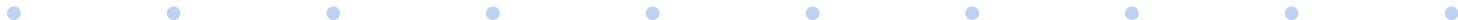
- **Membership Update**
- **Minutes (October 2019 RAB Meeting)**



# Restoration Advisory Board Meeting

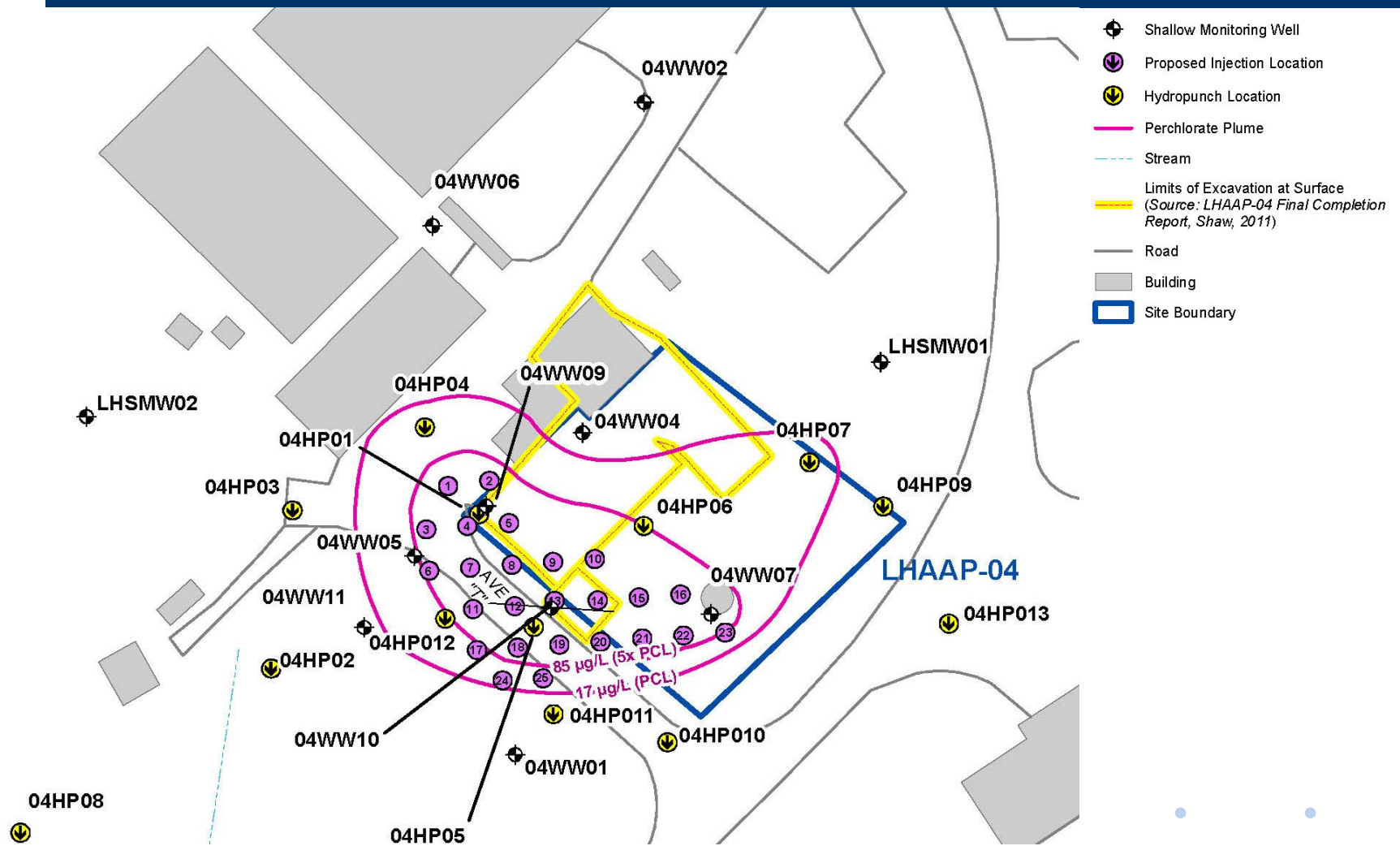
## Completed Field Work Since Last RAB Meeting

Site	Activity
LHAAP-03	Remedial Action (Soil Excavation)
LHAAP-04	Remedial Action (In-situ bioremediation [ISB] Injections)
LHAAP-16	Remedial Action (ISB Injections)
LHAAP-58	RA(O) Sampling –December 2019
LHAAP-18/24	RA(O) Sampling – December 2019



# Restoration Advisory Board Meeting

## LHAAP-04 Remedial Action Update



# Restoration Advisory Board Meeting

## LHAAP-04 Remedial Action Update

- ISB Injections performed in October and November 2019
- Injected 37,100 gallons of emulsified vegetable oil, nutrient, and water solution into 25 direct push injection locations
- Injection intervals ranged between 6 and 20 feet below ground surface
- Due to topography of site ditches and shallow injection depths “daylighting” of injected solution did occur requiring very slow injection rates
- Injected solution reached several of the most contaminated wells during injection, confirming radius of influence
- Performance total organic carbon sampling confirmed carbon source reached wells within the injection area

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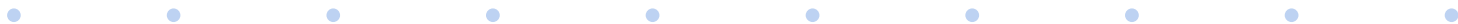




# Restoration Advisory Board Meeting

## LHAAP-16 Remedial Action Update

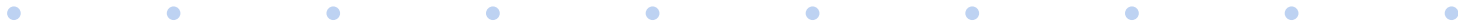
- ISB Injections performed from September – December 2019
- Injected ISB solution into direct push injection locations, newly installed injection wells, and existing wells in the Bayou Biobarrier; Landfill Biobarriers 1, 2, & 3; and the mid-plume area
- Injected 84,678 gallons of emulsified vegetable oil, nutrients, and bio-augmentation culture in 78 direct push injection locations and 22 injection wells
- Recirculated extracted groundwater in mid-plume intermediate zone and Landfill Biobarrier 2 to enhance distribution of amendments
- Minimal “daylighting” of injected solution occurred and observations and monitoring confirmed no impact to the Bayou



# Restoration Advisory Board Meeting

## LHAAP-16 Remedial Action Update

- First round of performance sampling has been completed for the Bayou Biobarrier, Landfill Biobarriers 1 and 3, and the mid-plume intermediate and shallow injection areas
- First round of performance sampling for Landfill Biobarrier 2 will be completed in January 2020.



# Restoration Advisory Board Meeting

## LHAAP-67 RA(O) Sampling

- Monitoring performed at 17 wells (15 sampled and 2 gauged for elevation only) in October 2018 and May 2019
- Results reported in the Year 5 RA(O) Report currently in preparation for submittal to the regulators
- Year 5 RA(O) Report recommends proceeding with annual monitoring beginning in October 2019 in accordance with the Response Action Completion Report
- October 2019 sampling event included the 2 newly installed wells (67WW17 and 67WW18) as a result of the Five Year Review Recommendation
- Chemicals of Concern (COCs) were not detected in either of the newly installed wells



# Restoration Advisory Board Meeting

## Documents in Process

Site	Document
LHAAP-04	Response Action Completion Report
LHAAP-37	Annual RA(O) Report
LHAAP-46	Annual RA(O) Report
LHAAP-67	Annual RA(O) Report
GWTP	Quarterly Evaluation Report: Third Quarter (July – September 2019)



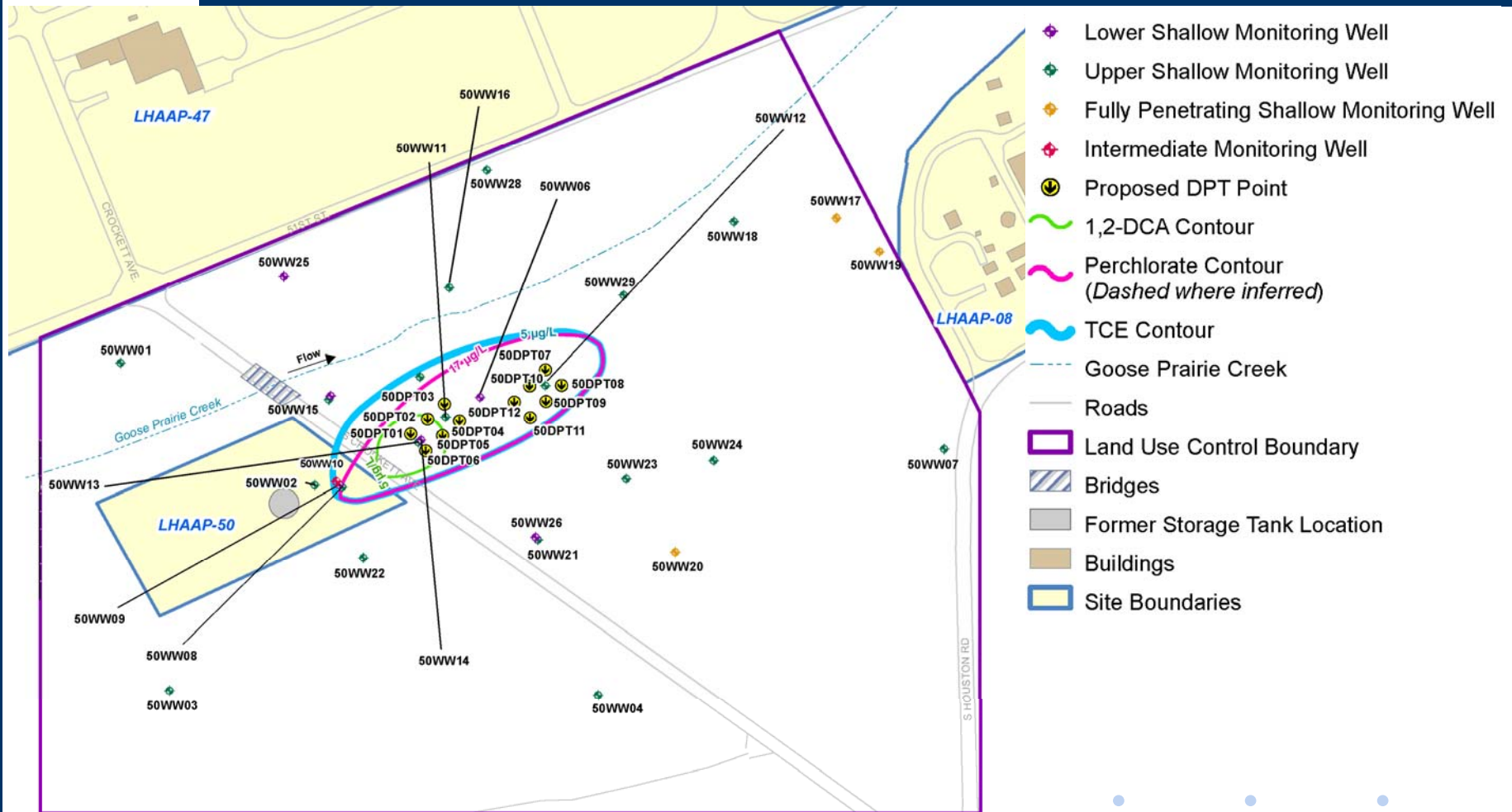
# Restoration Advisory Board Meeting

## 3 Month Look Ahead - Field Work by Bhate Team

Site	Activity
LHAAP-03	Complete excavation backfill
LHAAP-04	Performance monitoring
LHAAP-16	Performance monitoring
LHAAP-17	Complete excavation backfill
LHAAP-46	RA(O) Sampling – February 2020
LHAAP-50	Contingency Remedial Action Implementation
LHAAP-58	RA(O) Sampling – March 2020

# Restoration Advisory Board Meeting

## LHAAP-50 Contingency Remedial Action



# Restoration Advisory Board Meeting

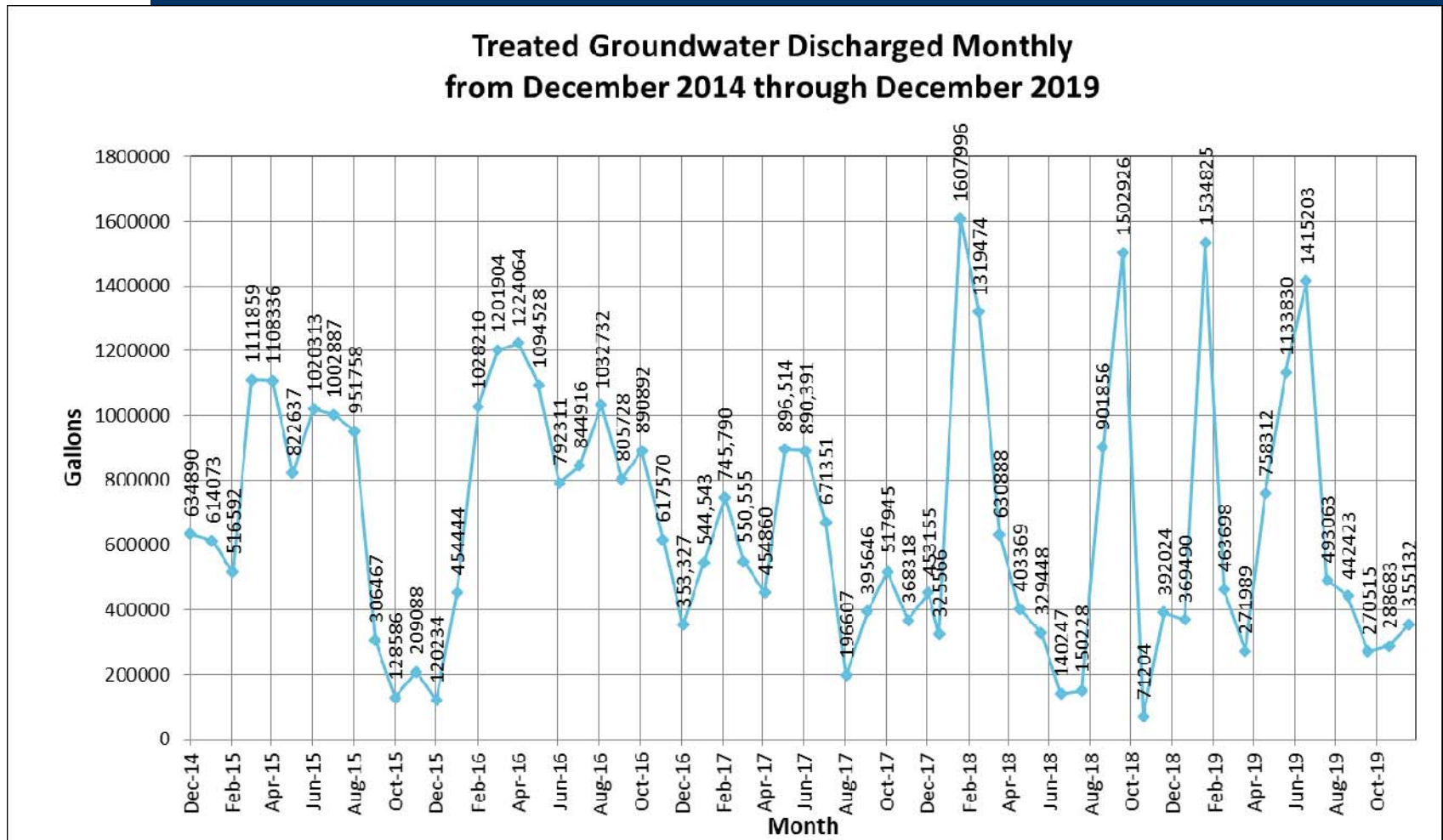
## 3 Month Look Ahead – Documents by Bhate Team

Site	Document
LHAAP-04	Response Action Completion Report to Regulators
LHAAP-37	RA(O) Report to Regulators
LHAAP-46	RA(O) Report to Regulators
LHAAP-67	Finalize RA(O) Report
GWTP, LHAAP-16, and LHAAP-18/24	Quarterly Evaluation Report: Third Quarter (July –September 2019)
	Quarterly Evaluation Report: Fourth Quarter (October – December 2019)



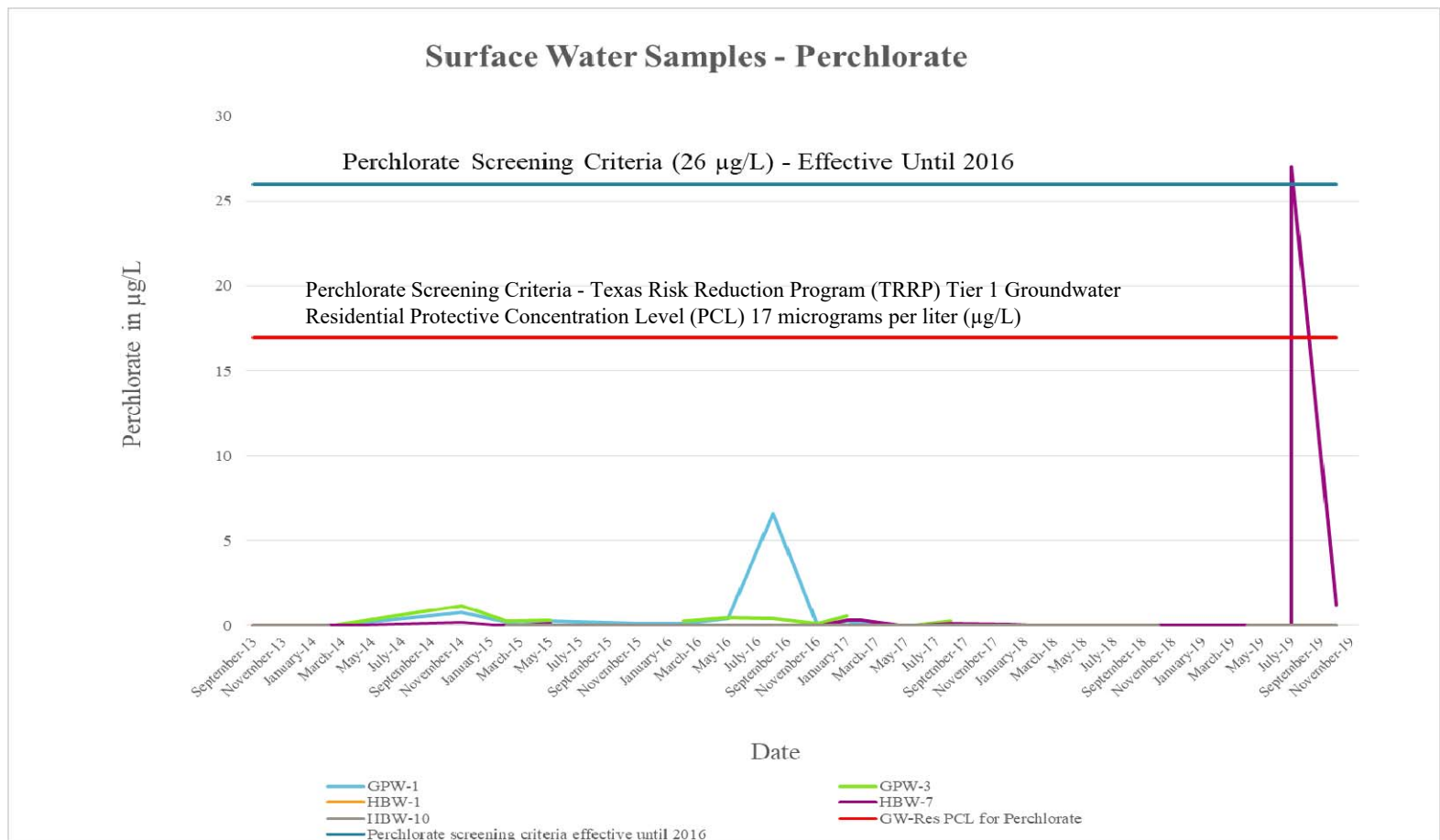
# Restoration Advisory Board Meeting

## GWTP Update



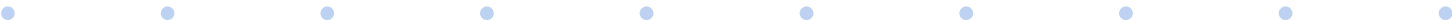
# Restoration Advisory Board Meeting

## Surface Water Sample Results



Note: Surface water at HBW-7 had a detection of 27  $\mu\text{g/L}$  from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later (30 July 2019) with a detection of 1.2  $\mu\text{g/L}$ .

# LHAAP-18/24, 29, 47 Status Update



# Restoration Advisory Board Meeting

## LHAAP-18/24,29 and 47 Document Status

- **LHAAP-18/24**
  - Final ROD signed by Army and submitted to the Regulators January 9, 2020, for signature and concurrence.
- **LHAAP-29**
  - Final ROD signed September 19, 2019
  - The ROD is available for public review at the Marshall Public Library.
- **LHAAP-47**
  - Draft PSI Report Addendum No. 2 in Regulator review
  - Results confirm a trichloroethylene (TCE) source area exists that requires further defining for remedial action analysis/costing.

# Restoration Advisory Board Meeting

## LHAAP-47 Field Work Completed

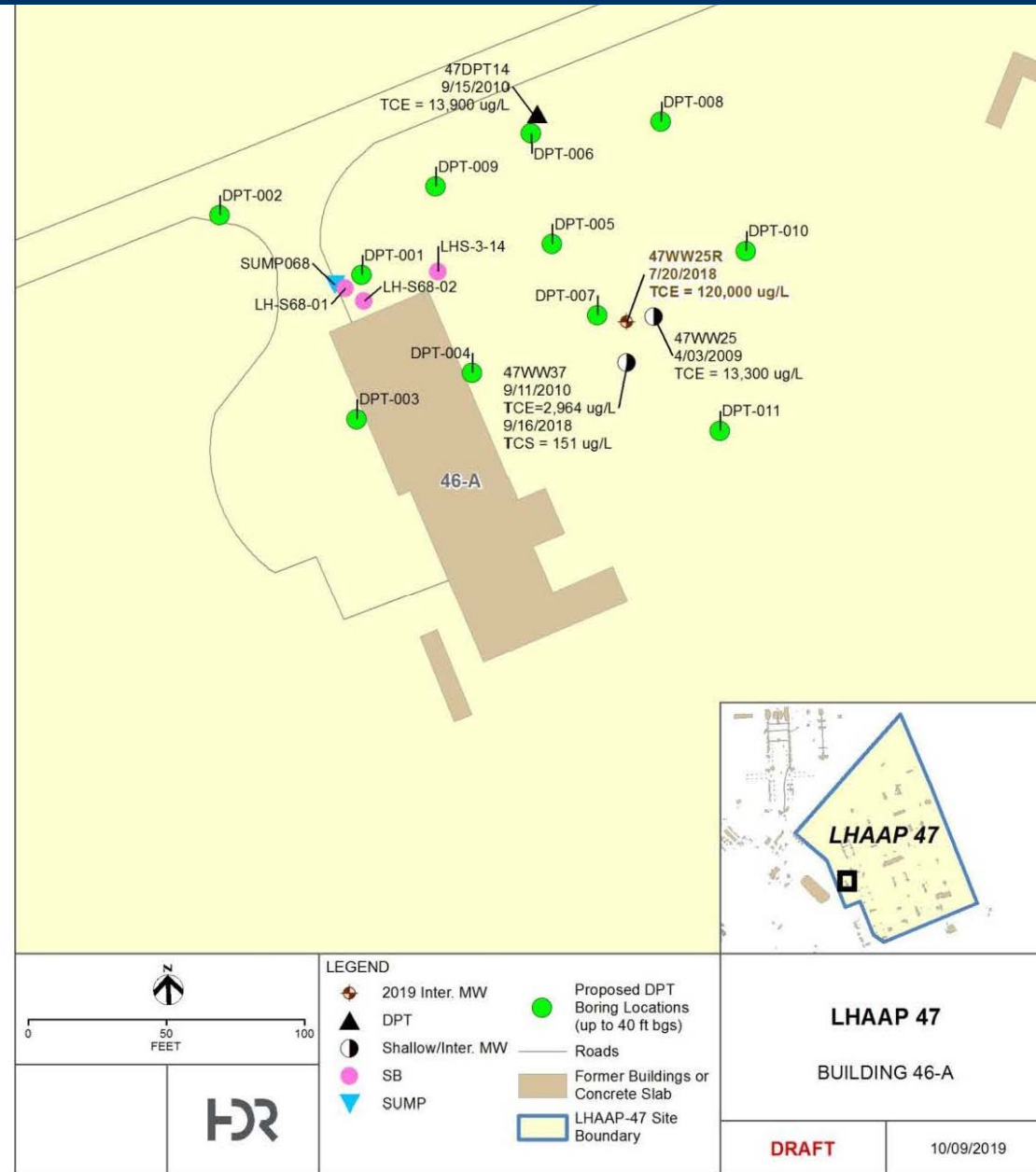
- **Work Completed**
  - **11 Direct Push Technology (DPT) borings**
  - **33 soil samples and 11 groundwater samples from DPT borings to identify source and extent**
  - **Groundwater samples from 3 existing wells for confirmation of results**







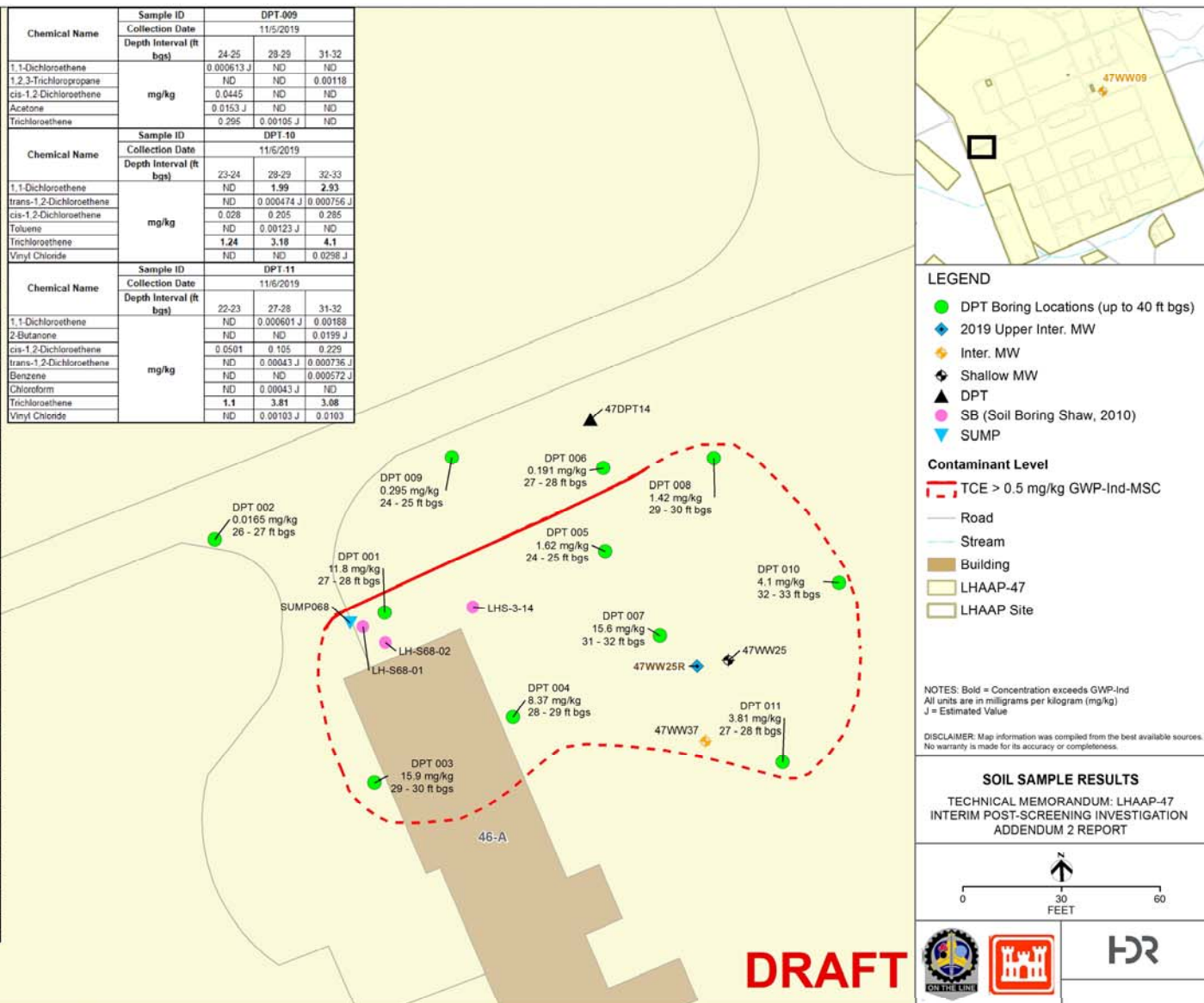
# LHAAP-47 Field Work Completed



# LHAAP-47 Field Work Results - Soil

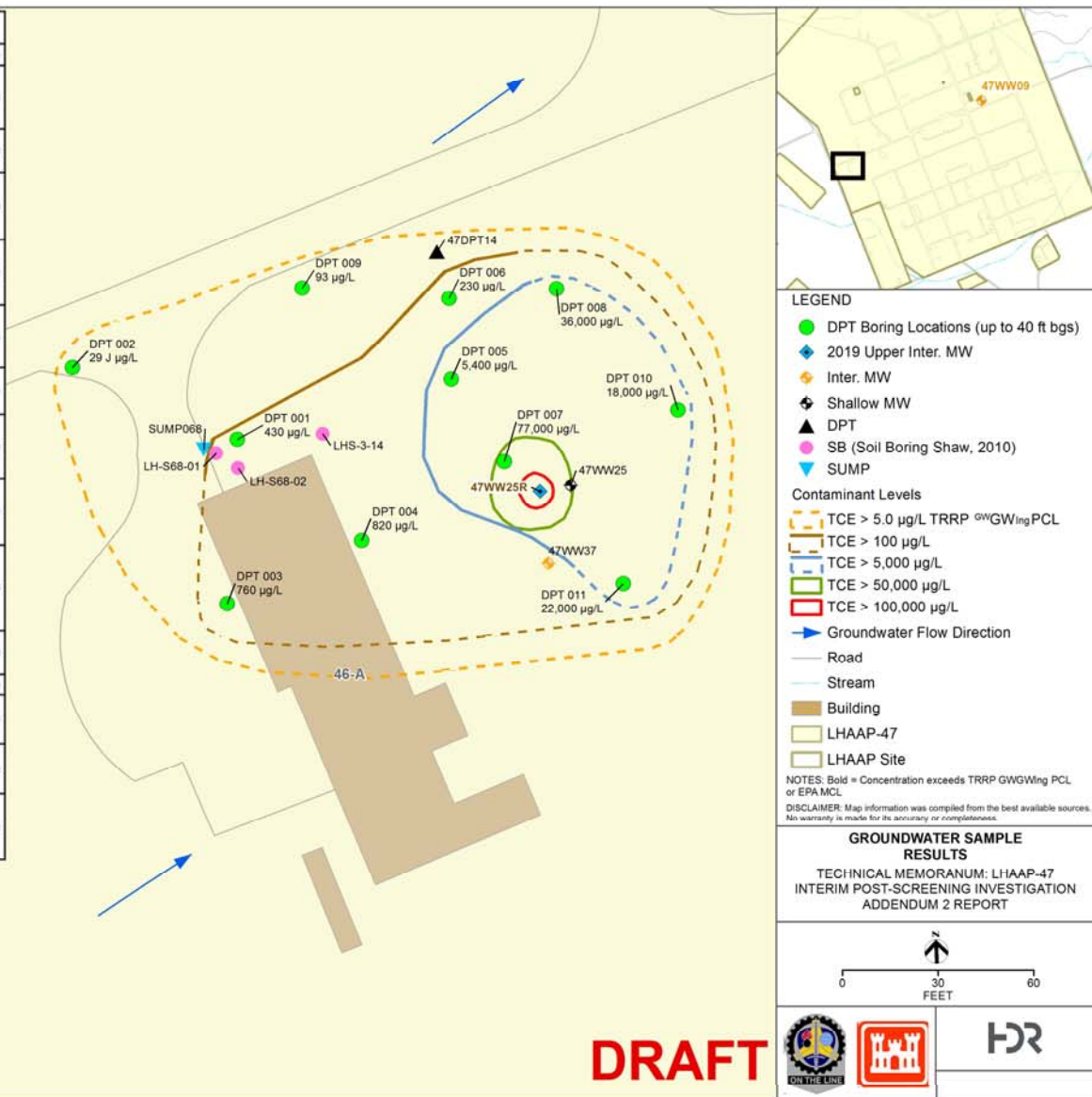
Chemical Name	Sample ID	DPT-001		
	Collection Date	11/5/2019		
	Depth Interval (ft bgs)	27-28	31-32	38-39
1,1-Dichloroethene	mg/kg	0.00493	ND	ND
cis-1,2-Dichloroethene		0.0738	ND	ND
Acetone		ND	0.0195 J	ND
Trichloroethene		11.8	0.00162 J	ND
Vinyl Chloride		0.000985 J	ND	ND
Chemical Name	Sample ID	DPT-002		
Collection Date	11/4/2019			
Depth Interval (ft bgs)	26-27	32-33	40-41	
cis-1,2-Dichloroethene	0.000561 J	0.00164 J	ND	
Trichloroethene	0.0165	0.0039	ND	
Chemical Name	Sample ID	DPT-003		
Collection Date	11/4/2019			
Depth Interval (ft bgs)	29-30	35-36	39-40	
1,1-Dichloroethene	mg/kg	0.00894	ND	ND
cis-1,2-Dichloroethene		0.0315	ND	ND
Carbon disulfide		ND	ND	0.000953 J
Acetone		0.0128 J	ND	0.0115 J
Tetrachloroethene		0.00105 J	ND	ND
Trichloroethene		15.8	ND	0.00148 J
Vinyl Chloride		0.000581 J	ND	ND
Chemical Name		Sample ID	DPT-004	
Collection Date	11/6/2019			
Depth Interval (ft bgs)	28-29	30-31	32-33	
1,1-Dichloroethene	mg/kg	0.00264	ND	ND
cis-1,2-Dichloroethene		0.0322	0.00211 J	ND
Acetone		ND	ND	0.00894 J
Trichloroethene		8.37	0.0187	0.000894 J
Vinyl Chloride		0.000633 J	ND	ND
Chemical Name	Sample ID	DPT-005		
Collection Date	11/5/2019			
Depth Interval (ft bgs)	24-25	27-28	31-32	
1,1-Dichloroethene	mg/kg	0.000799 J	0.000622 J	ND
cis-1,2-Dichloroethene		0.0342	0.0487	0.00426
Trichloroethene		1.62	0.957	0.271
Chemical Name	Sample ID	DPT-006		
Collection Date	11/5/2019			
Depth Interval (ft bgs)	20-21	27-28	30-31	
cis-1,2-Dichloroethene	mg/kg	0.00199 J	0.0056	ND
Trichloroethene		0.0684	0.191	0.00124 J
Chemical Name	Sample ID	DPT-007		
Collection Date	11/5/2019			
Depth Interval (ft bgs)	27-28	29-30	31-32	
1,1-Dichloroethene	mg/kg	0.00297	0.000647 J	0.00046 J
cis-1,2-Dichloroethene		0.064 J	0.0541	0.0513
Benzene		ND	ND	0.000575 J
Acetone		0.000955 J	0.000755 J	0.00046 J
Trichloroethene		6.21	1.76	15.6
Vinyl Chloride		0.00456	0.00129 J	0.00103 J
Chemical Name	Sample ID	DPT-008		
Collection Date	11/6/2019			
Depth Interval (ft bgs)	26-27	27-28	29-30	
1,1-Dichloroethene	mg/kg	0.000722 J	0.000437 J	0.000802 J
1,1-Dichloroethene		0.00103 J	0.000524 J	0.0015 J
cis-1,2-Dichloroethene		0.082	0.0454	0.0746 J
Methylene Chloride		ND	0.00166 J	ND
Toluene		ND	ND	0.000561 J
Trichloroethene		1.34	0.497	1.42
Vinyl Chloride		0.000825 J	ND	0.0016

Chemical Name	Sample ID		DPT-009		
	Collection Date		11/5/2019		
	Depth Interval (ft bgs)				
	mg/kg		24.25	28.29	31.32
1,1-Dichloroethene			0.000613 J	ND	ND
1,2,3-Trichloropropane			ND	ND	0.001
cis-1,2-Dichloroethene			0.0445	ND	ND
Acetone			0.0153 J	ND	ND
Trichloroethene			0.295	0.00105 J	ND
Chemical Name	Sample ID		DPT-10		
	Collection Date		11/5/2019		
	Depth Interval (ft bgs)				
	mg/kg		Z3-24	28-29	32-33
1,1-Dichloroethene			ND	1.99	2.93
trans-1,2-Dichloroethene			ND	0.000474 J	0.000756
cis-1,2-Dichloroethene			0.028	0.205	0.285
Toluene			ND	0.00123 J	ND
Trichloroethene			1.24	3.18	4.1
Vinyl Chloride			ND	ND	0.0298 J
Chemical Name	Sample ID		DPT-11		
	Collection Date		11/5/2019		
	Depth Interval (ft bgs)				
	mg/kg		22-23	27-28	31-32
1,1-Dichloroethene			ND	0.000601 J	0.00188
2-Butanone			ND	ND	0.0199 J
cis-1,2-Dichloroethene			0.0501	0.105	0.229
trans-1,2-Dichloroethene			ND	0.00043 J	0.000736
Benzene	mg/kg		ND	ND	0.000572 J
Chloroform			ND	0.00043 J	ND
Trichloroethene			1.1	3.81	3.08
Vinyl Chloride			ND	0.00103 J	0.010



# LHAAP-47 Field Work Results - Groundwater

Sample ID	Analyte	Result	Unit	Aquifer/Sample Depth	Date
DPT-001	Trichloroethene	430	(µg/L)	Upper Intermediate/40' bgs	11/7/2019
DPT-002	Trichloroethene	29 J	(µg/L)	Upper Intermediate/44' bgs	11/6/2019
	cis-1,2-Dichloroethene	0.99 J	(µg/L)		
	Toluene	0.71 J	(µg/L)		
DPT-003	Trichloroethene	760	(µg/L)	Upper Intermediate/40' bgs	11/6/2019
	Methylene Chloride	23 J	(µg/L)		
DPT-004	Trichloroethene	820	(µg/L)	Upper Intermediate/38' bgs	11/6/2019
	cis-1,2-Dichloroethene	24 J	(µg/L)		
	Methylene Chloride	24 J	(µg/L)		
DPT-005	Trichloroethene	5,400	(µg/L)	Upper Intermediate/34' bgs	11/7/2019
	cis-1,2-Dichloroethene	93 J	(µg/L)		
	Methylene Chloride	94 J	(µg/L)		
DPT-006	Trichloroethene	230	(µg/L)	Upper Intermediate/35' bgs	11/6/2019
	cis-1,2-Dichloroethene	4.2 J	(µg/L)		
	Methylene Chloride	6.6 J	(µg/L)		
DPT-007	Trichloroethene	77,000	(µg/L)	Upper Intermediate/36' bgs	11/6/2019
	cis-1,2-Dichloroethene	840 J	(µg/L)		
DPT-008	Trichloroethene	36,000	(µg/L)	Upper Intermediate/36' bgs	11/7/2019
	cis-1,2-Dichloroethene	820	(µg/L)		
	Methylene Chloride	210 J	(µg/L)		
DPT-009	Trichloroethene	93	(µg/L)	Upper Intermediate/40' bgs	11/6/2019
	cis-1,2-Dichloroethene	3	(µg/L)		
	Acetone	5.3 J	(µg/L)		
DPT-010	Trichloroethene	1,800	(µg/L)	Upper Intermediate/36' bgs	11/7/2019
	cis-1,2-Dichloroethene	1,300	(µg/L)		
	Methylene Chloride	200 J	(µg/L)		
	Vinyl Chloride	97 J	(µg/L)		
DPT-011	Trichloroethene	22,000	(µg/L)	Upper Intermediate/38' bgs	11/7/2019
	cis-1,2-Dichloroethene	1,500	(µg/L)		
47WW09	1,4-Dioxane	37	(µg/L)	Shallow Intermediate/33' bgs	11/7/2019
47WW25R-35	Trichloroethene	130,000	(µg/L)	Upper Intermediate/35' bgs	11/8/2019
	cis-1,2-Dichloroethene	2,100 J	(µg/L)		
47WW25R-38	Trichloroethene	140,000	(µg/L)	Upper Intermediate/38' bgs	11/8/2019
	cis-1,2-Dichloroethene	2,600	(µg/L)		
47WW37	Trichloroethene	190	(µg/L)	Intermediate/61' bgs	11/8/2019
	cis-1,2-Dichloroethene	13	(µg/L)		
	Methylene Chloride	61 J	(µg/L)		



**DRAFT**

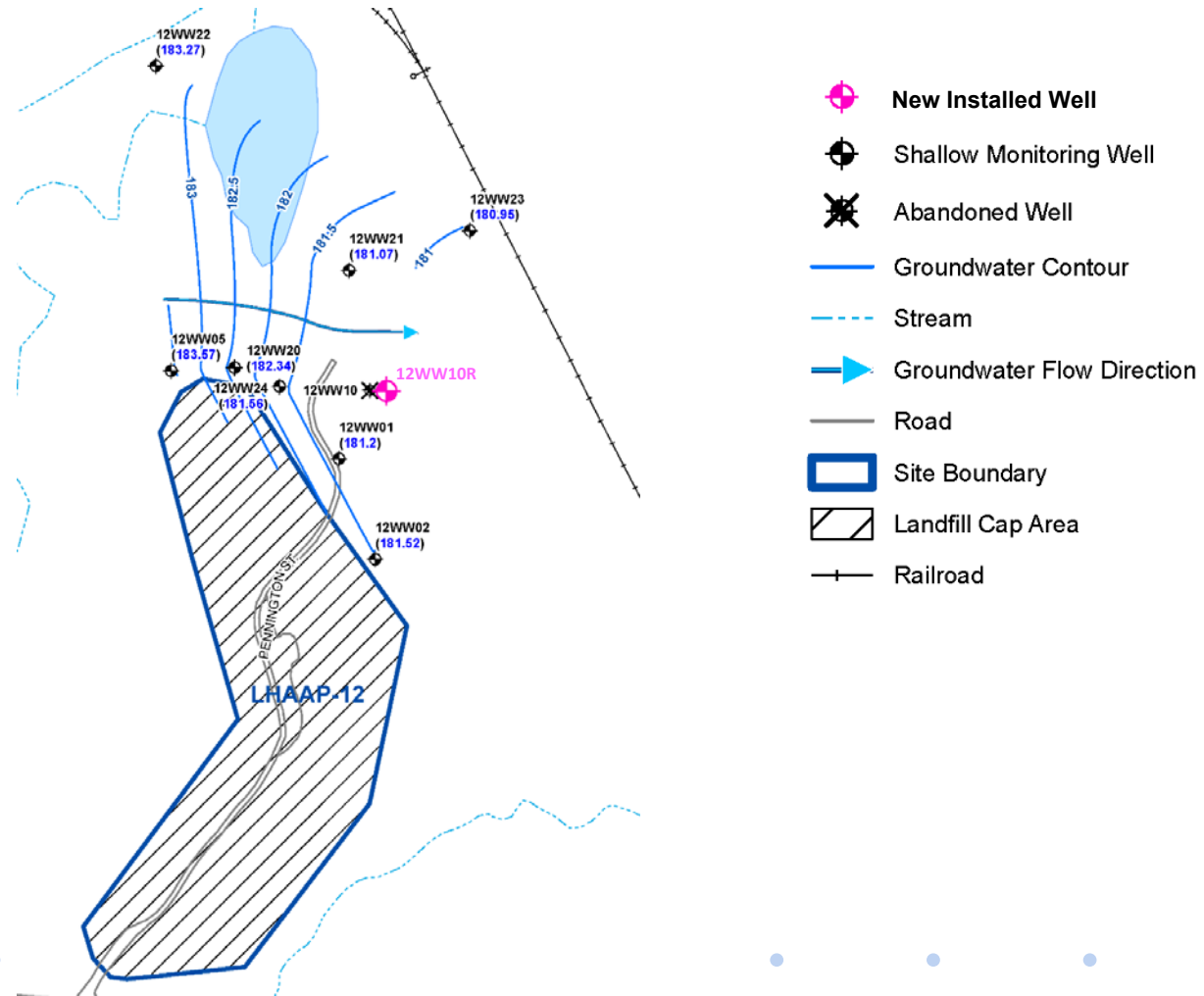
# Restoration Advisory Board Meeting

## Five Year Review Update

- The Five Year Review recommended new monitoring wells at LHAAP-12 (1) and LHAAP-67 (2) to refine the delineation of the groundwater plumes
- The Five Year Review recommended implementation of the contingency remedy at LHAAP-50
- A new well was installed at LHAAP-50 to refine the plume delineation and support the contingency remedy design
- Wells were installed at all three sites in late July and early August 2019

# Restoration Advisory Board Meeting

## LHAAP-12 New Well Location





# Restoration Advisory Board Meeting

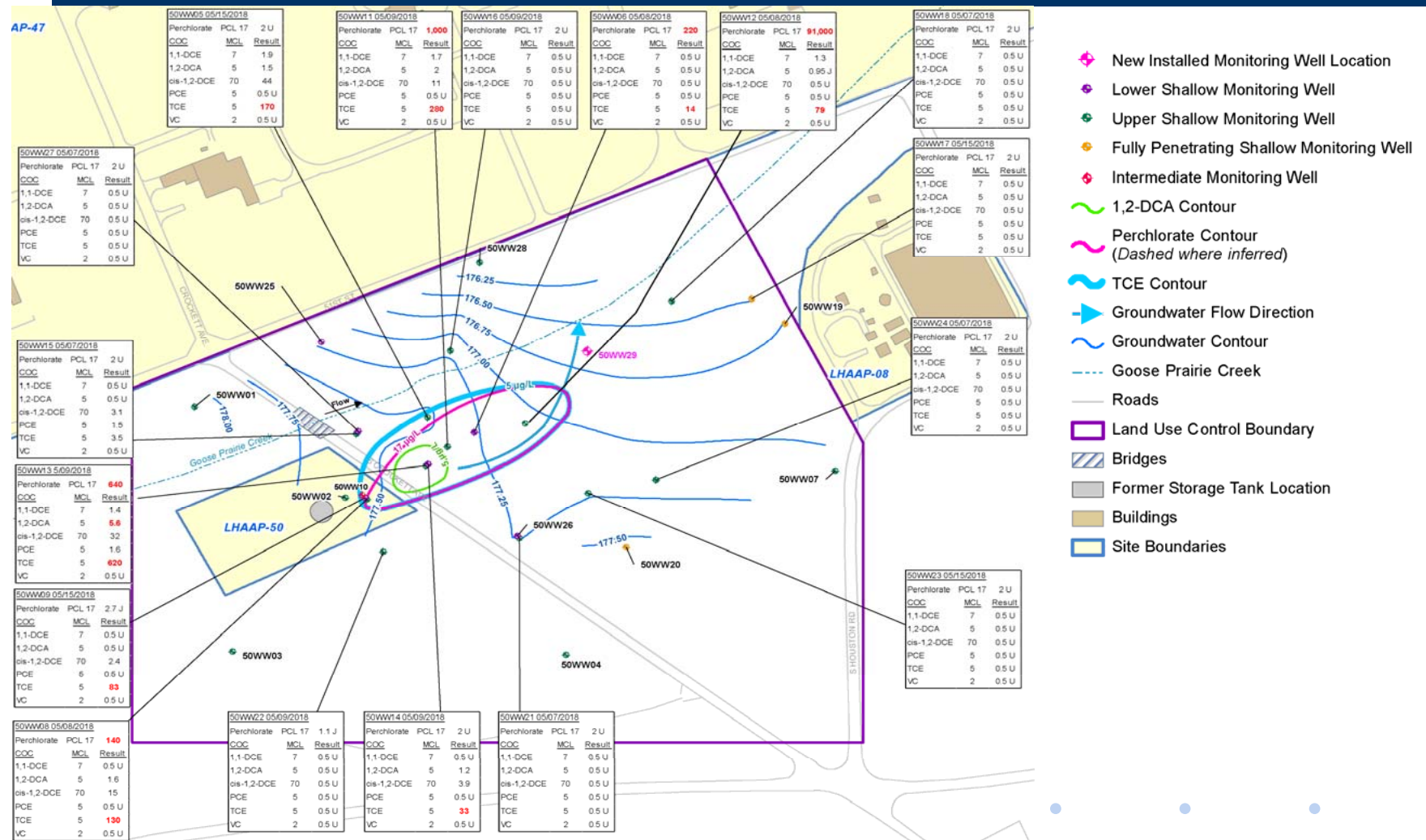
## Five Year Review New Well Installations

- **LHAAP-12:** A sample from the new well (12WW10R) was collected in December 2019; laboratory data has not yet been validated
- **LHAAP-50:** The new well (50WW29) did not contain detectable COCs in the November 2019 RA(O) sample
- **LHAAP-67:** Both new wells (67WW17 and 67WW18) did not contain detectable COCs in the October 2019 RA(O) samples



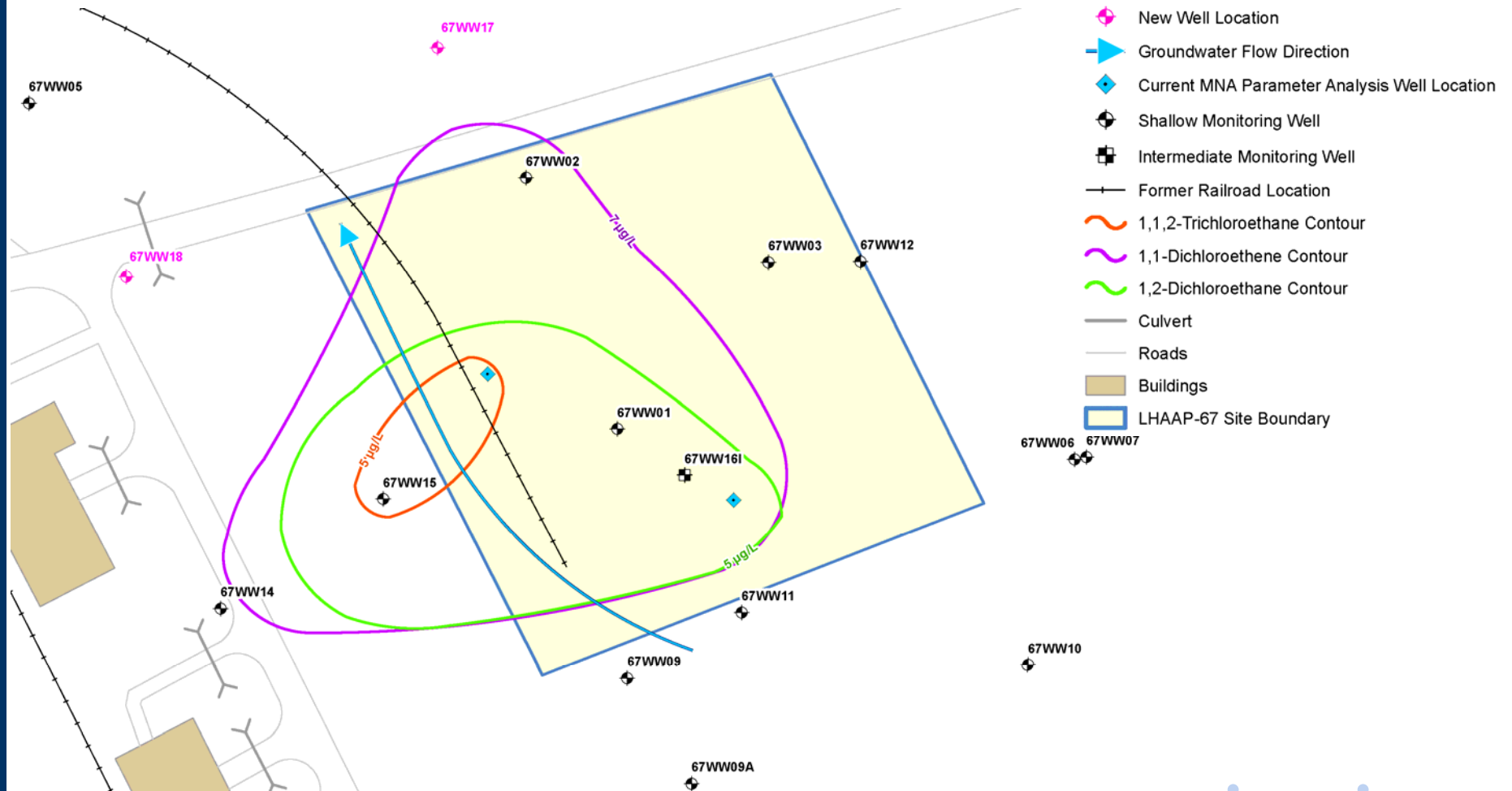
# Restoration Advisory Board Meeting

## LHAAP-50 New Well Location



# Restoration Advisory Board Meeting

## LHAAP-67 New Well Locations



# Restoration Advisory Board Meeting

## Next RAB Meeting Schedule & Closing Remarks

- Schedule April 2020 RAB Meeting
- Other Issues/Remarks
- Thank you for coming

## Groundwater Treatment Plant - Processed Groundwater Volumes

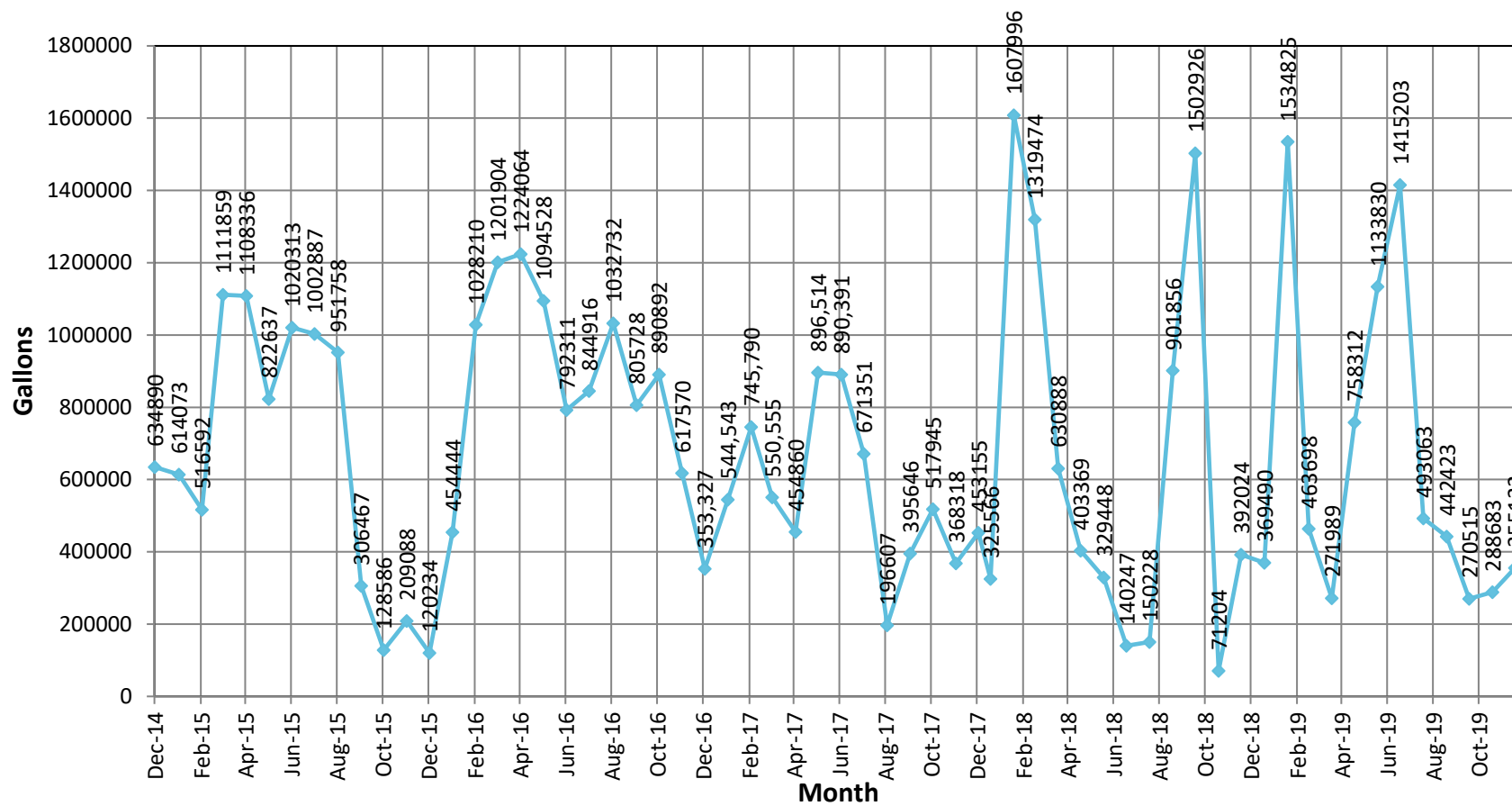
The amount of groundwater treated is determined by measuring the number of gallons of processed water discharged.

### Processed Water Discharged Data (in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199
Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716
Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547
Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456
Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012
Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719	962,890	843,913	716,057
Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
813,974	727,442	706,416	552,657	738,691	844,095	811,346	972,913	611,505	626,253	573,601	575,376
Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
440,877	572,479	634,890	614,073	516,592	1,111,859	1,108,336	822,637	1,020,313	1,002,887	951,758	306,467
Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
128,586	209,088	120,234	454,444	1,028,210	1,201,904	1,224,064	1,094,528	792,311	844,916	1,032,732	805,728
Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
890,892	617,570	353,327	544,543	745,790	550,555	454,860	896,514	890,391	528,538	195,198	961,324
Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul - 18	Aug-18	Sep-18
517,945	368,318	453,155	325,566	1,607,996	1,319,474	630,888	403,369	329,448	140,247	150,228	901,856
Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	June-19	Jul - 19	Aug-19	Sep-19
1,502,926	71,204	392,024	369,490	1,534,825	463,698	271,989	758,312	1,133,830	1,415,203	493,063	442,423
Oct-19	Nov-19	Dec-19									
270,515	288,683	355,132									

\*Indicates Estimate

# Treated Groundwater Discharged Monthly from December 2014 through December 2019



### Water Discharge Location and Volume (Gallons)

Month	Total Combined to Harrison Bayou	LHAAP-18/24 Sprinklers	GWTP To INF Pond	INF Pond to Harrison Bayou	Contract Hauled Off-Site
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	0	0	534,155	0	0
Jun-17	958,404	0	294,550	490,574	0
Jul-17	0	0	528,538	0	0
Aug-17	0	0	195,197	0	0
Sep-17	651,434	0	309,980	651,434	0
Oct-17	0	0	517,945	0	0
Nov-17	0	0	368,318	0	0
Dec-17	560,350	0	453,155	560,350	0
Jan-18	325,566	0	253,177	325,566	0
Feb-18	1,607,996	0	62,017	1,430,634	0
Mar-18	1,319,474	0	0	870,816	0
Apr-18	630,888	0	0	630,888	0
May-18	403,369	0	0	403,369	0
Jun-18	193,669	0	135,779	0	0
Jul -18	0	0	140,247	0	0
Aug -18	49,409	0	100,819	0	0
Sep-18	585,397	0	316,459	524,484	0
Oct-18	1,409,106	0	93,820	1,016,285	0
Nov-18	71,204	0	0	0	0
Dec-18	392,024	0	0	0	0
Jan-19	369,490	0	0	369,490	0
Feb-19	1,534,825	0	0	1,326,485	0
Mar-19	463,698	0	0	83,250	0
Apr-19	271,989	0	0	0	0
May-19	758,312	0	0	253,817	0
Jun-19	1,133,830	0	0	847,918	0

<b>Month</b>	<b>Total Combined to Harrison Bayou</b>	<b>LHAAP-18/24 Sprinklers</b>	<b>GWTP To INF Pond</b>	<b>INF Pond to Harrison Bayou</b>	<b>Contract Hauled Off-Site</b>
Jul -19	1,415,203	0	0	903,001	0
Aug-19	374,629	0	118,434	0	0
Sep-19	0	0	442,423	0	0
Oct-19	0	0	270,515	0	0
Nov-19	115,503	0	173,180	0	0
Dec-19	318,248	0	36,884	0	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>	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>
Creek Sample ID	Feb 2016	May 2016	Aug 2016	Nov 2016	Feb 2017	May 2017	Aug 2017	Dec 2017	Mar 2018	June 2018	August 2018
GPW-1	0.447	6.59	<0.2 U	0.301 J	<1 U	0.263	dry	<4.0 U	<4.0 U	dry	<2.0 U
GPW-3	0.474	0.457	0.141	0.563	<1 U	0.274	dry	<4.0 U	<4.0 U	dry	<2.0 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	<4.0 U	dry	<2.0 U
HBW-7	<0.2 U	<0.2 U	<0.2 U	0.318 J	<1 U	0.155	<0.2 U	<4.0 U	<4.0 U	dry	<2.0 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	<4.0 U	dry	<2.0 U

NS – not sampled

U – non-detect

J – Estimated

Dry – no surface water

Quarter	4th	1st	2nd	3rd	4th
Creek Sample ID	Oct 2018	Jan 2019	April 2019	July 2019	Oct 2019
GPW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
GPW-3	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
HBW-1	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U
	<2.0 U	<2.0 U	<2.0 U	27 (initial)/ 1.2 J (resample)	1.6 J
HBW-7					
HBW-10	<2.0 U	<2.0 U	<2.0 U	<2.0 U	<2.0 U

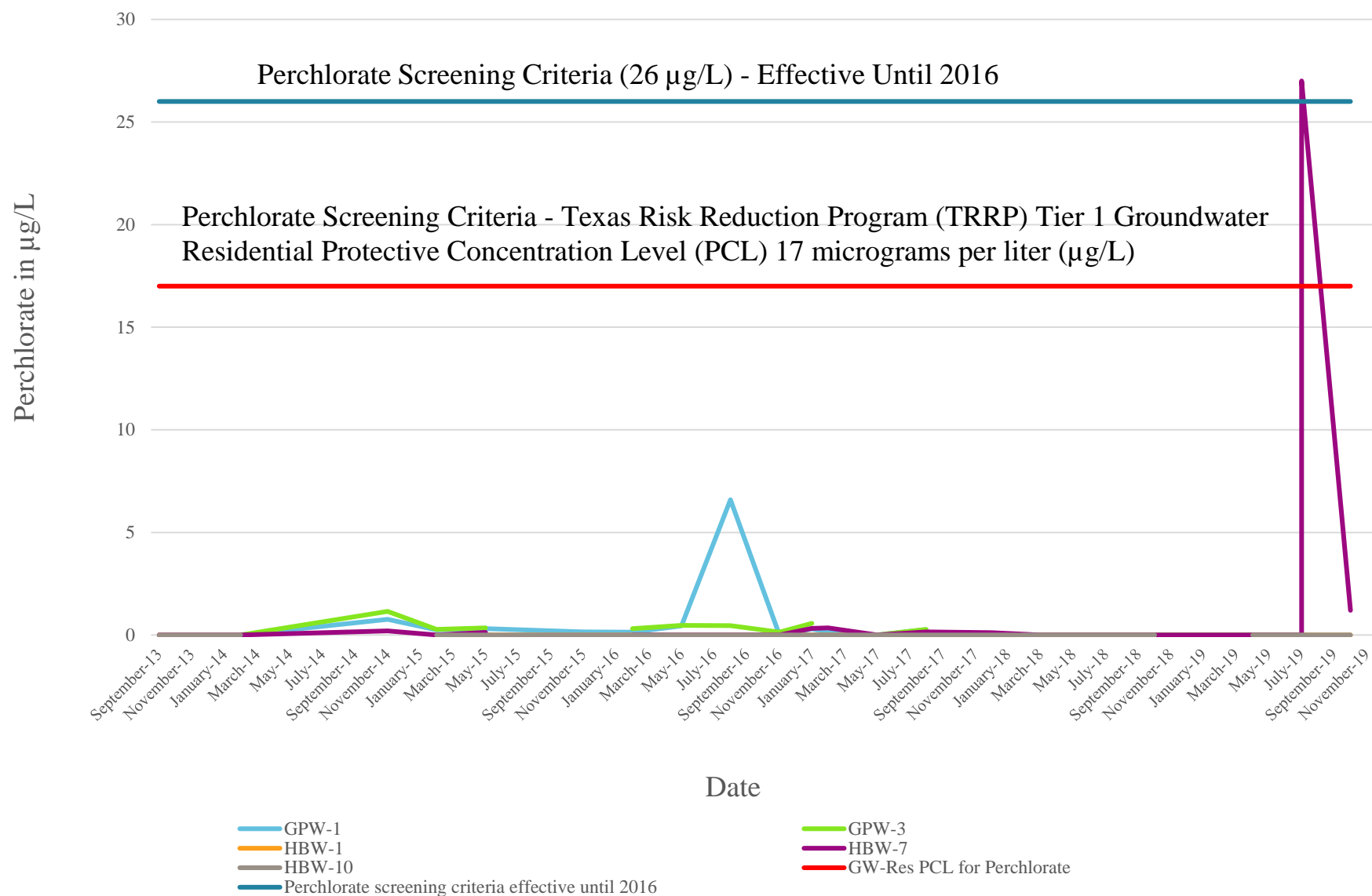
NS – not sampled

U – non-detect

J – Estimated

Dry – no surface water

## Surface Water Samples - Perchlorate



**Note:** Surface water at HBW-7 had a detection of 27  $\mu\text{g/L}$  from a sample collected on 11 July 2019. Surface water at HBW-7 was resampled 19 days later.

## Longhorn Army Ammunition Plant Creek Sampling Locations

