SEPTEMBER 2017

On-Post
Quarterly Groundwater Monitoring Report

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

December 2017

EXECUTIVE SUMMARY

- Groundwater samples were collected from 5 on-post monitoring wells scheduled for sampling at Camp Stanley Storage Activity (CSSA) in September 2017.
- CSSA experienced average precipitation volumes during the 3rd quarter of 2017 and the aquifer experienced a slight decrease from June to September 2017. The weather station (WS) at Area of Concern (AOC)-65 (AOC-65 WS) recorded 8.07 inches of rainfall from June to Sept, and the B-3 weather station (B-3 WS) recorded 9.48 inches of rainfall during this same timeframe. The normal rainfall for this area from June to September is 7.86 inches.
- At CSSA, the Middle Trinity aquifers' average groundwater elevation in September 2017 decreased 48.18 feet from the elevations measured in June 2017. The average depth to water in the wells was 262.58 feet below top of casing (BTOC) or 979.75 feet above mean sea level (MSL). As such, the Trinity-Glen Rose Groundwater Conservation District (TGRGCD) remains in Stage 1 Moderate Drought conditions since August 13, 2015. For the adjacent Edwards aquifer, the San Antonio Water System (SAWS) has moved back to 'year-round watering hours' implemented October 17, 2017.
- The maximum contaminant level (MCL) for VOCs was not exceeded in any wells sampled in September 2017.
- No wells sampled had metal detections above their corresponding MCL, action level (AL), or secondary standard (SS) in September 2017.
- No Westbay Well zones were scheduled for sampling in September 2017. However, these wells were profiled to capture water level data for the area.
- All samples collected in September 2017 were in accordance with the 2015 long term monitoring optimization (LTMO) report that has been approved by the TCEQ and USEPA.

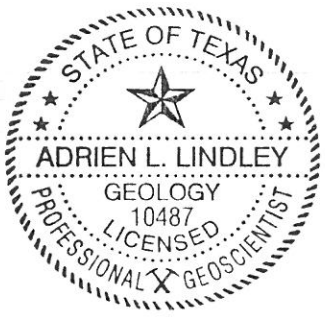
GEOSCIENTIST CERTIFICATION

SEPTEMBER 2017 ON-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 September 2017 On-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 CSSA Environmental Office, laboratory data provided by APPL Laboratories, and field data obtained during groundwater monitoring conducted at the site in September 2017, and is true and accurate to the best of my knowledge and belief.



Adrien Lindley, P.G.
State of Texas
Geology License No. 10487

12/11/2017
Date

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ACRONYMS AND ABBREVIATIONS

µg/L	microgram per liter
§3008(h) Order	RCRA 3008(h) Administrative Order on Consent
AL	Action Level
AOC	Area of Concern
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
BS	Bexar Shale
BTOC	below top of casing
CC	Cow Creek
cis-1,2-DCE	*cis*-1,2-Dichloroethene
COC	constituents of concern
CSSA	Camp Stanley Storage Activity
DQO	Data Quality Objectives
HSP	Health and Safety Plan
ISCO	In-Situ Chemical Oxidation
LGR	Lower Glen Rose
LTMO	Long-Term Monitoring Optimization
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MSL	mean sea level
NA	Not Available
PCE	Tetrachloroethene
P.G.	Professional Geologist
Parsons	Parsons Government Services, Inc.
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
SAP	Sampling and Analysis Plan
SAWS	San Antonio Water System
SS	Secondary Standard
SWMU	Solid Waste Management Units
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
TGRGCD	Trinity-Glen Rose Groundwater Conservation District
UGR	Upper Glen Rose
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WS	Weather Station

SEPTEMBER 2017 GROUNDWATER MONITORING REPORT CAMP STANLEY STORAGE ACTIVITY, TEXAS

1.0 INTRODUCTION

This report presents results from the on-post quarterly sampling performed at Camp Stanley Storage Activity (CSSA) in September 2017. Laboratory analytical results are presented along with potentiometric contour maps. Results from all four 2017 quarterly monitoring events (March, June, September, and December) will be described in detail in the 2017 Annual Report. 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. For this specific quarter, groundwater monitoring was performed September 20-28, 2017 by Parsons Government Services, Inc. (Parsons).

Current objectives of the groundwater monitoring program are to determine groundwater flow direction and elevations, determine groundwater contaminant concentrations for characterization purposes, and identify meteorological and seasonal variations in physical and chemical properties. **Appendix A** identifies the data quality objectives (DQOs) for CSSA's groundwater monitoring program, along with an evaluation of whether each DQO was attained. The objectives listed in **Appendix A** also reference appropriate sections of the Resource Conservation and Recovery Act (RCRA) **§3008(h) Administrative Order on Consent** [§3008(h) Order].

The CSSA groundwater monitoring program follows the provisions of the groundwater monitoring program DQOs as well as the recommendations of the **Three-Tiered Long Term Monitoring Network Optimization (LTMO) Evaluation (Parsons, 2015)** which provided recommendations for sampling based on an LTMO study performed for the CSSA groundwater monitoring program. The LTMO evaluation was updated in 2015 using groundwater data from monitoring conducted between 2010 and 2015. The proposed LTMO changes/updates were approved by the TCEQ and USEPA April 22 and May 5, 2016, respectively. These changes were briefed to the public in the 2016 Annual Fact Sheet. The updated LTMO study sampling frequencies were implemented in December 2016.

2.0 POST-WIDE FLOW DIRECTION AND GRADIENT

After above average rainfall in 2016 followed by continued steady rain events in early 2017, the rainfall began to taper off in May 2017. The San Antonio Water System (SAWS) restrictions moved from 'Stage 1' to 'year-round watering hours' on October 17, 2017. The Trinity-Glen Rose Groundwater Conservation District (TGRGCD) remains in Stage 1 water restrictions since August 13, 2015.

The 30-year precipitation normal for the San Antonio area for the three-month period of July through September is 7.86 inches of rainfall. Over the 3-month period of record, the weather station (WS) at B-3 (B-3 WS), recorded 9.48 inches of rainfall (0.12 inches in July, 4.98 inches in August, and 4.38 inches in September). Five days had daily rainfall totals in excess of 1 inch and August 7th recorded greater than 2 inches of rainfall at B-3. The Area of Concern (AOC-65) weather station (AOC-65 WS) recorded 8.07 inches of rainfall during the same period (0.38 inches in July, 4.12 inches in August, 3.57 inches in September). Three days had a daily rainfall total of more than 1 inch and 1 day with greater than 2 inches of rain.

Fifty-six water level measurements were recorded on September 28, 2017 from on- and off-post monitoring wells completed in the Lower Glen Rose (LGR), Bexar Shale (BS), and Cow Creek (CC) formational members of the Middle Trinity Aquifer (**Tables 2.1 and 2.2**). The groundwater potentiometric surface maps illustrating groundwater elevations from the LGR, BS, and CC zones in September 2017 are shown in **Figures 2.1, 2.2, and 2.3**, respectively.

The September 2017 potentiometric surface map for LGR-screened wells **(Figure 2.1)** exhibited a wide range of groundwater elevations, from a minimum of 945.63 feet above mean sea level (MSL) at CS-MW22-LGR to a maximum of 1037.45 feet above MSL at CS-MW4-LGR. Groundwater elevations are generally higher in the northern and central portions of CSSA, and decrease to the southeast. As measured in all non-pumping wells, the average groundwater elevation in September 2017 decreased 48.24 feet from the elevations measured in June 2017 to 980.30. This is 51.64 feet below the 14.75-year average groundwater elevation for the area (1031.91 feet) (**Figure 2.4**).

Well CS-MW4-LGR, located in the central portion of CSSA, typically has one of the highest groundwater elevations of LGR-screened wells. During average and above-average aquifer elevations, the groundwater level is 20 to 30 feet higher than the nearest comparable wells (CS-MW2-LGR and CS-MW5-LGR), creating a pronounced groundwater mound in the central portion of the facility. Long-term monitoring has ascertained that when groundwater near CS-MW4-LGR rises above about 970 feet MSL, the mounding effect is evident. In September 2017, water elevation at CS-MW4-LGR was 1037.45 feet MSL and the mounding effect was observable, and the groundwater level at CS-MW4-LGR was approximately 58 feet higher than CS-MW2-LGR and 63 feet higher than CS-MW5-LGR.

Table 2.1
Measured Groundwater Elevation
September 2017

Well ID:	TOC elevation (ft MSL)	Depth to Groundwater (ft BTOC)	Groundwater Elevation (ft MSL)	Formations Screened			Date
				LGR	BS	CC	
CS-1	1169.27	214.39	954.88	**ALL**			9/28/2017
CS-2	**1237.59**	**246.02**	**991.57**	**X**	**?**		9/28/2017
CS-3	1240.17	259.41	980.76	**X**			9/28/2017
CS-4	1229.28	247.97	981.31	**X**			9/28/2017
CS-10	**1331.51**	**375.48**	**956.03**	**ALL**			9/28/2017
CS-12	**1274.09**	**288.69**	**985.40**	**ALL**			9/28/2017
CS-13	**1193.26**	**250.41**	**942.85**	**ALL**			9/28/2017
CS-D	1236.03	252.97	983.06	**X**			9/28/2017
CS-MWG-LGR	1328.14	315.26	1012.88	**X**			9/28/2017
CS-MWH-LGR	1319.19	315.65	1003.54	**X**			9/28/2017
CS-I	1315.20	306.48	1008.72	**X**			9/28/2017
CS-MW1-LGR	1220.73	241.11	979.62	**X**			9/28/2017
CS-MW1-BS	1221.09	241.90	979.19		**X**		9/28/2017
CS-MW1-CC	1221.39	249.70	971.69			**X**	9/28/2017
CS-MW2-LGR	1237.08	258.11	978.97	**X**			9/28/2017
CS-MW2-CC	1240.11	261.99	978.12			**X**	9/28/2017
CS-MW3-LGR	1334.14	351.22	982.92	**X**			9/28/2017
CS-MW4-LGR	1209.71	172.26	1037.45	**X**			9/28/2017
CS-MW5-LGR	1340.24	365.50	974.74	**X**			9/28/2017
CS-MW6-LGR	1232.25	249.75	982.50	**X**			9/28/2017
CS-MW6-BS	1232.67	214.44	1018.23		**X**		9/28/2017
CS-MW6-CC	1233.21	284.70	948.51			**X**	9/28/2017
CS-MW7-LGR	1202.27	223.60	978.67	**X**			9/28/2017
CS-MW7-CC	1201.84	254.59	947.25			**X**	9/28/2017
CS-MW8-LGR	1208.35	227.50	980.85	**X**			9/28/2017
CS-MW8-CC	1206.13	259.63	946.50			**X**	9/28/2017
CS-MW9-LGR	1257.27	269.28	987.99	**X**			9/28/2017
CS-MW9-BS	1256.73	267.63	989.10		**X**		9/28/2017
CS-MW9-CC	1255.95	282.88	973.07			**X**	9/28/2017
CS-MW10-LGR	1189.53	199.77	989.76	**X**			9/28/2017
CS-MW10-CC	1190.04	220.95	969.09			**X**	9/28/2017
CS-MW11A-LGR	1204.03	219.56	984.47	**X**			9/28/2017
CS-MW11B-LGR	1203.52	200.35	1003.17	**X**			9/28/2017
CS-MW12-LGR	1259.07	282.61	976.46	**X**			9/28/2017
CS-MW12-BS	1258.37	284.66	973.71		**X**		9/28/2017
CS-MW12-CC	1257.31	285.10	972.21			**X**	9/28/2017
CS-MW16-LGR	1244.60	262.99	981.61	**X**			9/28/2017
CS-MW16-CC	1244.51	275.05	969.46			**X**	9/28/2017
B3-EXW01	1245.26	273.66	971.60	**X**			9/28/2017
B3-EXW02	1249.66	269.77	979.89	**X**			9/28/2017
B3-EXW03	1235.11	243.61	991.50	**X**			9/28/2017
B3-EXW04	1228.46	246.75	981.71	**X**			9/28/2017
B3-EXW05	1279.46	300.82	978.64	**X**			9/28/2017
CS-MW17-LGR	1257.01	304.15	952.86	**X**			9/28/2017
CS-MW18-LGR	1283.61	321.10	962.51	**X**			9/28/2017
CS-MW19-LGR	1255.53	280.35	975.18	**X**			9/28/2017
CS-MW20-LGR	1209.42	NA	NA	**X**			9/28/2017
CS-MW21-LGR	1184.53	230.37	954.16	**X**			9/28/2017
CS-MW22-LGR	1280.49	334.86	945.63	**X**			9/28/2017
CS-MW23-LGR	1258.20	288.85	969.35	**X**			9/28/2017
CS-MW24-LGR	1253.90	269.67	984.23	**X**			9/28/2017
CS-MW25-LGR	1293.01	304.68	988.33	**X**			9/28/2017
CS-MW35-LGR	1186.97	190.19	996.78	**X**			9/28/2017
CS-MW36-LGR	1218.74	235.51	983.23	**X**			9/28/2017
CS-MW37-LGR	1205.83	230.10	975.73	**X**			9/28/2017
FO-20	1327.00	300.27	1026.73		**ALL**		9/28/2017
Number of wells screened in each formation.				**37**	**4**	**9**	
Average groundwater elevation in each formation given in feet (non pumping wells).				**982.55**	**990.06**	**963.31**	

Notes:

Bold wells: CS-2, CS-10, CS-12, CS-13, and FO-20 are open boreholes across more than one formational unit.

? = Exact screening information unknown for this well.

Shaded wells are routinely pumped for either domestic, livestock, or environmental remediation purposes, and therefore are not used in calculating statistics.

CS-1, CS-10, CS-12, and CS-13 are current or future drinking water wells.

CS-MW16-LGR, CS-MW16-CC, B3-EXW01 through B3-EXW05 pumps are cycling continuously to feed the B-3 Bioreactor.

* = submersible pump running at time of water level measurement.

Formational average groundwater elevation is calculated from non-pumping wells screened in only one formation.

All measurements given in feet.

NA = Data not available

Table 2.2
Change in Groundwater Elevation from Previous Quarter
September 2017

Well ID	June 2017 Elevations	Sept. 2017 Elevations	GW elevation change (June minus Sept.)	Formations Screened		
				LGR	BS	CC
CS-1	1017.67	954.88	-62.79	ALL		
CS-2	**1018.43**	**991.57**	**-26.86**	**X**	**?**	
CS-3	1022.00	980.76	-41.24	**X**		
CS-4	1022.61	981.31	-41.30	**X**		
CS-10	**1022.31**	**956.03**	**-66.28**	**ALL**		
CS-12	**1015.09**	**985.40**	**-29.69**	**ALL**		
CS-13	**1023.43**	**942.85**	**-80.58**	**ALL**		
CS-D	1019.71	983.06	-36.65	**X**		
CS-MWG-LGR	1041.59	1012.88	-28.71	**X**		
CS-MWH-LGR	1024.14	1003.54	-20.60	**X**		
CS-I	1039.90	1008.72	-31.18	**X**		
CS-MW1-LGR	1031.77	979.62	-52.15	**X**		
CS-MW1-BS	1039.62	979.19	-60.43		**X**	
CS-MW1-CC	1023.12	971.69	-51.43			**X**
CS-MW2-LGR	1035.90	978.97	-56.93	**X**		
CS-MW2-CC	1030.12	978.12	-52.00			**X**
CS-MW3-LGR	1028.56	982.92	-45.64	**X**		
CS-MW4-LGR	1078.22	1037.45	-40.77	**X**		
CS-MW5-LGR	1033.26	974.74	-58.52	**X**		
CS-MW6-LGR	1031.09	982.50	-48.59	**X**		
CS-MW6-BS	1075.96	1018.23	-57.73		**X**	
CS-MW6-CC	1030.19	948.51	-81.68			**X**
CS-MW7-LGR	1025.55	978.67	-46.88	**X**		
CS-MW7-CC	1025.02	947.25	-77.77			**X**
CS-MW8-LGR	1029.55	980.85	-48.70	**X**		
CS-MW8-CC	1026.20	946.50	-79.70			**X**
CS-MW9-LGR	1020.72	987.99	-32.73	**X**		
CS-MW9-BS	1032.7	989.1	-43.60		**X**	
CS-MW9-CC	1021.54	973.07	-48.47			**X**
CS-MW10-LGR	1009.77	989.76	-20.01	**X**		
CS-MW10-CC	1014.86	969.09	-45.77			**X**
CS-MW11A-LGR	1015.10	984.47	-30.63	**X**		
CS-MW11B-LGR	1012.41	1003.17	-9.24	**X**		
CS-MW12-LGR	1025.65	976.46	-49.19	**X**		
CS-MW12-BS	1046.42	973.71	-72.71		**X**	
CS-MW12-CC	1023.65	972.21	-51.44			**X**
CS-MW16-LGR	1019.20	981.61	-37.59	**X**		
CS-MW16-CC*	1010.71	969.46	-41.25			**X**
B3-EXW01	1012.66	971.60	-41.06	**X**		
B3-EXW02	1022.06	979.89	-42.17	**X**		
B3-EXW03	1024.40	991.50	-32.90	**X**		
B3-EXW04	1027.46	981.71	-45.75	**X**		
B3-EXW05*	967.06	978.64	11.58	**X**		
CS-MW17-LGR	1028.75	952.86	-75.89	**X**		
CS-MW18-LGR	1023.74	962.51	-61.23	**X**		
CS-MW19-LGR	1039.09	975.18	-63.91	**X**		
CS-MW20-LGR	1044.69	NA	NA	**X**		
CS-MW21-LGR	1030.41	954.16	-76.25	**X**		
CS-MW22-LGR	1024.17	945.63	-78.54	**X**		
CS-MW23-LGR	1021.32	969.35	-51.97	**X**		
CS-MW24-LGR	1019.42	984.23	-35.19	**X**		
CS-MW25-LGR	1026.31	988.33	-37.98	**X**		
CS-MW35-LGR	1016.29	996.78	-19.51	**X**		
CS-MW36-LGR	1030.86	983.23	-47.63	**X**		
CS-MW37-LGR	1021.46	975.73	-45.73	**X**		
FO-20	**1044.07**	**1026.73**	**-17.34**	**ALL**		
Average groundwater elevation change (all wells minus pumping wells)			**-48.18**			
Average groundwater elevation change in each formation (non pumping wells)				**-45.51**	**-58.62**	**-61.03**

Notes:

Bold wells: CS-2, CS-10, CS-12, CS-13, and FO-20 are open boreholes across more than one formational unit.

? = Exact screening information unknown for this well.

Shaded wells are routinely pumped for either domestic, livestock, or environmental remediation purposes, and therefore are not used in calculating statistics.

CS-1, CS-9, CS-10, CS-12, and CS-13 are current, inactive, or future drinking water wells.

CS-MW16-LGR, CS-MW16-CC, B3-EXW01 through B3-EXW05 pumps are cycling continuously to feed the B-3 Bioreactor.

* = submersible pump running at time of water level measurement.

Formational average groundwater elevation change is calculated from non-pumping wells screened in only one formation.

All measurements given in feet.

NA = Data not available

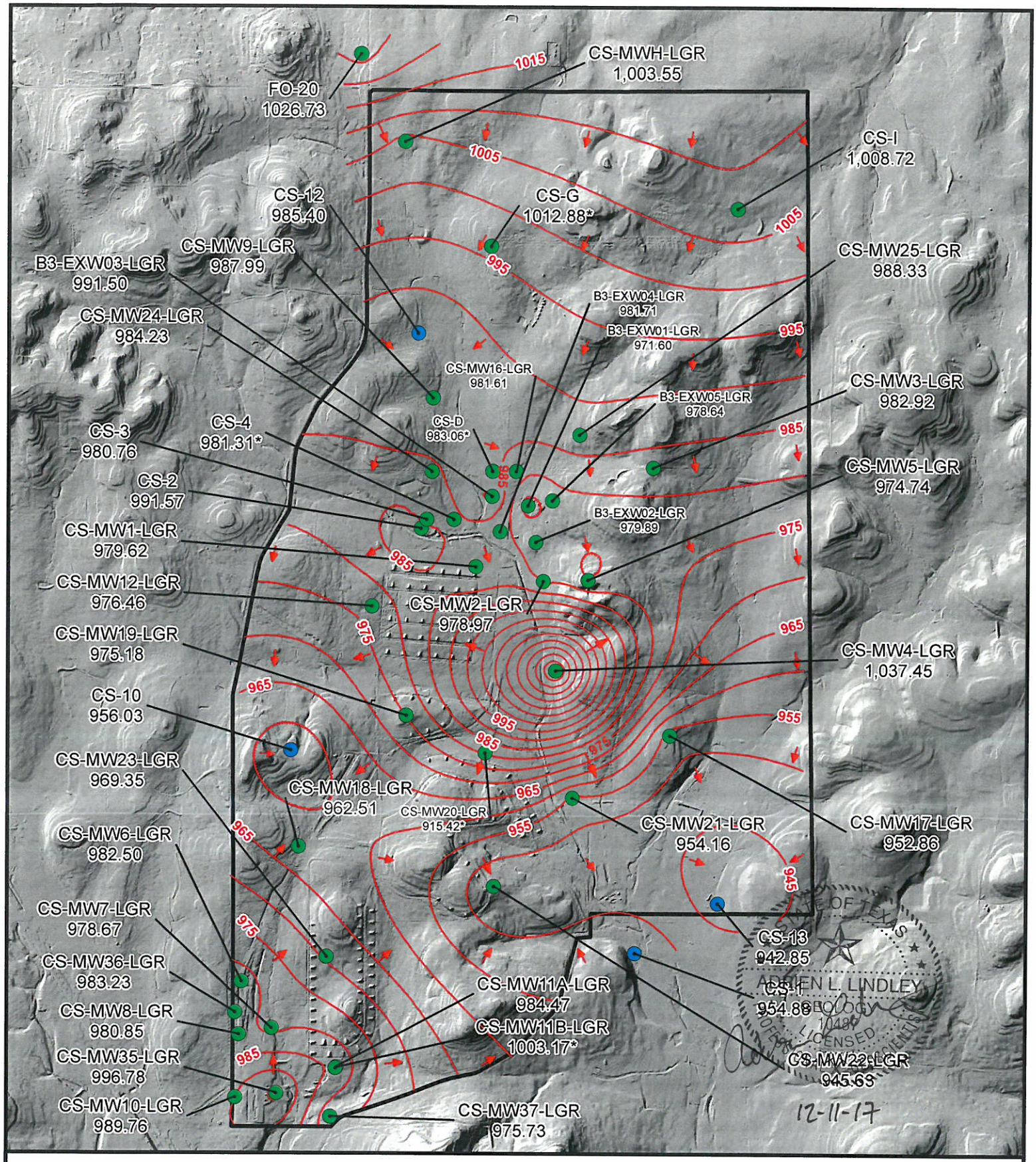


Figure 2.1

September 2017 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

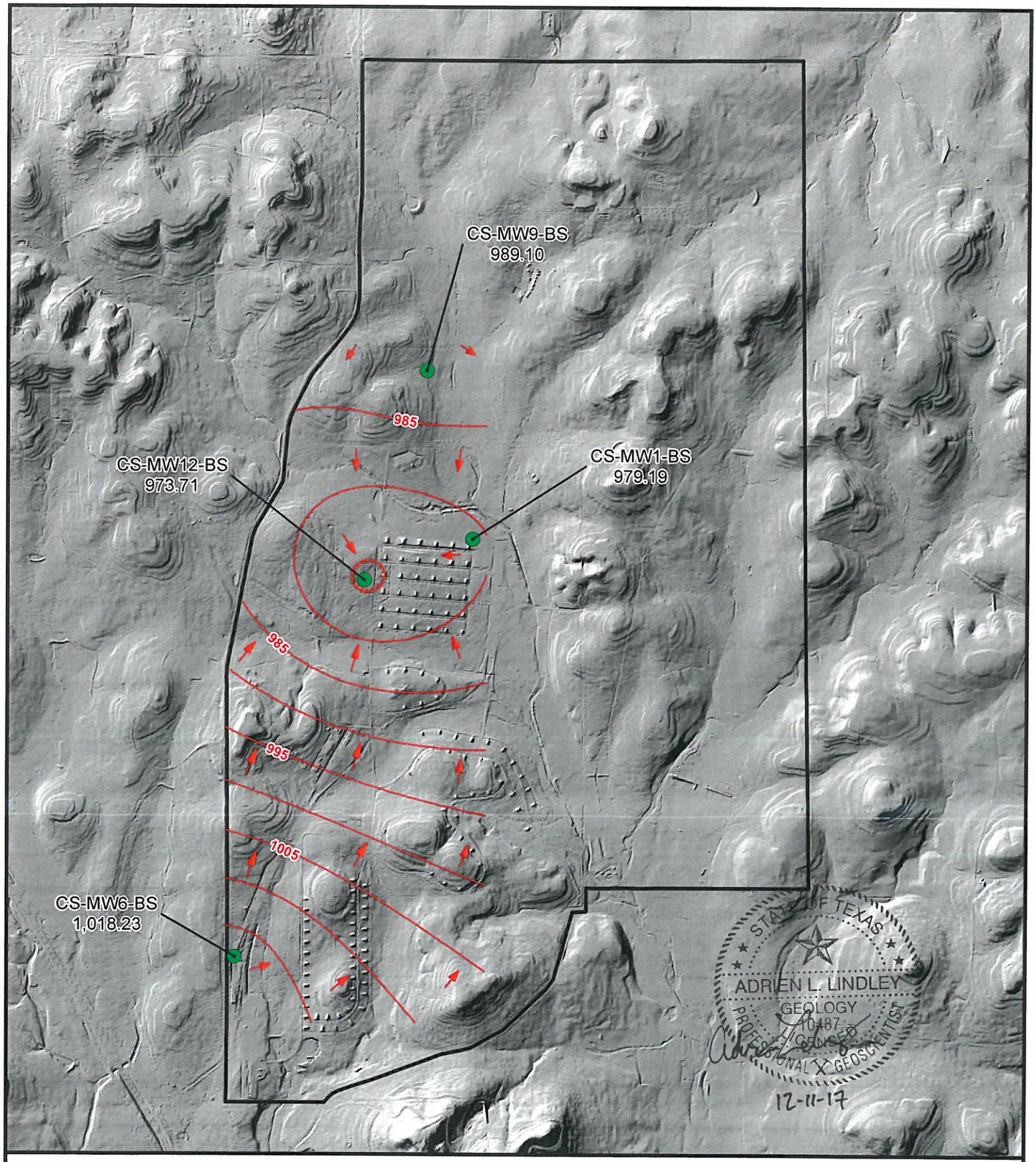


Figure 2.2

September 2017 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

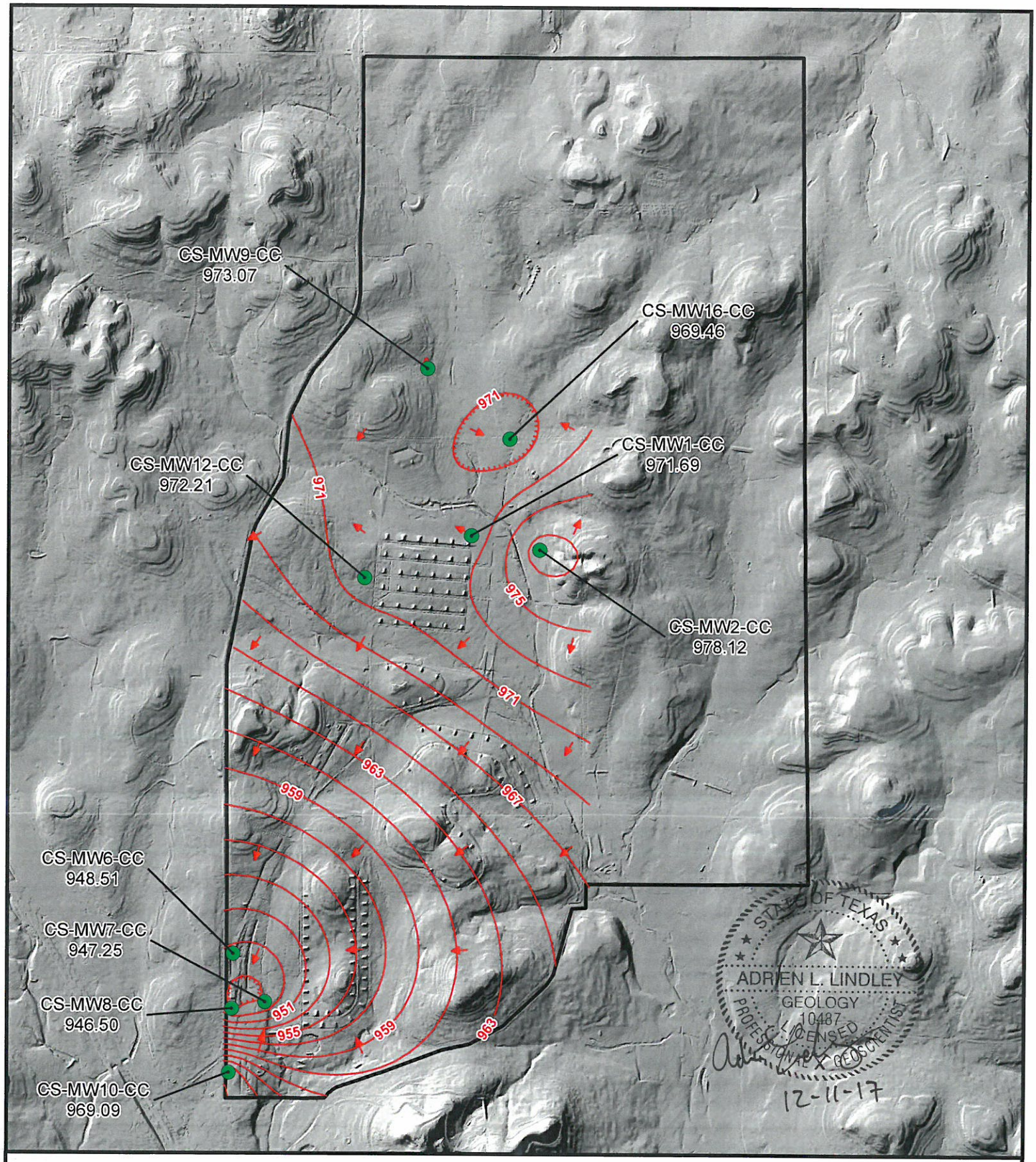


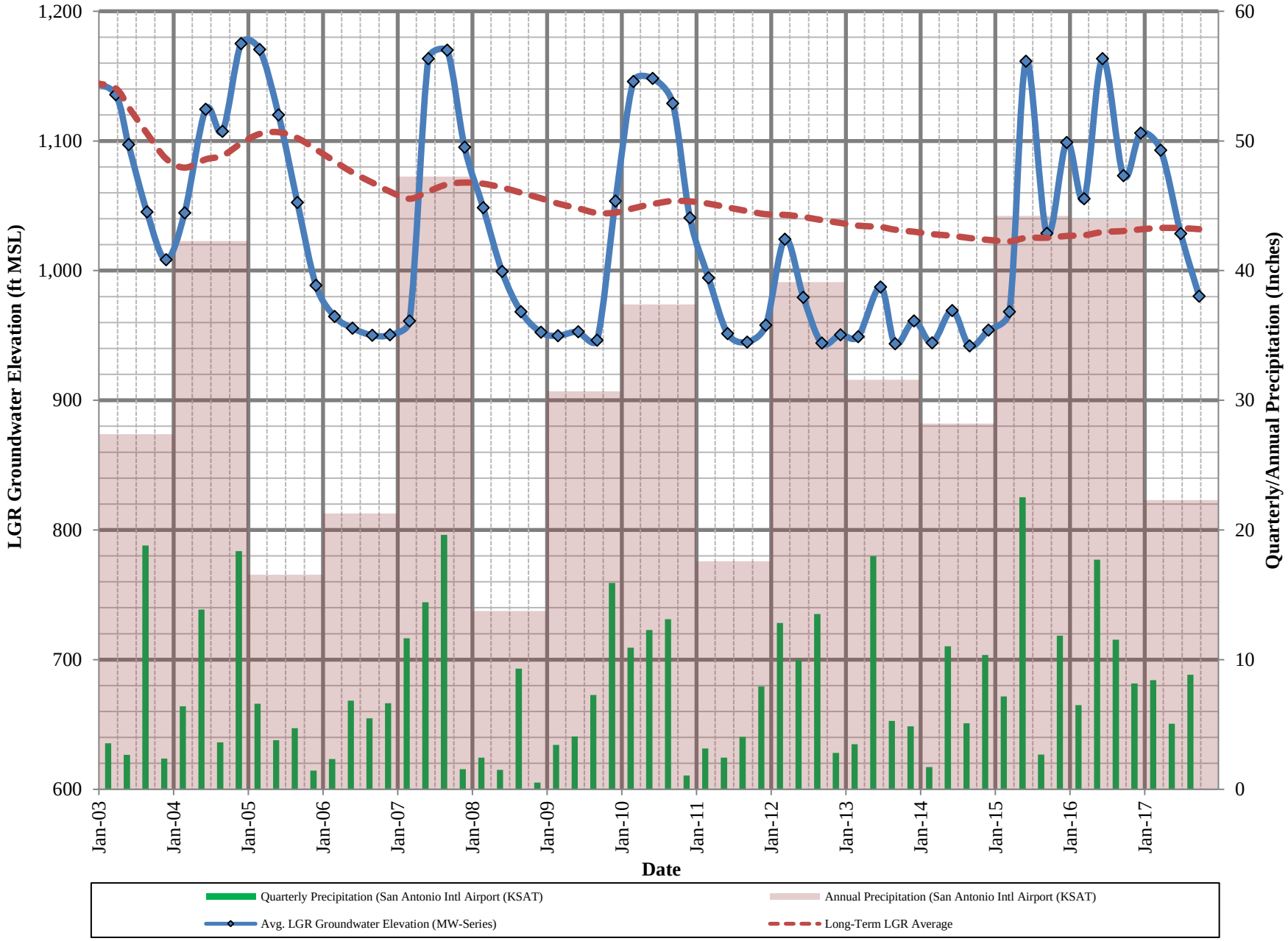
Figure 2.3

September 2017 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

Figure 2.4 - Average LGR Groundwater Elevations and Quarterly/Annual Precipitation



It should be noted that well pumping on and around CSSA affects the potentiometric surface. On-post wells CS-MW16-LGR, CS-MW16-CC, B3-EXW01, B3-EXW02, B3-EXW03, B3-EXW04, and B3-EXW05 are cyclically pumped as part of the Bioreactor remediation system at Solid Waste Management Unit (SWMU) B-3. These remediation wells provide groundwater to the Bioreactor system, and are automatically operated based upon water level within each well and availability within the storage tanks. Influences from the pumping of the Bioreactor wells B3-EXW01 through B3-EXW05 are manifested as "cones of depression". Although a very slight depression in the potentiometric surface centered on well CS-B3-EXW-01 is indicated in **Figure 2.1**, the typical "cone of depression" is not observed. Recent examples of this phenomenon are observed in March and June 2017 LGR potentiometric surface maps. The Bioreactor cone of depression is induced into the aquifer to extract contaminated water within its direct zone of influence, and otherwise retard the flow of the groundwater that cannot be directly captured by the extraction wells away from the site.

CSSA drinking water wells CS-1, CS-10, CS-12, and CS-13 are also cycled on and off to maintain the drinking water system currently in place at CSSA. Off-post water supply wells along Ralph Fair Road may also exert a subtle influence to gradients along the western and southern boundaries of the post. In fact, the northern end of CSSA exhibits a southwesterly gradient from well CS-I towards CS-12. In the central portion of CSSA, a southwesterly gradient is evident between the groundwater mound at CS-MW4-LGR and supply well CS-10. In the southern end of the base, an east-northeasterly groundwater gradient is evident between CS-MW35-LGR and CS-13.

Historical groundwater monitoring at CSSA has demonstrated that the aquifer gradient typically slopes in a south-southeast direction; however, variable aquifer levels and well-pumping scenarios can affect the localized and regional gradients (**Figure 2.1**). In particular, pumping action at wells CS-1, CS-10, CS-12, CS-13, CS-MW16-LGR/CC, B3-EXW01 through B3-EXW05, CS-MWH-LGR, CS-I, and even off-post wells (Fair Oaks Ranch) can significantly alter the LGR groundwater gradient. The regional gradient calculation, an overall groundwater gradient averaged across CSSA, is measured from CS-MWH-LGR to CS-1 (0.0033603 ft/ft) indicating a southerly flow. Localized gradients within CSSA indicates flow in multiple directions. In the North Pasture, groundwater from CS-I flows towards CS-12 at a gradient of 0.0036 ft/ft (west-southwest). In the central portion of CSSA, the groundwater mound at CS-MW4-LGR generates gradients flowing away from the mound in all directions. At the southern end of the camp a south-southeasterly gradient of 0.0040 ft/ft was present between CS-MW21-LGR and CS-1 and an east north-easterly gradient between CS-MW35-LGR and CS-1of 0.0058 ft/ft was present in the southwest corner of the camp.

Under normal conditions, the potentiometric surface in both the BS and CC members of the aquifer generally trend in a southerly direction, like the LGR. But during periods of above-average water levels or intense aquifer recharge, a strongly dominant eastward component in both the BS and CC is often observed. When present, the cone of depression from pumping at CS-MW16-CC can interrupt the typical flow patterns within the CC and BS (**Figures 2.2 and 2.3**). In September 2017, a slight depression is visible in the BS centered around CS-MW12-BS creates a trough in the potentiometric surface in the central portion of the post with higher BS groundwater elevations to the north and south. The average groundwater elevation in the BS in September was 990.06 feet MSL. The CC potentiometric surface shows a mostly typical flow

trend to the south-southwest with a slight westerly component in the west-central portion of the post, a slight cone of depression centered on CS-MW16-CC in the central portion of the post, and a more southerly flow in the southern portion of the post. The CC average elevation in June 2017 was 963.99 feet MSL.

A review of historical data has shown that the CC potentiometric surface develops a predominantly easterly gradient when the average CC groundwater elevation is higher than 995 feet MSL. Below that elevation, the gradient resumes a more southerly direction as is the case in September 2017, where average CC groundwater elevation was 963.99 feet MSL. Notable for September 2017 is the slight depression around the Bioreactor extraction well, CS-MW16-CC. That well is used for continuous groundwater extraction for the SWMU B-3 Bioreactor system. A well-developed cone of depression was observed during the events in June and March 2017.

Groundwater elevations have been measured and recorded since 1992. Previous droughts resulted in water levels decreasing substantially in 1996, 1999, 2000, 2006, 2008, 2009, 2011 through 2014. In 2015, approximately 44 inches of rainfall in the San Antonio area ended the drought cycle, resulting in a net gain of 145 feet in aquifer level over the course of the year. Through September 2017, approximately 23.95 inches of rainfall has been realized in the San Antonio area. By the end of September 2017, the postwide average level in the LGR wells decreased approximately 48 feet from June 2017. With this decrease, the September 2017 LGR groundwater average elevation (980.30 feet MSL) is now 51.6 feet below the long-term (14.5 year) average groundwater elevation (1,031.94 feet MSL).

It is worth noting that, based on more than 14.75 years of program history, the postwide LGR groundwater level has declined by 113.4 feet (see **Figure 2.4**). As can be expected with sparse data sets, the largest rate of change/decline (90 feet) came during the initial 4 years of the groundwater monitoring program. Over the past 10 years, the average decline rate has subdued, losing an additional 22.5 feet of average groundwater elevation. This 10-year period included 7 years of prolonged drought and three years of above average precipitation (2010, 2015, and 2016). The past 14.75-year history of CSSA groundwater monitoring indicates that the aquifer level is "below average" approximately 66 percent of the time. However, the past seven of eight monitoring events prior to the September 2017 monitoring event (September, December 2015, March, June, September, December 2016, and March and June 2017) have shown above-average aquifer levels. Above average groundwater elevations have been recorded only eight times in the past 28 monitoring events (7 years). Prior to June 2015, the LGR had not been above the long-term "average" water elevation since September 2010.

3.0 SEPTEMBER ANALYTICAL RESULTS

3.1 Monitoring Wells

Under the provisions of the groundwater monitoring DQOs and the 2015 LTMO evaluation, the schedule for sampling on-post in September 2017 included 5 wells. The samples included four production wells (CS-1, CS-10, CS-12, and CS-13) and monitoring well CS-MW37-LGR (see **Table 3.1)**. In conjunction with the off-post monitoring initiative (under a separate report) the September 2017 groundwater sampling constituted a "quarterly" event as outlined in the 2015 LTMO updated schedule, which was implemented in December 2016.

All 5 wells scheduled for monitoring in September 2017 were sampled. Additional samples were collected as part of the AOC-65 in-situ chemical oxidation (ISCO) and SWMU B-3 bioreactor Corrective Measures operations; these results will be documented in separate reports. **Tables 3.1** and **3.2** provide a sampling overview for September 2017 and the schedule under the LTMO recommendations. The wells listed in **Table 3.1** are sampled using dedicated low-flow gas-operated bladder pumps. Wells CS-1, CS-10, CS-12, and CS-13 were sampled using dedicated electric submersible pumps. **Figure 3.1** shows well sampling locations.

Wells sampled by low-flow pumps were purged until the field parameters of pH, temperature, and conductivity stabilized. The on-post monitoring wells were sampled in September 2017 for volatile organic compounds (VOCs) analytes which include *cis*-1,2-dichloroethene (*cis*-1,2-DCE), tetrachloroethene (PCE), trichloroethene (TCE), and vinyl chloride. Effective in September 2016 per the recently-approved DQOs, metals are no longer obtained from on-post monitoring wells. Metals analyses will continue to be collected from active groundwater remediation sites (AOC-65 and B-3), as well as on-post drinking water wells. As such, active and future drinking water wells CS-1, CS-10, CS-12, and CS-13 were analyzed for the same VOC analytes and metals (arsenic, barium, chromium, copper, zinc, cadmium, mercury, and lead).

Samples were analyzed by Agriculture & Priority Pollutant Laboratories (APPL) in Clovis, California. All detected concentrations of VOCs and metals are presented in **Table 3.3**. Full analytical results are presented in **Appendix B**.

No wells sampled this quarter had VOCs detected above the Maximum Contaminant Level (MCL) of 5 micrograms per liter (µg/L). A comparison of VOC concentrations versus water level for select wells is presented in **Figure 3.2**. The overall trend for CS-D, CS-4, CS-MW1-LGR, CS-MW5-LGR, CS-MW36-LGR last sampled in June 2017 was a slight decrease in VOC concentrations with a decrease in groundwater elevation. CS-MW5-LGR has been sampled since 2001, but it did not show concentrations of PCE and TCE above the MCL until December 2015.

Table 3.1
Overview of the On-Post Monitoring Program

Count	Well ID	*Analytes*	*Last Sample Date*	*Dec-16*	*Mar-17*	*Jun-17*	*Sep-17*	*Sampling Frequency**
	CS-MW1-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months / semi annual B-3
	CS-MW1-BS	VOCs	Dec-12	NS	NS	NS	NS	as needed
	CS-MW1-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW2-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW2-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW3-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW4-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW5-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months / semi annual B-3
	CS-MW6-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months GW / Qtrly ISCO
	CS-MW6-BS	VOCs	Dec-12	NS	NS	NS	NS	as needed
	CS-MW6-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW7-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months GW / Qtrly ISCO
	CS-MW7-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW8-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months GW / Qtrly ISCO
	CS-MW8-CC	VOCs	Jun-17	NS	NS	S	NS	15 months
	CS-MW9-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW9-BS	VOCs	Dec-12	NS	NS	NS	NS	as needed
	CS-MW9-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW10-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months
	CS-MW10-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW11A-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months
	CS-MW11B-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months
	CS-MW12-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months
	CS-MW12-BS	VOCs	Dec-12	NS	NS	NS	NS	as needed
	CS-MW12-CC	VOCs	Jun-17	NS	NS	S	NS	30 months
	CW-MW17-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months
	CS-MW18-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW19-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
1	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-17	S	S	S	S	Quarterly
	CS-2	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-4	VOCs	Jun-17	NS	NS	S	NS	15 months
2	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-17	S	S	S	S	Quarterly
3	CS-12	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-17	S	S	S	S	Quarterly
4	CS-13	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-17	offline	S	S	S	Quarterly
	CS-D	VOCs	Jun-17	NS	NS	S	NS	15 months GW / semi annual B3
	CS-MWG-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MWH-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-I	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW20-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW21-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW22-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW23-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW24-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW25-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW35-LGR	VOCs	Jun-17	NS	NS	S	NS	30 months
	CS-MW36-LGR	VOCs	Jun-17	NS	NS	S	NS	15 months GW / Qtrly ISCO
5	CS-MW37-LGR	VOCs	Jun-17			S	S	quarterly for 1 yr

* New LTMO sampling frequency to be implemented in December 2016
S = Sample
NS = No Sample
NSWL = No Sample due to low water level

Table 3.2 Westbay Sampling Frequency

Westbay Interval	Last Sample Date	Dec-16	Mar-17	Jun-17	Sep-17	LTMO Sampling Frequency (as of Dec. 2016)
CS-WB01-UGR-01	Dec-04	NS	NS	NSWL	NS	15 months GW/Qtrly ISCO
CS-WB01-LGR-01	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB01-LGR-02	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-03	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-04	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-05	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-06	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-07	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-08	Jun-17	NS	NS	S	NS	15 months
CS-WB01-LGR-09	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB02-UGR-01	Dec-04	NS	NS	NS	NS	port clogged, no sample
CS-WB02-LGR-01	Dec-14	NS	NS	NSWL	NS	15 months GW/Qtrly ISCO
CS-WB02-LGR-02	Mar-10	NS	NS	NSWL	NS	15 months
CS-WB02-LGR-03	Jun-17	NS	NS	S	NS	15 months
CS-WB02-LGR-04	Jun-17	NS	NS	S	NS	15 months
CS-WB02-LGR-05	Jun-17	NS	NS	S	NS	15 months
CS-WB02-LGR-06	Jun-17	NS	NS	S	NS	15 months
CS-WB02-LGR-07	Jun-17	NS	NS	S	NS	15 months
CS-WB02-LGR-08	Jun-17	NS	NS	S	NS	15 months
CS-WB02-LGR-09	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB03-UGR-01	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB03-LGR-01	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB03-LGR-02	Oct-07	NS	NS	NSWL	NS	15 months
CS-WB03-LGR-03	Jun-17	NS	NS	S	NS	15 months
CS-WB03-LGR-04	Jun-17	NS	NS	S	NS	15 months
CS-WB03-LGR-05	Jun-17	NS	NS	S	NS	15 months
CS-WB03-LGR-06	Jun-17	NS	NS	S	NS	15 months
CS-WB03-LGR-07	Jun-17	NS	NS	S	NS	15 months
CS-WB03-LGR-08	Jun-17	NS	NS	S	NS	15 months
CS-WB03-LGR-09	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB04-UGR-01	Mar-04	NS	NS	NSWL	NS	15 months GW/Qtrly ISCO
CS-WB04-LGR-01	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB04-LGR-02	Mar-14	NS	NS	NSWL	NS	15 months
CS-WB04-LGR-03	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-04	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-06	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-07	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-08	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-09	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-10	Jun-17	NS	NS	S	NS	15 months
CS-WB04-LGR-11	Jun-17	NS	NS	S	NS	15 months GW/Qtrly ISCO
CS-WB04-BS-01	Jun-17	NS	NS	S	NS	30 months
CS-WB04-BS-02	Jun-17	NS	NS	S	NS	30 months
CS-WB04-CC-01	Jun-17	NS	NS	S	NS	30 months
CS-WB04-CC-02	Jun-17	NS	NS	S	NS	30 months
CS-WB04-CC-03	Jun-17	NS	NS	S	NS	30 months

Profiling performed quarterly, in conjunction with post wide water levels.
S = Sample
NS = No Sample
NSWL = No sample due to low water level

Figure 3-1

On-Post and Off-Post Well Sampling Locations for September 2017

Camp Stanley Storage Activity

PARSONS

Table 3.3
September 2017 On-Post Quarterly Groundwater Results, Detected Analytes

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury
CSSA Drinking Water Well System									
CS-1	9/26/2017	--	**0.0342**	--	--	--	--	**0.115J**	--
CS-10	9/26/2017	--	**0.0351**	--	--	--	--	**0.353J**	--
CS-12	9/26/2017	--	**0.0298**	--	--	**0.008F**	--	**0.059J**	--
CS-12 FD	9/26/2017	--	**0.0297**	--	--	**0.006F**	--	**0.083J**	--
CS-13	9/25/2017	--	**0.0287**	--	--	--	--	**0.378**	--
Comparison Criteria									
Method Detection Limit (MDL)		**0.00022**	**0.0003**	**0.0005**	**0.001**	**0.003**	**0.0019**	**0.008**	**0.0001**
Reporting Limit (RL)		**0.03**	**0.005**	**0.007**	**0.01**	**0.01**	**0.025**	**0.05**	**0.001**
Max. Contaminant Level (MCL)		**0.01**	**2**	**0.005**	**0.1**	**AL=1.3**	**AL=0.015**	**SS=5.0**	**0.002**

Well ID	Sample Date	cis-1,2-DCE	PCE	TCE	Vinyl Chloride
CS-MW37-LGR	9/22/2017	--	--	--	--
CSSA Drinking Water Well System					
CS-1	9/26/2017	--	--	--	--
CS-10	9/26/2017	--	--	--	--
CS-12	9/26/2017	--	--	--	--
CS-12 FD	9/26/2017	--	--	--	--
CS-13	9/25/2017	--	--	--	--
Comparison Criteria					
Method Detection Limit (MDL)		**0.07**	**0.06**	**0.05**	**0.08**
Reporting Limit (RL)		**1.2**	**1.4**	**1**	**1.1**
Max. Contaminant Level (MCL)		**70**	**5**	**5**	**2**

BOLD	= Above the MDL
BOLD	= Above the RL
BOLD	= Above the MCL

Precipitation per Quarter:	Mar-17	Jun-17	Sep-17
AOC-65 Weather Station (AOC-65 WS)	NA	5.31	8.07
B-3 Weather Station (B-3 WS)	7.61	6.86	9.48

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

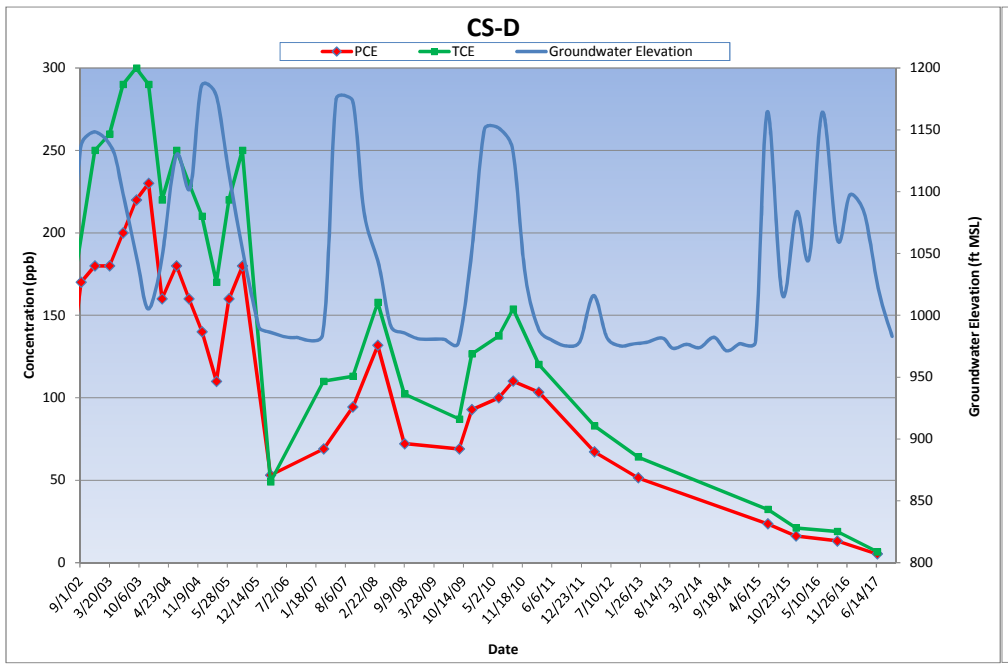
Abbreviations/Notes:

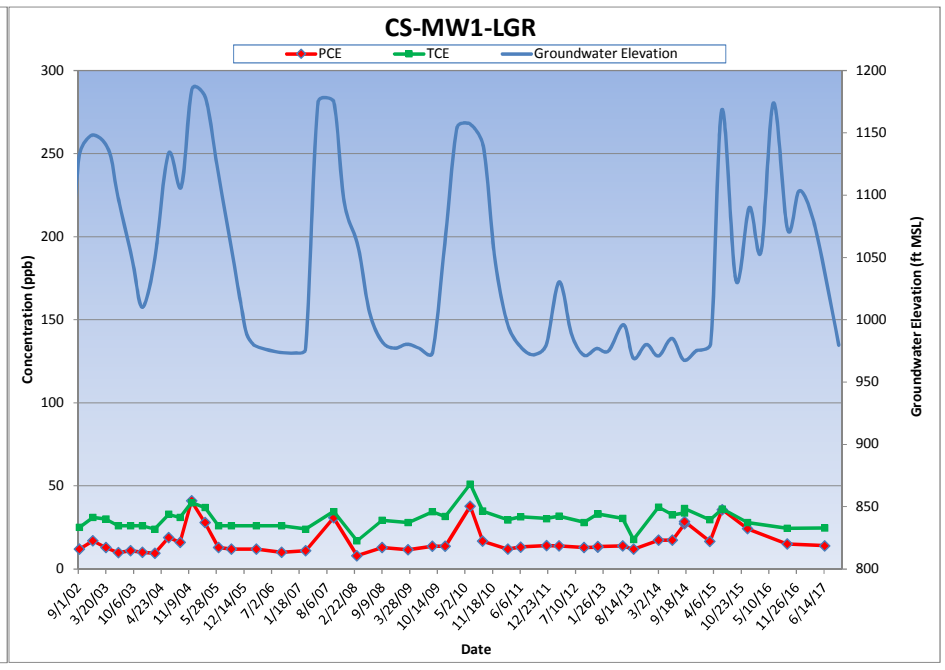
FD	Field Duplicate
TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene
AL	Action Level
SS	Secondary Standard

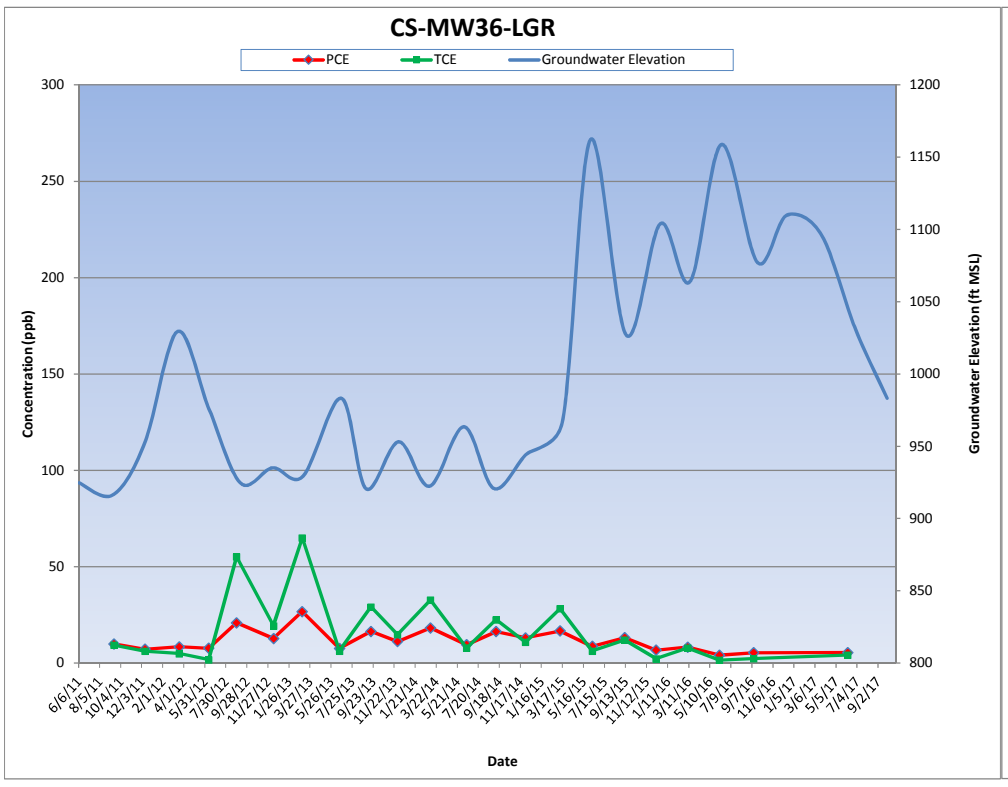
Data Qualifiers:

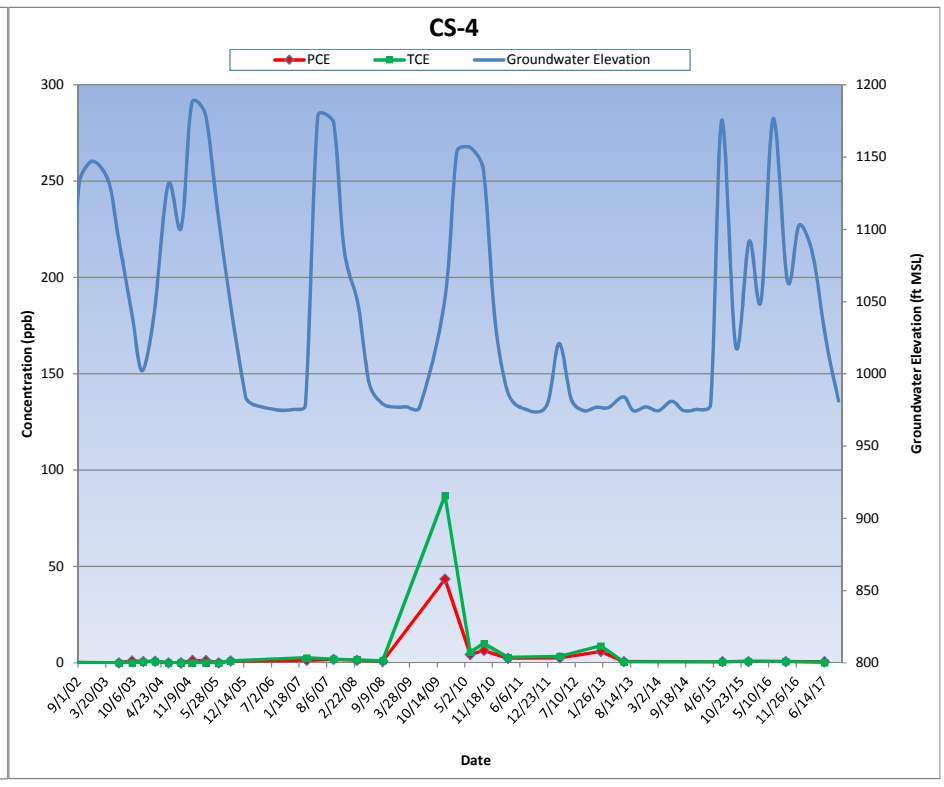
--The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.
F-The analyte was positively identified but the associated numerical value is below the RL.
J - Analyte detected, concentration estimated.
NA - data not available

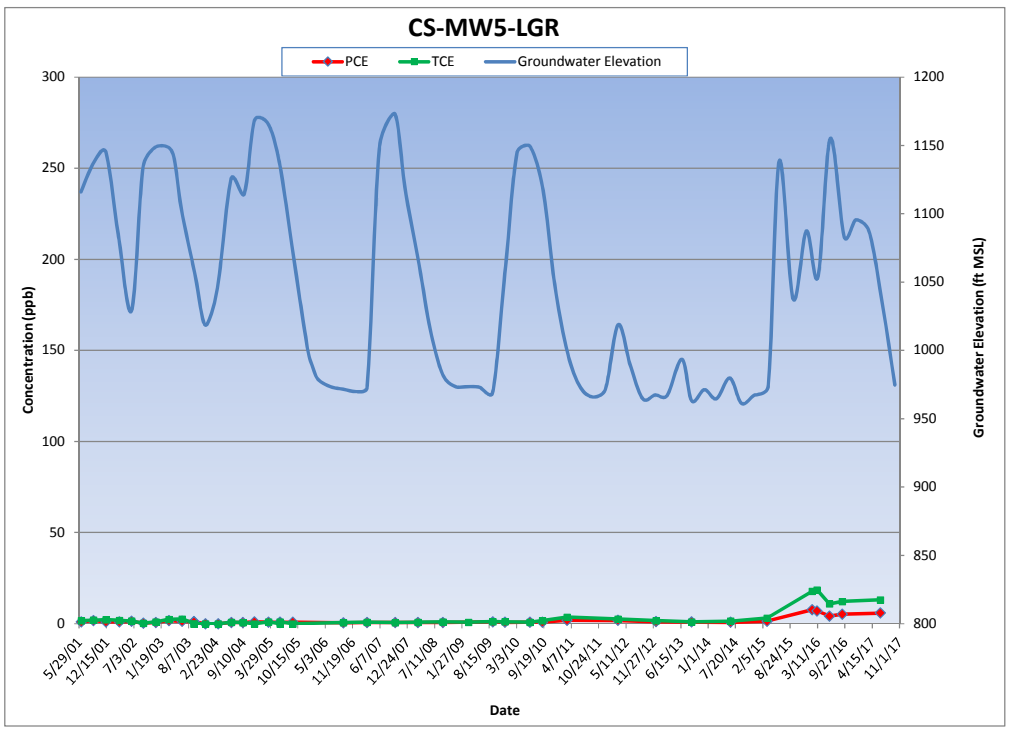
Figure 3.2
On-Post Cumulative Analytical vs. Groundwater Elevation











NOTE: Sampling dates are indicated by the squares on the trend line.

Results from on-post monitoring wells are considered definitive data and are subject to data validation and verification under provisions of the CSSA Quality Assurance Project Plan (QAPP). Parsons data package numbered 110046-#109 containing the analytical results from this sampling event, were received by Parsons October 25, 2017. Data validation was conducted and the data validation reports are presented in **Appendix C**.

3.2 Westbay-equipped Wells

The recently updated LTMO schedule was implemented in December 2016. In September 2017, no Westbay Well zones were scheduled for sampling. However, these wells (CS-WB01, CS-WB02, CS-WB03, and CS-WB04) were also profiled to capture water level readings. These Westbay wells are located in the vicinity of AOC-65, and are part of the post-wide quarterly groundwater monitoring program. Per the recently-approved 2015 LTMO, the Upper Glen Rose (UGR)/LGR zones are to be sampled on a 15-month schedule and the BS/CC zones are sampled on a 30-month schedule. The sampling of these wells began in September 2003.

There are four other Westbay wells (CS-WB05, CS-WB06, CS-WB07, and CS-WB08) that are located at the SWMU B-3 remediation site. Those wells are sampled on a separate schedule in association with the SWMU B-3 bioreactor monitoring. Results for those wells are presented in the SWMU B-3 Performance Status Reports.

4.0 SEPTEMBER 2017 SUMMARY

- Groundwater samples were collected from 5 on-post wells scheduled for monitoring in September 2017 at Camp Stanley Storage Activity (CSSA).
- From July 1st to September 30, 2017, CSSA's AOC-65 weather station recorded 8.07 inches of rainfall and the SWMU B-3 weather station recorded 9.48 inches of rainfall. The rainfall was sporadic with 0.12/0.38 inches falling in July, 4.98/4.12 inches falling in August, and 4.38/3.57 inches in September from B-3/AOC-65 weather stations. Six events had greater than one inch of daily rainfall at B-3.
- The Middle Trinity aquifer levels (LGR, BS, and CC) decreased an average of 48.18 feet per non-pumping well since last quarter. The average water level in September 2017 (excluding pumping wells) was 262.58 feet BTOC (979.75 feet MSL).
- No VOCs were detected above the MCL in September 2017 (**Table 3.3**).
- There were no metals detected above the MCL/AL/SS in the wells sampled in September 2017.
- Westbay Wells 01-04 were not sampled in September 2017. However, these well were profiled to capture water level data in the area.

APPENDIX A

EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT

Appendix A Evaluation of Data Quality Objectives Attainment

Activity	Objectives	Action	Objective Attained?	Recommendations
Field Sampling	Conduct field sampling in accordance with procedures defined in the project work plan, SAP, QAPP, HSP, and LTMO recommendations.	All sampling was conducted in accordance with the procedures described in the project plans.	Yes.	NA
Characterization of Environmental Setting (Hydrogeology)	Prepare water-level contour and/or potentiometric maps for each formation of the Middle Trinity Aquifer (3.5.3).	Potentiometric surface maps were prepared based on water levels measured in each of CSSA's wells screened in three formations on September 28, 2017.	To the extent possible with data available. Due to the limited data available and the fact that wells are completed across multiple water-bearing units, potentiometric maps should only be used for regional water flow direction, not local. Ongoing pumping in the CSSA area likely affects the natural groundwater flow direction.	As additional wells are installed screened in distinct formations, future evaluations will eliminate reliance on wells screened across multiple formations.
	Describe the flow system, including the vertical and horizontal components of flow (2.1.9).	Potentiometric maps were created using September 28, 2017 water level data, and horizontal flow direction was tentatively identified. Insufficient data are currently available to determine vertical component of flow.	As described above, due to the lack of aquifer-specific water level information, potentiometric surface maps should only be used as an estimate of regional flow direction.	Same as above.
	Define formation(s) in the Middle Trinity Aquifer are impacted by the VOC contaminants (2.1.3).	Quarterly groundwater monitoring provides information on Middle Trinity Aquifer impacts. Monitoring wells equipped with Westbay® - multi-port samplers are sampled every 15 or 30 months.	Yes.	Continue sampling.

Activity	Objectives	Action	Objective Attained?	Recommendations
Characterization of Environmental Setting (Hydrogeology) (Continued)	Identify any temporal changes in hydraulic gradients due to seasonal influences (2.1.5).	Downloaded data from continuous-reading transducers in wells: CS-MW4-LGR, CS-MW9-LGR, CS-MW12-LGR, CS-MW12-CC, and CS-MW10-CC. Additional continuous reading transducers were added to the program through the SCADA project. The following wells can be uploaded to see real time water level data: CS-MW16-LGR, CS-MW16-CC, CS-1, CS-12, CS-13, and CS-10. Data was also downloaded from the AOC-65 and B-3 weather stations. Water levels will be graphed at these wells against precipitation data through December 2017 and included in the annual groundwater report.	Yes.	Continue collection of transducer data and possibly install transducers in other cluster wells.
Contamination Characterization (Ground Water Contamination)	Characterize the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility (3.1.2).	Samples for laboratory analysis were collected from all 4 CSSA on-post drinking water wells and from 1 on-post monitoring well. The 4 BS wells are no longer sampled as part of the groundwater program.	The horizontal and vertical extent of groundwater contamination is continuously monitored.	Continue groundwater monitoring and construct additional wells as necessary.
	Determine the horizontal and vertical concentration profiles of all constituents of concern (COC) in the groundwater that are measured by USEPA-approved procedures (3.1.2). COCs are those chemicals that have been detected in groundwater in the past and their daughter (breakdown) products.	Groundwater samples were collected from wells: CS-1, CS-10, CS-12, CS-13, and CS-MW37-LGR . Samples were analyzed for the short list of VOCs using USEPA method SW8260B. The drinking water wells were also sampled for metals (arsenic, barium, chromium, copper, cadmium, mercury, lead, and zinc). Analyses were conducted in accordance with the CSSA QAPP and approved variances. All reporting limits (RL) were below MCLs, as listed below:	Yes.	Continue sampling.

Activity	Objectives	Action	Objective Attained?	Recommendations
Contamination Characterization (Ground Water Contamination) (Continued)	Determine the horizontal and vertical concentration profiles of all constituents of concern (COC) in the groundwater that are measured by USEPA-approved procedures (3.1.2). COCs are those chemicals that have been detected in groundwater in the past and their daughter (breakdown) products.	**ANALYTE** / **RL (µg /L)** / **MCL(µg/L)** *cis*-1,2-DCE: 1.2 / 70 PCE: 1.4 / 5 TCE: 1.0 / 5 Vinyl chloride: 1.1 / 2	Yes.	Continue sampling.
		ANALYTE / **RL (µg/L)** / **MCL/AL (µg /L)** Barium: 5 / 2,000 Chromium: 10 / 100 Copper: 10 / 1,300 Zinc: 50 / 5,000 Arsenic: 30 / 10 Cadmium: 7 / 5 Lead: 25 / 15 Mercury: 1 / 2	Yes.	Continue sampling.
	Meet CSSA QAPP quality assurance requirements.	Samples were analyzed in accordance with the CSSA QAPP and approved variances. Parsons chemists verified all data.	Yes.	NA
		All data flagged with a "U," "J," "M," and "F" are usable for characterizing contamination. All "R" flagged data are considered unusable.	Yes.	NA

Activity	Objectives	Action	Objective Attained?	Recommendations
Contamination Characterization (Ground Water Contamination) (Continued)	Meet CSSA QAPP quality assurance requirements. (Continued)	Previously, a method detection limit (MDL) study for arsenic, cadmium, and lead was not performed within a year of the analyses, as required by the AFCEE QAPP.	The laboratory performed new MDL studies in February 2001 for these metals and the new MDL values were found to be almost identical to the previous MDLs and all met the associated AFCEE QAPP requirements. MDLs for these three metals are well below MCLs. In addition, the laboratory performed daily calibrations and RL verifications for these metals, both of which demonstrate the laboratory's ability to detect and quantitate these metals at RL levels. These daily analyses also indicate that concentrations above the laboratory RL for these compounds were not affected by the expired MDL study.	Use results for groundwater characterization purposes.
Remediation	Determine goals and create cost-effective and technologically appropriate methods for remediation (2.2.1).	Continued data collection will provide analytical results for accomplishing this objective.	Ongoing.	Continue sampling and evaluation, including quarterly groundwater monitoring teleconferences to address remediation.
	Determine placement of new wells for monitoring (2.3.1, 3.6)	Sampling frequency and sample locations to be monitored (including any new wells) will be based on trend data from monitoring event(s) (3.1.5).	Ongoing.	Continue quarterly groundwater teleconferences to discuss sampling frequency and placement of new monitor wells.
Project schedule/ Reporting	Produce a quarterly monitoring project schedule as a road map for sampling, analysis, validation, verification, reviews, and reports.	Prepare schedules and sampling guidelines prior to each quarterly sampling event.	Yes.	Continue sampling schedule preparation each quarter.

APPENDIX B

QUARTERLY ON-POST GROUNDWATER MONITORING ANALYTICAL RESULTS SEPTEMBER 2017

Appendix B
Quarterly On-Post Groundwater Monitoring Analytical Results, September 2017

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury
CSSA Drinking Water Well System									
CS-1	9/26/2017	0.00022U	**0.0342**	0.0005U	0.001U	0.003U	0.0019U	**0.115J**	0.0001U
CS-10	9/26/2017	0.00022U	**0.0351**	0.0005U	0.001U	0.003U	0.0019U	**0.353J**	0.0001U
CS-12	9/26/2017	0.00022U	**0.0298**	0.0005U	0.001U	**0.008F**	0.0019U	**0.059J**	0.0001U
CS-12 FD	9/26/2017	0.00022U	**0.0297**	0.0005U	0.001U	**0.006F**	0.0019U	**0.083J**	0.0001U
CS-13	9/25/2017	0.00022U	**0.0287**	0.0005U	0.001U	0.003U	0.0019U	**0.378**	0.0001U
Comparison Criteria									
Method Detection Limit (MDL)		**0.00022**	**0.0003**	**0.0005**	**0.001**	**0.003**	**0.0019**	**0.008**	**0.0001**
Reporting Limit (RL)		**0.03**	**0.005**	**0.007**	**0.01**	**0.01**	**0.025**	**0.05**	**0.001**
Max. Contaminant Level (MCL)		**0.01**	**2**	**0.005**	**0.1**	**AL=1.3**	**AL=0.015**	**SS=5.0**	**0.002**

Well ID	Sample Date	cis-1,2-DCE	PCE	TCE	Vinyl Chloride
CS-MW37-LGR	9/22/2017	0.07U	0.06U	0.05U	0.08U
CSSA Drinking Water Well System					
CS-1	9/26/2017	0.07U	0.06U	0.05U	0.08U
CS-10	9/26/2017	0.07U	0.06U	0.05U	0.08U
CS-12	9/26/2017	0.07U	0.06U	0.05U	0.08U
CS-12 FD	9/26/2017	0.07U	0.06U	0.05U	0.08U
CS-13	9/25/2017	0.07U	0.06U	0.05U	0.08U
Comparison Criteria					
Method Detection Limit (MDL)		**0.07**	**0.06**	**0.05**	**0.08**
Reporting Limit (RL)		**1.2**	**1.4**	**1**	**1.1**
Max. Contaminant Level (MCL)		**70**	**5**	**5**	**2**

BOLD	= Above the MDL
BOLD	= Above the RL
BOLD	= Above the MCL

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

Abbreviations/Notes:

FD	Field Duplicate
TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene
AL	Action Level
SS	Secondary Standard

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.
J - Analyte detected, concentration estimated.
NA - data not available

APPENDIX C
DATA VALIDATION REPORT

SDG 83858

DATA VERIFICATION SUMMARY REPORT

for on-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers five groundwater samples and the associated field quality control (QC) samples collected from on-post Camp Stanley Storage Activity (CSSA) on September 22 and 26, 2017. The samples were assigned to the following Sample Delivery Group (SDG). All samples were analyzed for volatile organic compounds (VOCs) and metals including arsenic, barium, cadmium, chromium, copper, lead, zinc, and mercury.

83858

The field QC samples associated with this SDG were one field duplicate (FD), one set of matrix spike/matrix spike duplicate (MS/MSD), and one trip blank (TB) samples. 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 one cooler which was received by the laboratory at a temperature of 3.0ºC, which was within the 2-6ºC range recommended by the CSSA QAPP.

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 five (5) on-post groundwater samples, one FD, one set of MS/MSD, and one (1) TB. Samples were collected on September 22, 25, and 26, 2017 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, #222536, #222538, and #222581 under two sets of initial calibration (ICAL) with two instrument. 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 three laboratory control spike (LCS) samples, MS/MSD analyses, and the surrogate spikes. Sample CS-1 was designated as the parent sample for the MS/MSD analyses.

All LCS, MS, MSD, and surrogate spike recoveries were within acceptance criteria.

Precision

Precision was evaluated using the relative percent difference (%RPD) of the MS/MSD results and parent/FD results. Sample CS-12 was collected in duplicate.

None of the four target VOCs were detected in the parent and FD samples at or above the reporting limits, therefore, the %RPD calculations were not applicable.

All %RPDs of MS and MSD were compliant.

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 trip blank and laboratory blank for cross contamination of samples during sample collection 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 for both instrument.
- All initial calibration criteria were met for both set of curves.

- All initial calibration verification (ICV) criteria were met. The two ICVs were prepared using secondary source standards. 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 and one TB associated with the VOC analyses in this SDG and all were 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%.

ICP-AES METALS

General

The ICP-AES portion of this SDG consisted of five (5) on-post groundwater samples, one FD, and one set of MS/MSD. All samples were collected on September 22, 25, and 26, 2017. All samples were analyzed for arsenic, barium, cadmium, chromium, copper, lead, and zinc.

The ICP-AES metals analyses were performed using USEPA SW846 Method 6010B. 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.

The samples for ICP-AES metals were digested in batch #222897. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS, MS and MSD. CS-1 was designated as the parent sample for the MS/MSD analyses.

All LCS, MS, and MSD recoveries were within acceptance criteria.

Precision

Precision was measured based on the %RPD of MS/MSD results and parent/FD sample results. Sample CS-12 was collected in duplicate.

All %RPDs were compliant for the MS/MSD.

For the parent/FD samples, only barium and zinc were detected above the reporting limits. The %RPD was compliant for barium. The %RPD of zinc was 34% which

exceeded the 20% limit. "J" flags were applied to the zinc result of all samples collected on September 26, 2017 which include samples CS-12, CS-12FD, CS-1, and CS-10.

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 preservation and holding times; and
- Examining laboratory blank for cross contamination of samples during analysis.

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

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All CCV criteria were met.
- All interference check (ICSA/ICSAB) criteria were met.
- No dilution test was required, as per the CSSA QAPP.

One method blank and several calibration blanks were analyzed in association with the ICP-AES analyses in this SDG. All blanks were free of target metals at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

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

MERCURY

General

The mercury portion of this SDG consisted of five (5) on-post groundwater samples, one FD, and one (1) set of MS/MSD. All samples were collected on September 22, 25, and 26, 2017 and were analyzed for mercury.

The mercury analyses were performed using USEPA SW846 Method 7470A. These samples were analyzed following the procedures outlined in the CSSA QAPP, prepared and analyzed within the holding time required by the method.

The mercury samples were prepared in batch #222902. The analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the %R obtained from the LCS, MS, and MSD analyses. CS-1 was designated as the parent sample for the MS/MSD analyses.

The LCS, MS, and MSD recovery were within acceptance criteria.

Precision

Precision was measured based on the %RPD of MS/MSD results and parent/FD sample results. Sample CS-12 was collected in duplicate.

The %RPD of MS/MSD was compliant.

Mercury was not detected in the parent and FD sample.

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 blanks for cross contamination of samples during analysis.

All samples were analyzed following the COC and the analytical procedures described in the CSSA QAPP, prepared and analyzed within the holding times required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All calibration verification criteria were met.

There was one method blank and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of mercury at or above the RL.

Completeness

Completeness has been evaluated by comparing the total number of samples collected with the total number of samples with valid analytical data.

Mercury result for the samples in this SDG was considered usable. The completeness for the mercury portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.