

**September 2019**

**Off-Post**

**Quarterly Groundwater Monitoring Report**



*Prepared For*

**Department of the Army  
Camp Stanley Storage Activity  
Boerne, Texas**

**November 2019**

## EXECUTIVE SUMMARY

- A total of 13 off-post samples were collected during the September 2019 sampling event for volatile organic compound (VOC) analyses.
- Analyses indicated two off-post wells, RFR-10 and OFR-3, exceeded the maximum contaminant level (MCL) for volatile organic compounds (VOCs). These wells are equipped with GAC (granular activated carbon) filtration systems.
- Wells LS-5 and RFR-11 had VOC detections above the RL (reporting limit) but below the MCL this sampling event. These wells are also equipped with GAC filtration systems.
- GAC-filtered samples were collected in September 2019 as part of the groundwater monitoring program. All samples were non-detect indicating the GAC filtration system are functioning properly. GAC filtered samples are collected semi-annually and will be collected again in March 2020.
- Semi-annual GAC maintenance was performed September 16, 2019. This involved replacing the first carbon canister in each GAC system and other routine maintenance. This carbon exchange is performed semi-annually; the next carbon change-out is due in March 2020.

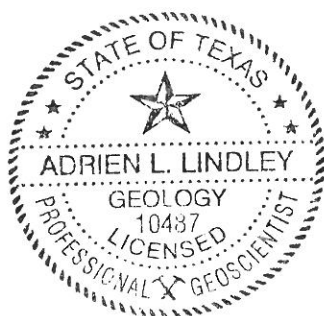
## GEOSCIENTIST CERTIFICATION


### September 2019 Off-Post Quarterly Groundwater Monitoring Report

For

Department of the Army  
Camp Stanley Storage Activity  
Boerne, Texas

I, Adrien Lindley, Professional Geologist (P.G.), hereby certify that the 2019 September Off-Post Quarterly Groundwater Monitoring Report for the Camp Stanley Storage Activity installation in Boerne, Texas accurately represents the site conditions of the subject area. This certification is limited only to geoscientific products contained in the subject report and is made on the basis of written and oral information provided by the Camp Stanley Storage Activity Environmental Office, laboratory data provided by APPL, and field data obtained during groundwater monitoring conducted at the site in September 2019, and is true and accurate to the best of my knowledge and belief.



  
Adrien Lindley, P.G.  
State of Texas  
Geology License No. 10487  
11/12/2019  
Date

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**ABBREVIATIONS AND ACRONYMS**

µg/L	microgram per liter
AOC	Area of Concern
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
<i>cis</i> -1,2-DCE	<i>cis</i> -1,2-Dichloroethene
CSSA	Camp Stanley Storage Activity
DQO	Data Quality Objective
FD	Field Duplicate
GAC	Granular Activated Carbon
HASP	Health and Safety Plan
JW	Jackson Woods
LS	Leon Springs
LTMO	Long Term Monitoring Optimization
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NA	Not Applicable
OFR	Old Fredericksburg Road
Parsons	Parsons Government Services, Inc.
PCE	Tetrachloroethene
P.G.	Professional Geologist
Plan	Off-Post Monitoring Program and Response Plan
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RFR	Ralph Fair Road
RL	Reporting Limit
SAP	Sampling and Analysis Plan
SLD	Scenic Loop Drive
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

**SEPTEMBER 2019  
OFF-POST GROUNDWATER MONITORING REPORT  
CAMP STANLEY STORAGE ACTIVITY**

**1.0 INTRODUCTION**

This report presents results from the off-post quarterly sampling performed for Camp Stanley Storage Activity (CSSA) in September 2019 as required by the Administrative Order on Consent dated May 5, 1999. The purpose of this report is to present a summary of the sampling results. Results from all four 2019 quarterly monitoring events (March, June, September, and December) will be described in detail in an Annual Report to be submitted after December 2019. The Annual Report will also provide an interpretation of all analytical results and an evaluation of any temporal or spatial trends observed in the groundwater contaminant plume during investigations.

Groundwater monitoring was performed September 4-20, 2019. The quarterly off-post groundwater monitoring program was initiated in September 2001 in accordance with the **Off-Post Monitoring Program and Response Plan (CSSA, 2002)**, herein referred to as the “Plan”. Action levels for detection of volatile organic compounds (VOCs) and the rationale for sampling off-post wells are described in the Plan.

The CSSA groundwater monitoring program also follows the provisions of the groundwater monitoring program data quality objectives (DQOs) as well as the recommendations of all applicable project-specific work plans. **Appendix A** provides an evaluation of the DQO attainment for this sampling event. Approval for the updated DQOs and the long term monitoring optimization (LTMO) was received from the Texas Commission on Environmental Quality (TCEQ) on April 22, 2016 and the United States Environmental Protection Agency (USEPA) on May, 5, 2016. The sampling schedule provided in the 2015 LTMO update was implemented during the December 2016 sampling event.

The primary objective of the off-post groundwater monitoring program is to determine whether concentrations of chlorinated VOCs detected in off-post public and private drinking water wells exceed safe drinking water standards. Other objectives are to determine the lateral and vertical extent of the contaminant plumes and identify trends (decreasing or increasing) in contaminant levels over time in the sampled wells.

## 2.0 SEPTEMBER 2019 ANALYTICAL RESULTS

During the September 2019 event, groundwater samples were collected from 6 off-post wells shown in **Figure 2.1**. Seven granular activated carbon (GAC) filtered samples (LS-5-A2, LS-6-A2, LS-7-A2, OFR-3-A2, RFR-10-A2, RFR-10-B2, and RFR-11-A2) are collected semi-annually (March and September), and were collected during this event.

**Table 2.1** includes the rationale for selection of the 6 wells and 7 post GAC samples scheduled to be sampled in September 2019. These included:

- Three privately owned wells in the Leon Springs Villa area (LS-5, LS-6, and LS-7);
- One privately-owned well on Old Fredericksburg Road (OFR-3);
- Two privately-owned wells (RFR-10 and RFR-11) in the Ralph Fair Road area.

A total of 13 groundwater samples, two trip blanks, two field duplicates (FD), and one matrix spike/matrix spike duplicate (MS/MSD) included with the on-post data groups were submitted to Agriculture & Priority Pollutant Laboratories, Inc. (APPL) in Clovis, California for analysis. Groundwater samples were analyzed for the short list of VOCs using SW-846 Method 8260B. The approved short list of VOCs includes *cis*-1,2-dichloroethene (*cis*-1,2-DCE), tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride.

The data package (Parsons Government Services, Inc. [Parsons] internal reference 110201-#10) contains the analytical results for this sampling event and are presented in **Appendix C**. Laboratory results were reviewed and verified according to the guidelines outlined in the CSSA Quality Assurance Project Plan (QAPP), Version 1.0. Parsons received this data package on October 9<sup>th</sup>, 2019.

All active wells with submersible pumps were sampled from a tap located as close to the wellhead as possible. Most taps were previously installed by CSSA to obtain a representative groundwater sample before pressurization or storage of groundwater in the water supply distribution system. Water was purged to engage the well pump prior to sample collection. Conductivity, pH, and temperature readings were recorded to confirm adequate purging while the well was pumping. Generally, this required an average of 20 gallons to be purged prior to sample collection.

Concentrations of the VOCs detected in September 2019 are presented in **Table 2.2**. Full analytical results from the September 2019 sampling event are presented in **Appendix B**. As shown in **Table 2.1**, all 13 samples that were scheduled for collection in September 2019 were obtained.

Table 2-1  
Sampling Rationale for September 2019

Well ID	2001		2002				2003				2004				2005				2006				2007				2008				2009				2010			
	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec				
FO-J1														NS																								
I10-2																																			NA			
I10-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
I10-10																																						
JW-7		NS	NS	NS	NS	NS	NS	NS																														
JW-8	NS	NS	NS	NS	NS	NS	NS																															
LS-5																																						
LS-5-A2																																						
LS-6																																						
LS-6-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS			
LS-7																																						
LS-7-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS			
OFR-3																																			NA			
OFR-3-A2	NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS			
RFR-10																																						
RFR-10-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS			
RFR-10-B2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS			
RFR-11																																						
RFR-11-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS			
RFR-12																																			NA			
RFR-14																																						

VOCs detected are greater than 90% of the MCL. Sample monthly; quarterly after GAC installation.

VOCs detected are greater than 80% of the MCL. The well will be placed on a monthly sampling schedule until GAC installation then quarterly sampling after GAC installation.

VOCs detected are less than 80% of the MCL (<4.0 ppb and >0.06 ppb for PCE & <4.0 ppb >0.05 ppb for TCE). After four quarters of stable results the well can be removed from quarterly sampling.

No VOCs detected. Sample on an as needed basis.

This well has a GAC filtration unit installed by CSSA. Post GAC samples are collected every six months.  
A1 - after GAC canister #1  
A2 - after GAC canister #2

Yes  
To be sampled in September 2019.

NS  
Not sampled for that event.

NA  
Not applicable, sample could not be collected due to pump outage or well access conflict.

Well ID	2011				2012				2013				2014				2015				2016				2017				2018				2019			Sampling Frequency
	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept					
FO-J1			NS	NS	NA	NS	NS	NA	NS	NS	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	30 month			
I10-2	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	NS	exclude after June-18; pump out			
I10-8			NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	NS	30 month			
I10-10																																		15 month		
JW-7			NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	NS	30 month			
JW-8			NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	NS	30 month			
JW-20																																		exclude after Mar-19		
LS-5																																		Yes	Quarterly	
LS-5-A2	C installed 10/6/11		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
LS-6																																		Yes	Quarterly	
LS-6-A2		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)				
LS-7																																		Yes	Quarterly	
LS-7-A2		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)				
OFR-3		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Quarterly				
OFR-3-A2	NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)				
RFR-10																																		Yes	Quarterly	
RFR-10-A2		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)				
RFR-10-B2		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)				
RFR-11																																		Yes	Quarterly	
RFR-11-A2		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)				
RFR-12	NS			NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS	NS	15 month			
RFR-14			NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	NS	NS	30 month			

LTMO has excluded the following wells from the program:  
 -Dec. 2015: BSR-03, FO-8, FO-17, FO-22, HS-2, HS-3, I10-5, I10-7, JW-6, JW-9, JW-12, JW-13, JW-14, JW-15, JW-26, JW-27, JW-28, JW-29, JW-30, JW-31, OW-HH1, OW-CE1, OW-MT2, OW-DAIRYWELL, OW-HH3, RFR-3, RFR-4, RFR-5, RFR-8, RFR-9, RFR-13, SLD-01, and SLD-02. OW-HH3, RFR-3, RFR-4, RFR-5, RFR-8, RFR-9, RFR-13, SLD-01, and SLD-02.  
 -Sept. 2016: JW-5, OW-HH2, and OW-BARNOWL.  
 -Sept. 2017: BSR-04 and HS-1.  
 -Mar. 2019: JW-20

The following wells have been plugged and abandoned: I10-4, I10-9, LS-1, LS-4, OFR-1, and OFR-4.

Wells Sampled: 6  
 Post GAC samples: 7  
 Total Samples: 13





0 0.25 0.5  
Miles

**Sampled Wells September 2019**

- > MCL (VOC's) only
- > RL (VOC's) only
- > MDL (VOC's) only
- ND

Figure 2-1

On-Post and Off-Post Well Sampling  
Locations for September 2019  
Camp Stanley Storage Activity

**PARSONS**



**Table 2.2**  
**September 2019 Off-Post Groundwater Results, Detected Analytes Only**

Subdivision	Well ID	Sample Date	cis-1,2-DCE	PCE	TCE	Vinyl Chloride
Leon Springs Villas	LS-5	9/4/2019	--	<b>0.59F</b>	<b>2.34</b>	--
	LS-5-A2	9/4/2019	--	--	--	--
	LS-6	9/4/2019	--	<b>0.77F</b>	--	--
	LS-6-A2	9/4/2019	--	--	--	--
	LS-7	9/4/2019	--	<b>1.20F</b>	--	--
	LS-7 FD	9/4/2019	--	<b>1.35F</b>	--	--
	LS-7-A2	9/4/2019	--	--	--	--
Old Fredericksburg Road	OFR-3	9/4/2019	--	<b>5.89</b>	<b>3.21</b>	--
	OFR-3-A2	9/4/2019	--	--	--	--
Ralph Fair Road	RFR-10	9/4/2019	--	<b>5.90</b>	<b>3.39</b>	--
	RFR-10-A2	9/4/2019	--	--	--	--
	RFR-10-B2	9/4/2019	--	--	--	--
	RFR-11	9/4/2019	--	<b>1.42</b>	<b>1.46</b>	--
	RFR-11-A2	9/4/2019	--	--	--	--
<b>Laboratory Detection Limits &amp; Maximum Contaminant Level</b>						
<b>Method Detection Limit (MDL)</b>			<b>0.07</b>	<b>0.06</b>	<b>0.05</b>	<b>0.08</b>
<b>Reporting Limit (RL)</b>			<b>1.2</b>	<b>1.4</b>	<b>1</b>	<b>1.1</b>
<b>Max. Contaminant Level (MCL)</b>			<b>70</b>	<b>5</b>	<b>5</b>	<b>2</b>

<b>BOLD</b>	≥ MDL
<b>BOLD</b>	≥ RL
<b>BOLD</b>	≥ MCL

All samples were analyzed by APPL, Inc.  
VOC data reported in ug/L.

**Abbreviations/Notes:**  
TCE Trichloroethene  
PCE Tetrachloroethene  
DCE Dichloroethene  
FD Field Duplicate

**Data Qualifiers:**  
--The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.  
F-The analyte was positively identified but the associated numerical value is below the RL.

Two wells (RFR-10 and OFR-3) exceeded the Maximum Contaminant Level (MCL) of 5 micrograms per liter ( $\mu\text{g/L}$ ) in September 2019 for PCE. PCE and/or TCE was detected above the Reporting Limits (RLs) in private drinking water wells LS-5 and RFR-11. These wells are equipped with GAC filtration systems. Vinyl chloride and *cis*-1,2-DCE were not detected in any of the off-post wells sampled in September 2019.

On September 16, 2019, routine semi-annual maintenance was performed on the GAC treatment systems at LS-5, LS-6, LS-7, OFR-3, RFR-10, and RFR-11. Carbon canisters were exchanged and other routine maintenance was performed. GAC-filtered samples were collected this quarter as part of the groundwater project. All GAC-filtered samples were non-detect indicating the GAC systems are functioning properly. GAC-filtered samples will be collected again during the March 2020 event.

Based on historical detections, the lateral extent of VOC detections extends beyond the south and west boundaries of CSSA. Past detections of VOCs have extended 0.37 miles south to well LS-4 and 2.9 miles west towards Scenic Loop Drive (SLD) at well SLD-01. Detections above the RL ( $1.4 \mu\text{g/L}$ ) and MCL ( $5 \mu\text{g/L}$ ) however, are confined to within 0.5 miles of the southwest corner of CSSA. VOC detections beyond that distance range between 1% and 28% of the regulatory MCL thresholds of  $5 \mu\text{g/L}$  for PCE and TCE and are therefore considered trace detections. The CSSA action levels that trigger the requirement for installation of wellhead protection on water supply wells for both PCE and TCE are 80% of the MCL ( $4 \mu\text{g/L}$ ), and the furthest historical detection exceeding the action level is 0.43 miles from the southwest corner of the post (and 0.32 miles to the closest point along the CSSA boundary).

### 3.0 SUMMARY AND RECOMMENDATIONS

Results of the September 2019 sampling event are summarized as follows:

- All 13 samples scheduled for collection in September 2019 were obtained during the quarterly monitoring event.
- Two wells (RFR-10 and OFR-3) exceeded the MCL for PCE in September 2019. These wells have GAC filtration systems in place. Well RFR-10 has had two consecutive quarters with PCE above the MCL. PCE was also above the MCL in well OFR-3, PCE was last above the MCL in this well in June 2017.
- TCE and/or PCE was detected above the RL in private drinking water wells LS-5 and RFR-11. These wells have GAC filtration systems in place.
- PCE was detected below the RL in wells LS-6 and LS-7, these wells also have GAC filtration systems in place.
- Vinyl chloride and cis-1,2-DCE were not detected in any of the off-post wells sampled in September 2019.
- GAC-filtered samples were collected as part of the quarterly groundwater monitoring in September 2019. These samples were non-detect indicating the GAC systems are functioning properly. GAC-filtered samples are collected semi annually, every March and September. The next GAC-filtered samples will be collected in March 2020.
- Semi-annual GAC maintenance, including carbon change-out, was performed September 16, 2019. The next semi-annual GAC maintenance is due in March 2020.
- In accordance with project DQOs and LTMO schedule, the rationale for selection of 13 samples to be collected in December 2019 is provided in **Table 3.1**.

**Table 3-1  
Sampling Rationale for December 2019**

Well ID	2001		2002				2003				2004				2005				2006				2007				2008				2009				2010			
	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec				
FO-J1														NS																								
I10-2																																			NA			
I10-8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS				
I10-10																																						
JW-7		NS	NS	NS	NS	NS	NS	NS																														
JW-8	NS	NS	NS	NS	NS	NS	NS																															
LS-5																																						
LS-5-A2																																						
LS-6																																						
LS-6-A2					NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS			
LS-7																																						
LS-7-A2					NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS			
OFR-3																																						
OFR-3-A2	NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS				
RFR-10																																						
RFR-10-A2					NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS			
RFR-10-B2					NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS			
RFR-11																																						
RFR-11-A2					NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS			
RFR-12																																						
RFR-14																																						

VOCs detected are greater than 90% of the MCL. Sample monthly; quarterly after GAC installation.

VOCs detected are greater than 80% of the MCL. The well will be placed on a monthly sampling schedule until GAC installation then quarterly sampling after GAC installation.

VOCs detected are less than 80% of the MCL (<4.0 ppb and >0.06 ppb for PCE & <4.0 ppb >0.05 ppb for TCE). After four quarters of stable results the well can be removed from quarterly sampling.

No VOCs detected. Sample on an as needed basis.

This well has a GAC filtration unit installed by CSSA. Post GAC samples are collected every six months. A1 - after GAC canister #1 A2 - after GAC canister #2

To be sampled in December 2019.

Not sampled for that event.

Not applicable, sample could not be collected due to pump outage or well access conflict.

Well ID	2011				2012				2013				2014				2015				2016				2017				2018				2019				Sampling Frequency
	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec	Mar	Jun	Sept	Dec					
FO-J1			NS	NS	NA	NS	NS	NA	NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	Yes	30 month				
I10-2	NS	NS	NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	Yes	exclude after June-18; pump out				
I10-8			NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	Yes	30 month				
I10-10																																		Yes	15 month		
JW-7				NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	Yes	30 month			
JW-8				NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS		NS	NS	Yes	30 month			
LS-5																																		Yes	Quarterly		
LS-5-A2					installed 10/6/11	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
LS-6																																		Yes	Quarterly		
LS-6-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
LS-7																																		Yes	Quarterly		
LS-7-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
OFR-3	NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Quarterly			
OFR-3-A2	NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
RFR-10																																		Yes	Quarterly		
RFR-10-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
RFR-10-B2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
RFR-11																																		Yes	Quarterly		
RFR-11-A2				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	Biannually (Mar & Sep)			
RFR-12	NS	NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	15 month			
RFR-14				NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS		NS	Yes	30 month			

Wells Sampled: 13  
Post GAC samples: 0  
Total Samples: 13

LTMO has excluded the following wells from the program:  
-Dec. 2015: BSR-03, FO-8, FO-17, FO-22, HS-2, HS-3, I10-5, I10-7, JW-6, JW-9, JW-12, JW-13, JW-14, JW-15, JW-26, JW-27, JW-28, JW-29, JW-30, JW-31, OW-HH1, OW-CE1, OW-MT2, OW-DAIRYWELL, OW-HH3, RFR-3, RFR-4, RFR-5, RFR-8, RFR-9, RFR-13, SLD-01, and SLD-02. OW-HH3, RFR-3, RFR-4, RFR-5, RFR-8, RFR-9, RFR-13, SLD-01, and SLD-02.  
-Sept. 2016: JW-5, OW-HH2, and OW-BARNOWL.  
-Sept. 2017: BSR-04 and HS-1.  
-Mar. 2019: JW-20

The following wells have been plugged and abandoned: I10-4, I10-9, LS-1, LS-4, OFR-1, and OFR-4.

**APPENDIX A  
EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT**

<b>Activity</b>	<b>Objectives</b>	<b>Action</b>	<b>Objective Attained?</b>	<b>Recommendations</b>
Field Sampling	Conduct field sampling in accordance with procedures defined in the project work plan, SAP, QAPP, and HASP.	All sampling was conducted in accordance with the procedures described in the project plans.	Yes	NA
Contamination Characterization (Groundwater Contamination)	Determine the potential extent of off-post contamination (§2.1 of the DQOs for the Groundwater Contamination Investigation, revised February 2016).	Samples for laboratory analysis were collected from selected off-post public and private wells, which are located within a ½ mile radius of CSSA.	Partially	Replace wells where no VOCs were detected with wells that may be identified in the future, located to the west and southwest of Area of Concern (AOC)-65 to provide better definition of Plume 2. Continue sampling of wells to the west of Plume 1 (Fair Oaks and Jackson Woods) to confirm any detections possibly related to Plume 1.
	Meet CSSA QAPP quality assurance requirements.	Samples were analyzed in accordance with the CSSA QAPP, and approved variances. A chemist verified all data.	Yes	NA
		All data flagged with a “U” and “J” are usable for characterizing contamination.	Yes	NA

Activity	Objectives	Action	Objective Attained?	Recommendations
	<p>Evaluate CSSA monitoring program and expand as necessary (§2.1 of the DQOs for the Groundwater Contamination Investigation, revised February 2016). Determine locations of future monitoring locations.</p>	<p>Evaluation of data collected is ongoing and is reported in this quarterly groundwater report and will be reported in future quarterly groundwater reports. Additional information covering the CSSA monitoring program is available in Volume 5, CSSA Environmental Encyclopedia.</p>	<p>Yes</p>	<p>Continue data evaluation and quarterly teleconferences for evaluation of the monitoring program. Each teleconference / planning session covers expansion of the quarterly monitoring program, if necessary.</p>
<p>Project Schedule/ Reporting</p>	<p>The quarterly monitoring project schedule shall provide a schedule for sampling, analysis, validation, verification, reviews, and reports for monitoring events off-post.</p>	<p>A schedule for sampling, analysis, validation, verification and data review, and reports is provided in this quarterly groundwater report and will be reported in future quarterly groundwater reports. Additional information covering the CSSA monitoring program is available in Volume 5, CSSA Environmental Encyclopedia.</p>	<p>Yes</p>	<p>Continue quarterly reporting to include a schedule for sampling, analysis, validation, and verification and data review and data reports.</p>

Activity	Objectives	Action	Objective Attained?	Recommendations
Remediation	Evaluate the effectiveness of GACs and install as needed (§3.2 both of the DQOs for the Groundwater Contamination Investigation, revised February 2016).	Perform maintenance as needed. Install new GACs as needed.	Yes	Maintenance of the off-post GAC systems to be continued by Parsons' personnel every 3 weeks. Twice yearly (or as needed) maintenance to the off-post GAC systems by additional subcontractors to continue. Evaluations of future sampling results for installation of new GAC systems will occur as needed.



**APPENDIX B  
SEPTEMBER 2019 QUARTERLY OFF-POST  
GROUNDWATER ANALYTICAL RESULTS**

**Appendix B**  
**September 2019 Quarterly Off-post Groundwater Analytical Results**

Well ID	Sample Date	cis-1,2-DCE	PCE	TCE	Vinyl Chloride
LS-5	9/4/2019	0.07U	<b>0.59F</b>	<b>2.34</b>	0.08U
LS-5-A2	9/4/2019	0.07U	0.06U	0.05U	0.08U
LS-6	9/4/2019	0.07U	<b>0.77F</b>	0.05U	0.08U
LS-6-A2	9/4/2019	0.07U	0.06U	0.05U	0.08U
LS-7	9/4/2019	0.07U	<b>1.20F</b>	0.05U	0.08U
LS-7 FD	9/4/2019	0.07U	<b>1.35F</b>	0.05U	0.08U
LS-7-A2	9/4/2019	0.07U	0.06U	0.05U	0.08U
OFR-3	9/4/2019	0.07U	<b>5.89</b>	<b>3.21</b>	0.08U
OFR-3-A2	9/4/2019	0.07U	0.06U	0.05U	0.08U
RFR-10	9/4/2019	0.07U	<b>5.90</b>	<b>3.39</b>	0.08U
RFR-10-A2	9/4/2019	0.07U	0.06U	0.05U	0.08U
RFR-10-B2	9/4/2019	0.07U	0.06U	0.05U	0.08U
RFR-11	9/4/2019	0.07U	<b>1.42</b>	<b>1.46</b>	0.08U
RFR-11-A2	9/4/2019	0.07U	0.06U	0.05U	0.08U

<b>BOLD</b>	≥ MDL
<b>BOLD</b>	≥ RL
<b>BOLD</b>	≥ MCL

All samples were analyzed by APPL, Inc.

VOC data reported in ug/L.

**Abbreviations/Notes:**

TCE                    Trichloroethene  
PCE                    Tetrachloroethene  
DCE                    Dichloroethene  
FD                      Field Duplicate

**Data Qualifiers:**

U-The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

F-The analyte was positively identified but the associated numerical value is below the RL.

**APPENDIX C  
DATA VALIDATION REPORTS**

**SDG 90036**

**DATA VERIFICATION SUMMARY REPORT**  
**for groundwater samples collected from**  
**CAMP STANLEY STORAGE ACTIVITY**

**BOERNE, TEXAS**

Data Verification by: Sandra de las Fuentes  
Parsons - Austin

**INTRODUCTION**

The following data verification summary report covers thirteen water samples collected from Camp Stanley Storage Activity (CSSA) on September 4, 2019. The samples were assigned to the following Sample Delivery Group (SDG).

90036

The field QC sample associated with this SDG was one trip blank (TB) and one field duplicate (FD). No ambient blanks were collected. During the initiation of this project, it was determined that ambient blanks were not necessary due to the absence of a source at these sites.

All samples were collected by Parsons and analyzed by APPL, Inc. following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0. Samples in this SDG were shipped to the laboratory in a single cooler, which was received by the laboratory at a temperature of 3.9°C.

**SAMPLE IDs AND REQUESTED PARAMETERS**

Sample ID	Matrix	VOCs	Comments
TB-1	Water	X	Trip Blank
LS-7	Water	X	
LS-7-A2	Water	X	
LS-5	Water	X	
LS-5-A2	Water	X	
LS-6	Water	X	
LS-6-A2	Water	X	
OFR-3	Water	X	
OFR-3-A2	Water	X	
RFR-10	Water	X	
RFR-10-A2	Water	X	
RFR-10-B2	Water	X	
RFR-11	Water	X	

Sample ID	Matrix	VOCs	Comments
RFR-11-A2	Water	X	
LS-7 FD	Water	X	FD of LS-7

## EXTRACTION, ANALYTICAL, AND REPORTING DETAILS

Parameter	Matrix	Prep Method	Analytical Method	Units
VOCS	WATER	SW5030B	SW8260B	µg/L

## EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data package included sample results; field and laboratory quality control samples; calibrations; case narratives; raw data; chain-of-custody (COC) forms and the sample receipt checklist. The findings presented in this report are based on the reviewed information, and whether the guidelines in the CSSA QAPP, Version 1.0, were met.

## VOLATILES

### General

The volatiles portion of this data package consisted of thirteen (13) groundwater samples, one (1) TB and one (1) FD. All samples were collected on September 4, 2019 and analyzed for a reduced list of VOCs which included: *cis*-1,2-dichloroethene, tetrachloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in three analytical batches, #245763, #245790 and #245772 under one initial calibration (ICAL). All samples were analyzed following the procedures outlined in the CSSA QAPP and were prepared and analyzed within the holding time required by the method. All analyses were performed undiluted.

### Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the three laboratory control samples (LCS) and the surrogate spikes.

All LCS and surrogate spike recoveries were within acceptance criteria.

### Precision

Precision was evaluated using the relative percent difference (RPD) obtained from the field duplicate analyte results. Sample LS-7 FD was collected and analyzed as the field duplicate of LS-7.

All FD/parent sample results were non-detect except for Tetrachloroethene, which reported concentrations below the reporting limit (RL). The RPD is only evaluated when both the parent and FD have detections above the RLs; therefore, precision is considered acceptable.

### **Representativeness**

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blank and TB for cross contamination of samples during sample collection, transportation, and analysis.

All samples in this data package were analyzed following the COC and the analytical procedures described in the CSSA QAPP, Version 1.0. All samples were prepared and analyzed within the holding time required by the method.

- All instrument performance check criteria were met.
- All initial calibration criteria were met.
- All initial calibration verification (ICV) criteria were met. The ICV was prepared using a secondary source standard. All second source verification criteria were met.
- All continuing calibration verification (CCV) criteria were met.
- All internal standard criteria were met.

There were three method blanks associated with the VOC analyses in this SDG. The MBs were non-detect for all target VOCs.

There was one trip blank sample associated with the VOC analyses in this SDG. The TB was also non-detect for all target VOCs.

### **Completeness**

Completeness has been evaluated in accordance with the CSSA QAPP. The number of usable results has been divided by the number of possible individual analyte results and expressed as a percentage to determine the completeness of the data set.

All VOC results for the samples in this SDG were considered usable. The completeness for this SDG is 100%, which meets the minimum acceptance criteria of 95%.