2011 ANNUAL GROUNDWATER REPORT

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

Prepared By
PARSONS

Austin, Texas

July 2012

GEOSCIENTIST CERTIFICATION

2011 Annual Groundwater Monitoring Report

For

Department of the Army

Camp Stanley Storage Activity

Boerne, Texas

I, W. Scott Pearson, P.G., hereby certify that the 2011 Annual 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 2011, and is true and accurate to the best of my knowledge and belief.

W. Scott Pearson, P.G.
State of Texas
Geology License No. 2186

7-26-2012

Date

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

µg/L	Microgram per liter
1,1-DCE	1,1-dichloroethene
§3008(h) Order	RCRA 3008(h) Administrative Order on Consent
AL	Action Level
AOC	Area of Concern
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
BACT	Bacteriological
Bexar Met	Bexar Metropolitan Water District
BS	Bexar Shale
CC	Cow Creek
cis-1,2-DCE	*cis*-1,2-dichloroethene
COC	Contaminants of concern
CSSA	Camp Stanley Storage Activity
DQO	Data Quality Objectives
GAC	Granular activated carbon
GPM	Gallons per minute
GUI	Groundwater Under the Influence (of Surface Water)
LGR	Lower Glen Rose
LTMO	Long Term Monitoring Optimization
MCL	Maximum contaminant limits
MDL	Method detection limit
MPA	Microscopic Particulate Analysis
MSL	Mean sea level
NWS	National Weather Service
PCE	Tetrachloroethene
Plan	CSSA Off-post Monitoring Program and Response Plan
QAPP	Quality Assurance Program Plan
RCRA	Resource Conservation Recovery Act
RL	Reporting limit
SAWS	San Antonio Water Systems
SCADA	Supervisory Control and Data Acquisition
SS	Secondary standard
SWMU	Solid Waste Management Units
TCE	Trichloroethene
TCEQ	Texas Commission on Environmental Quality
TO	Task Order
trans-1,2-DCE	*trans*-1,2-dichloroethene
UGR	Upper Glen Rose
USEPA	United States Environmental Protection Agency

ACRONYMS AND ABBREVIATIONS *(continued)*

VOC	Volatile organic compound
WS-N	Weather station north
WS-S	Weather station south

EXECUTIVE SUMMARY

This report provides an evaluation of results from groundwater monitoring conducted in 2011 at Camp Stanley Storage Activity (CSSA). Groundwater monitoring was performed on-post and off-post during the months of March, June, September, and December 2011. The CSSA groundwater monitoring program objectives 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. This report describes the physical and chemical characteristics of the groundwater monitoring results and changes occurring to the program during 2011.

- The drought pattern that persisted through 2008 and much of 2009 finally changed in September 2009 and the aquifer rose to more normal elevations. 2010 had near average precipitation with major rain events evenly spaced throughout the year. However, in 2011 Texas endured one of the most severe droughts in history. The 2011 annual rainfall at CSSA was 17.24 inches which was 20 inches below average for the Boerne area.

- A new drought cycle ensued in October 2010 with a corresponding decline in water levels. This drought cycle persisted through 2011. The aquifer declined almost 93 feet during the first nine months of the year. Although over half of the rainfall recorded in 2011 fell in the last 3 months of the year (11.71 inches) and recharged the aquifer by 15 feet. However, the later year rainfall was not enough to relieve the severe drought conditions at the end of 2011.

- A total of 74 samples were collected from 38 on-post wells. Contaminant concentrations above drinking water standards were detected at 9 on-post wells. Five wells (CS-MW16-LGR, CS-MW16-CC, CS-D, CS-MW1-LGR, and CS-MW36-LGR) exceeded drinking water standards for volatile organic compounds (VOCs) and four wells (CS-1, CS-9, CS-MW16-LGR, and CS-MW9-BS) exceeded drinking water standards for metals.

- A total of 77 samples were collected from 39 Westbay zones. VOC concentrations above drinking water standards were detected in a total of 19 zones at all four Westbay locations.

- A total of 132 samples were collected from 53 off-post wells. VOC concentrations above drinking water standards were detected at 3 off-post wells (OFR-3, RFR-10, and I10-4). OFR-3 and RFR-10 had GAC units installed in 2001 and I10-4 is not currently being used as a drinking water source. Analysis of post-GAC samples continued to show that all VOCs are being removed and that the treatment continues to be effective. Off-post wells were not sampled for metals content.

1.0 INTRODUCTION

This report provides an evaluation of results from groundwater monitoring conducted in 2011 at CSSA. Groundwater monitoring was performed on-post and off-post during the months of March, June, September, and December 2011. All wells considered for sampling in 2011 are shown on **Figure 1.1**. This report describes the physical and chemical characteristics of the groundwater monitoring results and changes occurring to the program during 2011.

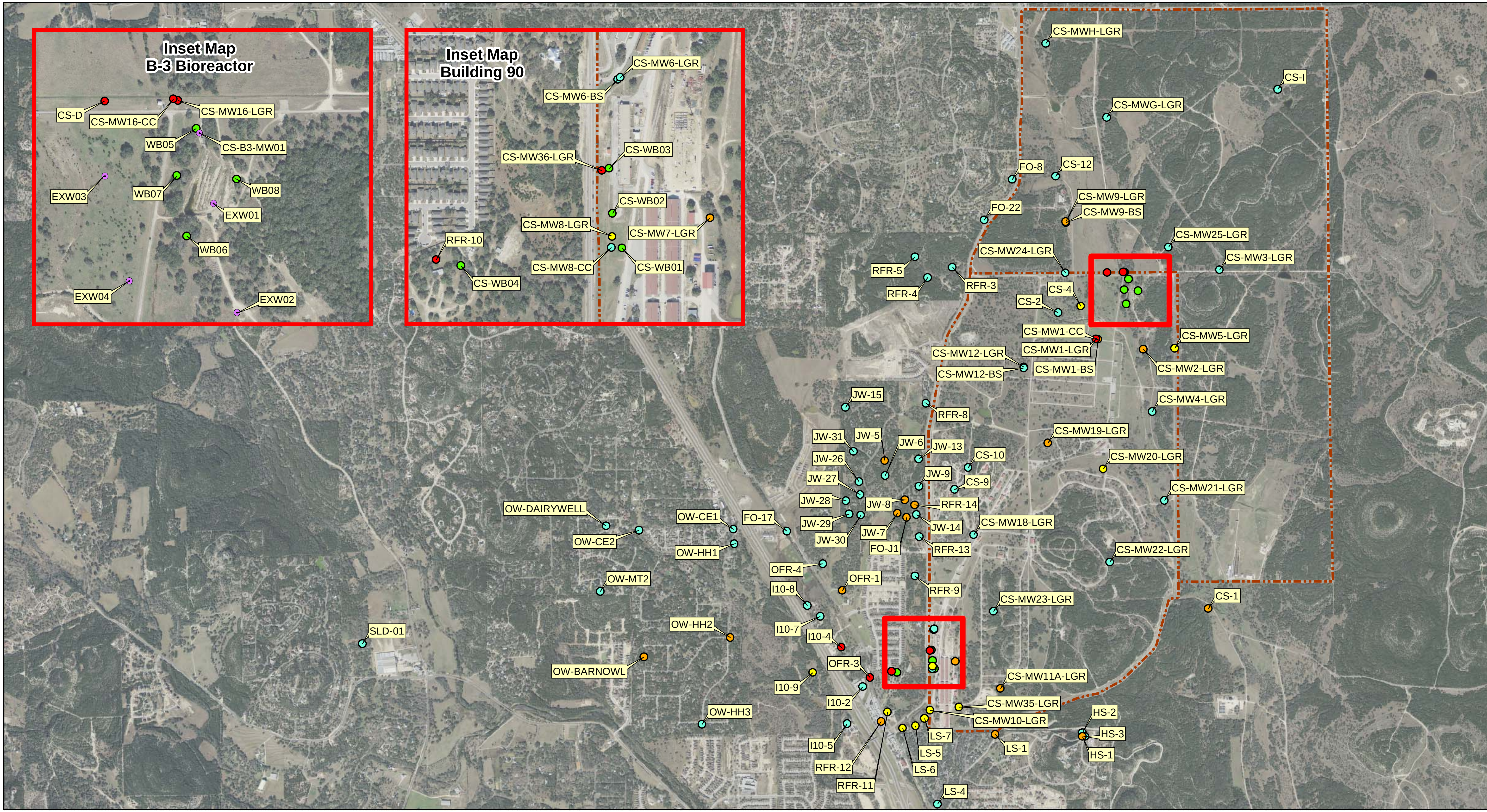
1.1 On-Post Groundwater Monitoring

The current objectives of Camp Stanley Storage Activity's (CSSA) on-post groundwater monitoring program are to monitor groundwater flow direction trends and elevations, determine groundwater contaminant concentrations for characterization purposes, and identify meteorological and seasonal variations in physical and chemical properties of the groundwater. The objectives incorporate and comply with the Resource Conservation Recovery Act (RCRA) §3008(h) Administrative Order on Consent (§3008(h) Order) issued by the United States Environmental Protection Agency (USEPA) on May 5, 1999.

On-post groundwater monitoring was initiated in 1992 in response to volatile organic compound (VOC) contamination detected in CSSA drinking water supply well CS-MW16-LGR and continued periodically until the current CSSA quarterly groundwater monitoring program for on-post wells was initiated in December 1999.

The CSSA groundwater monitoring program follows the provisions of the groundwater monitoring program *Final Data Quality Objectives (DQO) for the Groundwater Monitoring Program* (Parsons 2010) in **Appendix A**, as well as the recommendations of the *Three-Tiered Long Term Monitoring Network Optimization Evaluation* (Parsons 2010) which provided recommendations for sampling based on a long-term monitoring optimization (LTMO) study performed for the CSSA groundwater monitoring program. LTMO study sampling frequencies were implemented on-post in December 2005, as approved by the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA). The LTMO evaluation was updated in 2010 using groundwater data from monitoring conducted between 2005 and 2009. It has been approved by the TCEQ and USEPA and was implemented on- and off-post in June 2011 (**Appendix K**).

A comprehensive summary of the results from the 2011 on-post groundwater sampling events is presented in **Appendix B**. **Appendices C** and **D** present Westbay analytical results in tabular and graphical format, respectively. Abbreviated tables showing only the detected compounds are included in the groundwater results discussions in Section 2.2.1 of this report. **Appendix E** presents the CSSA Drought Contingency Plan trigger levels, and **Appendix F** includes the potentiometric groundwater maps.



Aerial Photo Date: 2010

N
W E
S

0 0.5 1 2
Miles

- Wells with VOC concentrations > MCL
- Wells with VOC concentrations between RL and MCL
- Wells with VOC concentrations < RL
- Non-detect
- Mulit-port Westbay Wells
- Other Wells
- Fence Line

Figure 1.1

2011 Sampled On-Post and
Off-Post Groundwater Wells
Camp Stanley Storage Activity

PARSONS

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Off-post results for groundwater sampling and Granular Activated Carbon (GAC) maintenance are included as **Appendices G** and **H**. Analytical results for samples collected at supply well CS-12 are provided in **Appendix I**. Laboratory data packages for 2011 were submitted to CSSA in electronic format separately from this report. However, **Appendix J** presents the associated data validation reports for those analytical package submittals. Transmittal letters from the US EPA approving the 2010 LTMO and providing directive for groundwater plume representations are included in **Appendices K** and **L**.

1.2 Off-Post Groundwater Monitoring

The primary objective of the off-post groundwater monitoring program is to determine whether concentrations of VOCs detected in off-post public and private drinking water wells exceed safe drinking water standards. A secondary objective of the off-post groundwater monitoring program is to determine the lateral and vertical extent of the contaminant plumes associated with past releases near Area of Concern (AOC)-65 or from Solid Waste Management Units (SWMU) B-3 and O-1. A third objective of the off-post groundwater monitoring program is to assess whether there are apparent trends in contaminant levels (decreasing or increasing) over time in the sampled wells.

CSSA was required by the §3008(h) Order to identify and locate both privately and publicly owned groundwater wells within ¼-mile of CSSA. The Offsite Well Survey Report (Parsons 2001) was submitted to fulfill this requirement. This survey was updated in 2010 to capture any new wells that have been added in the area and to extend the ¼-mile to ½-mile of CSSA. In total, 97 well locations are identified in the updated 2010 Well Survey. A total of 47 locations (45 active and 2 plugged) were identified within ¼-mile radius, and another 39 locations (33 active and 6 plugged) are believed to exist between ¼ to ½-mile away from CSSA. Finally, a total of 11 locations (10 active and 1 plugged) were identified in a special interest area beyond the ½-mile survey that is considered to be downgradient of the CSSA VOC plumes.

Additional background information regarding off-post private and public water supply wells is located in the ***CSSA Environmental Encyclopedia, Volume 5 Groundwater***. Some off-post wells were initially sampled in 1995 and quarterly sampling of off-post wells began in 2001 in accordance with the *Off-Post Monitoring Program and Response Plan* (CSSA 2002a).

Under the Plan, the following criteria are used to determine the action levels for detected VOCs and to determine which off-post wells are sampled:

- If VOC contaminant levels are ≥90 percent of the maximum contaminant levels (MCL) for tetrachloroethene [PCE] and trichloroethene [TCE]) (≥4.5 micrograms per liter [µg/L] based on preliminary data received from the laboratory, and the well is used as a potable water source, the well will be taken offline, bottled water will be supplied within 24 hours after receipt of the data, and a confirmation sample will be collected from the well within 14 days of receipt of the final validated analytical report. If the confirmation sample confirms contaminants of concern (COC) are at or above 90 percent of the MCLs, the well will be evaluated, and either installation of an appropriate method for wellhead treatment or connection to an alternative water source will be performed.

- If VOC contaminant levels are ≥80 but ≤90 percent of the MCL (>4.0 and < 4.5 µg/L for PCE and TCE) during any single monitoring event based on preliminary data from the laboratory, and the well is used as a potable water source, it will be monitored monthly. If the monthly follow-up sampling confirms that COCs are ≥80 but ≤90 percent of the MCL, it will continue to be sampled monthly until the VOC levels fall below the 80 percent value.
- If any COC is detected at levels greater than or equal to the analytical method detection limit (MDL) (historically 0.06 µg/L for PCE and 0.05 µg/L for TCE), and <80 percent of the MCL, the well will be sampled on a quarterly basis. This sampling will be conducted concurrently with on-post sampling events and will be used to develop historical trends in the area. Quarterly sampling will continue for a minimum of 1 year, after which the sampling frequency will be reviewed and may be decreased.
- If COCs are not detected during the initial sampling event (i.e., no VOC contaminant levels above the MDL), further sampling of the well will be reconsidered. A well with no detectable VOCs may be removed from the sampling list. However, if analytical data suggest future plume migration could negatively influence the well, it will be re-sampled as needed. The well owner, USEPA, and TCEQ will be apprised of any re-sampling decisions regarding the non-detect wells.
- For wells where a wellhead treatment system has been installed, post-treatment samples will be collected and analyzed after initial system start-up and at 6-month intervals to confirm the system is effectively removing VOCs.

A comprehensive summary of the results from the 2011 off-post groundwater sampling events is presented in **Appendix G**. Abbreviated tables showing only the detected compounds are included in the groundwater results discussions in Section 2.2.2 of this report. **Appendix H** summarizes pre- and post-granular activated carbon (GAC) filtration system sampling results.

The cumulative historical results from both on- and off-post groundwater monitoring are presented in summary tables located in the Introduction to the *On-Post and Off-Post Quarterly Groundwater Monitoring Program* (Tables 6 through 9), ***CSSA Environmental Encyclopedia, Volume 5 Groundwater.***

2.0 GROUNDWATER MONITORING RESULTS

2.1 Physical Characteristics

2.1.1 Water Level Measurements

Water level measurements were recorded prior to sampling during the March, June, September, and December 2011 events. Water level measurements made at all monitoring wells and drinking water wells listed in **Table 2.1**, a total of 54 wells. Water levels from one off-post well (FO-20) is used to develop the northern perimeter of the LGR gradient maps. Water levels were measured by either e-line indicator or collected from a permanently installed transducer.

Water level elevations and quarterly elevations are summarized in **Table 2.1**. The average groundwater elevation measurements for each of the Lower Glen Rose (LGR), Bexar Shale (BS), and Cow Creek (CC) intervals of the Middle Trinity Aquifer are provided in **Table 2.2**. The averages were calculated using groundwater elevations from wells screened in only one of the three intervals. Water elevations from 7 wells completed with open boreholes over multiple formations were not used. From January to September 2011, the average water level dropped 92.5 feet in response to less than 6 inches of rainfall through September. In that same time period there was only 1 significant (greater than 1 inch) rain event which occurred on January 9, 2011.

The aquifer levels began to rebound the last quarter of 2011, which received 11.71 inches of rainfall. In response to that precipitation activity the aquifer levels increased by 14.7 feet. Through all the hydrologic cycles in 2011, the overall groundwater levels in the Middle Trinity Aquifer decreased 77.77 feet from January through December 2011, as shown in **Table 2.1**. The total amount of precipitation that fell in 2011 was 17.24 inches, which is a drastic decrease from 35.25 inches that fell in 2010, as measured by the CSSA weather stations.

Based on 2011 quarterly aquifer level measurements, **Figure 2.1** shows the relationships of the water level in each portion of the aquifer at CSSA cluster wells (CS-MW1, CS-MW2, CS-MW6, CS-MW7, CS-MW8, CS-MW9, CS-MW10, and CS-MW12). The general trend in **Figure 2.1** shows that at an individual location, the head in the LGR well is typically greater than in the CC well. The amount of dissimilarity between water levels within a cluster is a good indicator to the degree of hydraulic separation between the formational units. Theoretically, intervals that are well connected hydraulically will have the same or very similar groundwater elevation.

In 2011, well clusters in the southern portion in the post (CS-MW6, CS-MW7, CS-MW8, and CS-MW10) show less hydraulic head separation between the LGR and CC production zones than cluster wells to the north (CS-MW1, CS-MW2, CS-MW9, and CS-MW12.

Table 2.1
Summary of Groundwater Elevations and Changes, 2011

						Groundwater Elevation Change				Formations Screened		
Well ID	TOC elevation (ft MSL)	March 2011 Elevations	June 2011 Elevations	September 2011 Elevations	December 2011 Elevations	December 10 minus March 2011	June minus March	September minus June	December minus September	LGR	BS	CC
CS-1+ #	**1169.27**	**991.37**	**831.97**	**873.07**	**898.97**	**-24.00**	**-159.40**	**41.10**	**25.90**	**ALL**		
CS-2	**1237.59**	**982.12**	**979.97**	**979.64**	**980.57**	**-50.32**	**-2.15**	**-0.33**	**0.93**	**?**	**?**	
CS-3	1240.17	987.93	977.33	973.09	978.25	-49.03	-10.60	-4.24	5.16	X		
CS-4	**1229.28**	**987.90**	**976.83**	**NA**	**977.42**	**-49.80**	**-11.07**	NA	NA	**?**	**?**	
CS-9	**1325.31**	**978.66**	**935.37**	**937.63**	**946.08**	**-53.68**	**-43.29**	**2.26**	**8.45**	**ALL**		
CS-10+ #	**1331.51**	**937.93**	**935.51**	**937.51**	**951.51**	**-95.00**	**-2.42**	**2.00**	**14.00**	**ALL**		
CS-12+ #	**1274.09**	**NA**	**981.89**	**976.39**	**984.09**	**NA**	**NA**	**-5.50**	**7.70**	**ALL**		
CS-D	1236.03	989.06	979.85	975.28	978.73	-44.54	-9.21	-4.57	3.45	X		
CS-MWG-LGR	1328.14	1038.83	1058.89	1013.29	1015.97	-25.61	20.06	-45.60	2.68	X		
CS-MWH-LGR	1319.19	1032.66	1007.50	1006.54	1011.74	-12.13	-25.16	-0.96	5.20	X		
CS-I #	1315.20	1026.05	1008.35	999.99	1010.55	-122.20	-17.70	NA	10.56		X	
CS-MW1-LGR+	1220.73	996.51	978.43	971.93	980.03	-51.37	-18.08	-6.50	8.10			X
CS-MW1-BS+	1221.09	1012.04	980.65	973.94	978.73	-46.77	-31.39	-6.71	4.79	X		
CS-MW1-CC+	1221.39	998.55	939.29	916.81	942.85	-10.52	-59.26	-22.48	26.04			
CS-MW2-LGR	1237.08	1001.48	978.39	969.30	977.11	-49.60	-23.09	-9.09	7.81	X		
CS-MW2-CC	1240.11	996.46	942.31	923.08	937.11	-16.38	-54.15	-19.23	14.03	X		
CS-MW3-LGR	1334.14	995.93	984.75	979.51	981.33	-49.76	-11.18	-5.24	1.82	X		
CS-MW4-LGR*	1209.71	1031.53	976.27	967.98	1026.37	-48.37	-55.26	-8.29	58.39	X		
CS-MW5-LGR	1340.24	999.46	973.68	965.91	971.61	-49.07	-25.78	-7.77	5.70		X	
CS-MW6-LGR+	1232.25	992.06	927.94	921.38	951.37	-49.98	-64.12	-6.56	29.99			X
CS-MW6-BS+	1232.67	1053.42	987.37	951.67	949.37	-30.25	-66.05	-35.70	-2.30	X		
CS-MW6-CC+	1233.21	996.02	913.13	903.40	920.99	-43.10	-82.89	-9.73	17.59			X
CS-MW7-LGR	1202.27	988.50	918.99	911.69	936.09	-47.99	-69.51	-7.30	24.40	X		
CS-MW7-CC	1201.84	990.34	904.83	895.32	912.40	-45.56	-85.51	-9.51	17.08			X
CS-MW8-LGR	1208.35	992.63	919.10	913.66	945.36	-47.75	-73.53	-5.44	31.70	X		
CS-MW8-CC	1206.13	991.81	909.53	896.68	914.07	-44.97	-82.28	-12.85	17.39		X	
CS-MW9-LGR+	1257.27	989.38	986.15	984.73	987.96	-47.08	-3.23	-1.42	3.23			X
CS-MW9-BS+	1256.73	1004.97	990.31	986.78	987.98	-42.85	-14.66	-3.53	1.20	X		
CS-MW9-CC+	1255.95	1005.30	954.17	929.69	965.85	-16.85	-51.13	-24.48	36.16			X
CS-MW10-LGR+	1189.53	976.90	895.65	886.23	913.74	-54.79	-81.25	-9.42	27.51	X		
CS-MW10-CC+	1190.04	972.09	885.96	878.29	895.11	-54.48	-86.13	-7.67	16.82	X		
CS-MW11A-LGR	1204.03	980.79	894.85	882.70	909.73	-41.94	-85.94	-12.15	27.03	X		
CS-MW11B-LGR	1203.52	1005.67	996.25	995.60	NA	-9.60	-9.42	-0.65	NA		X	
CS-MW12-LGR+	1259.07	989.01	969.60	965.07	973.63	-50.40	-19.41	-4.53	8.56			X
CS-MW12-BS+	1258.37	1011.82	976.17	968.98	973.95	-41.05	-35.65	-7.19	4.97	X		
CS-MW12-CC+	1257.31	1001.95	945.36	920.11	957.03	-25.20	-56.59	-25.25	36.92			X
CS-MW16-LGR+ #	1244.60	992.18	955.10	974.50	959.70	-16.58	-37.08	19.40	-14.80	X		
CS-MW16-CC+ #	1244.51	997.41	883.71	866.91	874.81	100.05	-113.70	-16.80	7.90	X		
B3-EXW01+ #	1245.26	NA	NA	935.16	936.36	NA	NA	NA	1.20	X		
B3-EXW02+ #	1249.66	NA	NA	935.86	933.16	NA	NA	NA	-2.70	X		
B3-EXW03	1235.11	NA	NA	NA	987.59	NA	NA	NA	NA	X		
B3-EXW04	1228.46	NA	NA	NA	971.11	NA	NA	NA	NA	X		
CS-MW17-LGR	1257.01	989.61	936.96	936.16	940.24	-50.92	-52.65	-0.80	4.08	X		
CS-MW18-LGR	1283.61	984.09	937.32	934.17	942.22	-52.73	-46.77	-3.15	8.05	X		
CS-MW19-LGR	1255.53	995.48	952.44	949.43	964.20	-52.50	-43.04	-3.01	14.77	X		
CS-MW20-LGR	1209.42	1000.43	953.33	949.72	968.80	-51.43	-47.10	-3.61	19.08	X		
CS-MW21-LGR*	1184.53	989.71	934.83	933.68	938.51	-51.10	-54.88	-1.15	4.83	X		
CS-MW22-LGR	1280.49	985.48	914.55	NA	910.82	-50.02	-70.93	NA	NA	X		
CS-MW23-LGR	1258.20	985.50	915.42	909.80	922.95	-45.70	-70.08	-5.62	13.15	X		
CS-MW24-LGR*	1253.90	985.79	979.18	975.99	979.78	-47.86	-6.61	-3.19	3.79	X		
CS-MW25-LGR	1293.01	995.44	991.66	986.62	987.88	-49.10	-3.78	-5.04	1.26	X		
CS-MW35-LGR	1186.97	NA	895.14	886.12	914.35	NA	NA	-9.02	28.23	X		
CS-MW36-LGR	1218.74	NA	924.68	916.32	952.44	NA	NA	-8.36	36.12	X		
FO-20	NA	1068.18	1035.43	1030.29	1049.91	-7.06	-32.75	-5.14	19.62	**ALL**		
Average groundwater elevation change (all wells minus pumpers):						**-41.89**	**-41.80**	**-8.81**	**14.73**			
Average groundwater elevation change since December 2010:						**-19.44**						

Notes:
Average groundwater elevation change is calculated from wells screened in only one formation.
Bold wells: CS-1, CS-2, CS-4, CS-9, CS-10, CS-11, and CS-12 are open boreholes across more than one of the formations and are not included in average groundwater elevation calculations. CS-1, CS-9, CS-10 and CS-11 are current and former drinking water wells.
*Wells equipped with a transducer
+ Wells equipped with a SCADA transducer
# well is pumping
NA = Data not available or the well is dry (CS-MW11B-LGR is often dry).
?=Exact screening information unknown for this well.
All measurements given in feet.

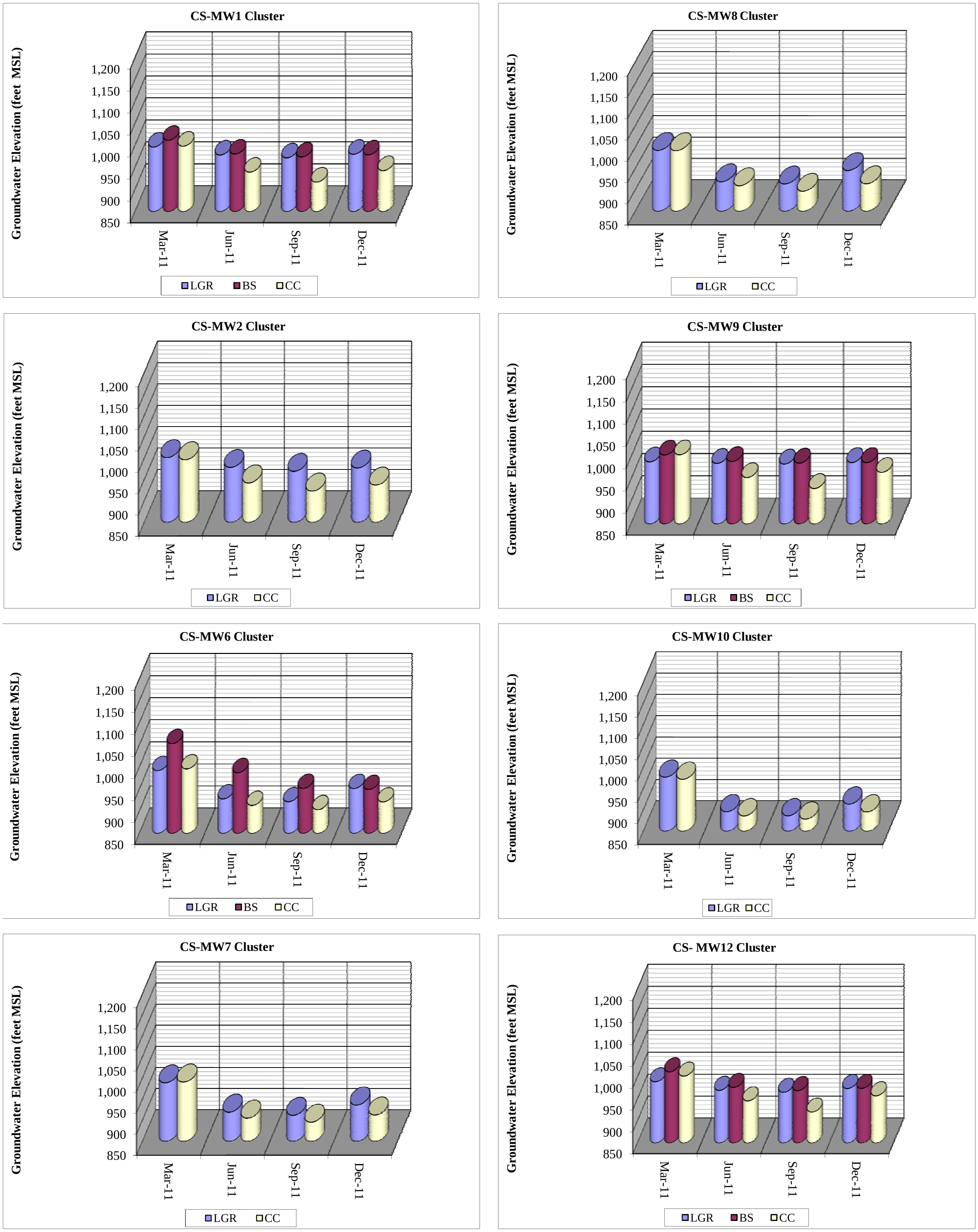
Table 2.2
Summary of Groundwater Elevation by Formation, 2011

		2011 Groundwater Elevations				Formations Screened		
Well ID	**TOC elevation**	**March**	**June**	**September**	**December**	**LGR**	**BS**	**CC**
CS-1+ #	**1169.27**	**991.37**	**831.97**	**873.07**	**898.97**	**ALL**		
CS-2	**1237.59**	**982.12**	**979.97**	**979.64**	**980.57**	**?**	**?**	
CS-3	1240.17	987.93	977.33	973.09	978.25	**X**		
CS-4	**1229.28**	**987.90**	**976.83**	**NA**	**977.42**	**?**	**?**	
CS-9	**1325.31**	**978.66**	**935.37**	**937.63**	**946.08**	**ALL**		
CS-10+ #	**1331.51**	**937.93**	**935.51**	**937.51**	**951.51**	**ALL**		
CS-12+ #	**1274.09**	**NA**	**981.89**	**976.39**	**984.09**	**ALL**		
CS-D	1236.03	989.06	979.85	975.28	978.73	**X**		
CS-MWG-LGR	1328.14	1038.83	1058.89	1013.29	1015.97	**X**		
CS-MWH-LGR	1319.19	1032.66	1007.50	1006.54	1011.74	**X**		
CS-I	1315.20	1026.05	1008.35	999.99	1010.55	**X**		
CS-MW1-LGR+	1220.73	996.51	978.43	971.93	980.03	**X**		
CS-MW1-BS+	1221.09	1012.04	980.65	973.94	978.73		**X**	
CS-MW1-CC+	1221.39	998.55	939.29	916.81	942.85			**X**
CS-MW2-LGR	1237.08	1001.48	978.39	969.30	977.11	**X**		
CS-MW2-CC	1240.11	996.46	942.31	923.08	937.11			
CS-MW3-LGR	1334.14	995.93	984.75	979.51	981.33	**X**		
CS-MW4-LGR*	1209.71	1031.53	976.27	967.98	1026.37	**X**		
CS-MW5-LGR	1340.24	999.46	973.68	965.91	971.61	**X**		
CS-MW6-LGR+	1232.25	992.06	927.94	921.38	951.37	**X**		
CS-MW6-BS+	1232.67	1053.42	987.37	951.67	949.37		**X**	
CS-MW6-CC+	1233.21	996.02	913.13	903.40	920.99			**X**
CS-MW7-LGR	1202.27	988.50	918.99	911.69	936.09	**X**		
CS-MW7-CC	1201.84	990.34	904.83	895.32	912.40			**X**
CS-MW8-LGR	1208.35	992.63	919.10	913.66	945.36	**X**		
CS-MW8-CC	1206.13	991.81	909.53	896.68	914.07			**X**
CS-MW9-LGR+	1257.27	989.38	986.15	984.73	987.96	**X**		
CS-MW9-BS+	1256.73	1004.97	990.31	986.78	987.98		**X**	
CS-MW9-CC+	1255.95	1005.30	954.17	929.69	965.85			**X**
CS-MW10-LGR+	1189.53	976.90	895.65	886.23	913.74	**X**		
CS-MW10-CC+	1190.04	972.09	885.96	878.29	895.11			**X**
CS-MW11A-LGR	1204.03	980.79	894.85	882.70	909.73	**X**		
CS-MW11B-LGR	1203.52	1005.67	996.25	995.60	NA	**X**		
CS-MW12-LGR+	1259.07	989.01	969.60	965.07	973.63	**X**		
CS-MW12-BS+	1258.37	1011.82	976.17	968.98	973.95		**X**	
CS-MW12-CC+	1257.31	1001.95	945.36	920.11	957.03			**X**
CS-MW16-LGR+ #	1244.60	992.18	955.10	974.50	959.70	**X**		
CS-MW16-CC+ #	1244.51	997.41	883.71	866.91	874.81			**X**
B3-EXW01+ #	1245.26	NA	NA	935.16	936.36	**X**		
B3-EXW02+ #	1249.66	NA	NA	935.86	933.16	**X**		
B3-EXW03	1235.11	NA	NA	NA	987.59	**X**		
B3-EXW04	1228.46	NA	NA	NA	971.11	**X**		
CS-MW17-LGR	1257.01	989.61	936.96	936.16	940.24	**X**		
CS-MW18-LGR	1283.61	984.09	937.32	934.17	942.22	**X**		
CS-MW19-LGR	1255.53	995.48	952.44	949.43	964.20	**X**		
CS-MW20-LGR	1209.42	1000.43	953.33	949.72	968.80	**X**		
CS-MW21-LGR*	1184.53	989.71	934.83	933.68	938.51	**X**		
CS-MW22-LGR	1280.49	985.48	914.55	NA	910.82	**X**		
CS-MW23-LGR	1258.20	985.50	915.42	909.80	922.95	**X**		
CS-MW24-LGR*	1253.90	985.79	979.18	975.99	979.78	**X**		
CS-MW25-LGR	1293.01	995.44	991.66	986.62	987.88	**X**		
CS-MW35-LGR	1186.97	NA	895.14	886.12	914.35	**X**		
CS-MW36-LGR	1218.74	NA	924.68	916.32	952.44	**X**		
FO-20	NA	1068.18	1035.43	1030.29	1049.91	**ALL**		
Average groundwater elevation by formation, each event:	**LGR:**	**997.07**	**957.42**	**952.98**	**963.15**	**Average groundwater elevation by formation all of 2011:**		**967.66**
	BS:	**1020.56**	**983.63**	**970.34**	**972.51**			**986.76**
	CC:	**994.18**	**917.00**	**900.90**	**922.89**			**933.74**

Notes:
Average groundwater elevation change is calculated from wells screened in only one formation.

Bold wells: CS-1, CS-2, CS-4, CS-9, CS-10, and CS-11 are open boreholes across more than one of the formations and are not included in average groundwater elevation calculations. CS-1, CS-9, CS-10 and CS-11 are current and former drinking water wells.
*Wells equipped with a transducer
+ Wells equipped with a SCADA transducer
NA = Data not available or the well is dry (CS-MW11B-LGR is often dry).
?=Exact screening information unknown for this well.
All measurements given in feet.

Figure 2.1
Comparison of Groundwater Elevations within Well Clusters



J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2011\Annual Rpt\Figure 2-1 Cluster Wells Comparisons.xlsx

The other notable trend in this graphic is that much more drastic declines in groundwater levels occurred in the southern portion of base (CS-MW6, CS-MW7, CS-MW8, and CS-MW10). The decreases seen in groundwater elevations in MW1-CC and MW2-CC may also be in part attributable to periodic pumping from CS-MW16-CC. This phenomenon has been documented by pumping tests conducted at CS-MW16-CC. While the production of groundwater from the CC is more prolific than from the LGR, the CC portion of the aquifer is more sensitive to long-term pumping, and its effects can be measured in wells more than 2,200 feet from a pumping well.

Under more favorable hydrologic conditions, the groundwater elevation in the BS typically falls between the LGR and CC elevations. However, when water levels decline as they did during the first three quarters of 2011, the BS groundwater elevation is generally higher than both of its counterparts. This phenomenon has been observed before in the cluster wells, and is attributed to the low draining potential of the less permeable BS matrix during continual aquifer declines. Conversely, during recharge events the groundwater in the BS wells will lag behind the LGR and CC wells, and seems to be typical for the area.

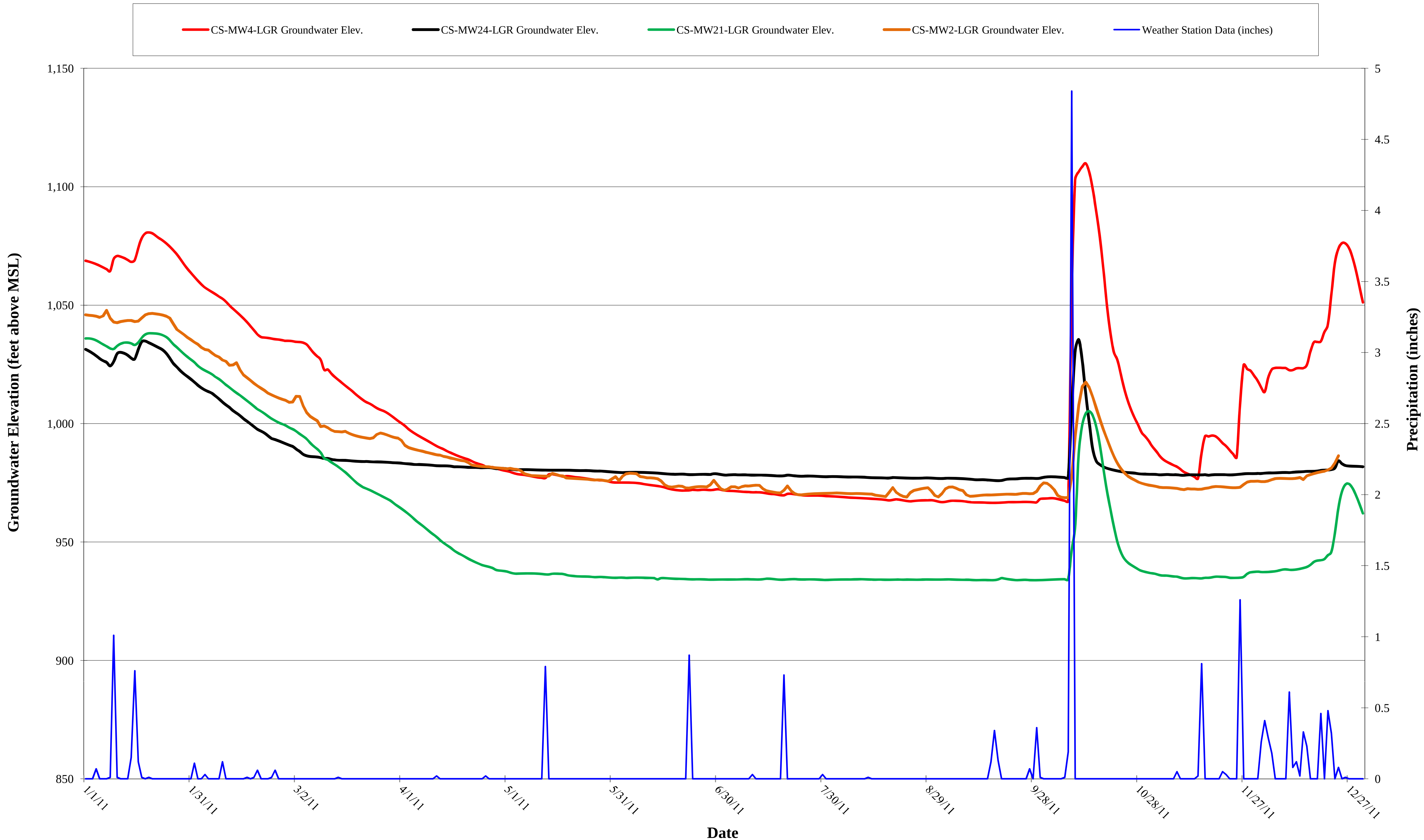
2.1.2 Weather Station and Transducer Data

Of the 54 wells listed on **Table 2.1**, 24 are equipped with transducers to continuously log groundwater levels, 21 are providing telemetry directly to the Supervisory Control and Data Acquisition (SCADA) system. The wells with SCADA transducers are still being programmed for SCADA compatibility. Two weather stations are in place at CSSA, WS-N just inside the north pasture fence northwest of B-3 in the north-central region of CSSA, and WS-S in the southwest corner of CSSA adjacent to AOC-65. Both weather stations record meteorological data, including precipitation, wind speed, wind direction, temperature, etc. The data are recorded to evaluate whether trends in rainfall and groundwater recharge are apparent.

Continuous aquifer level data (January 2011 through December 31, 2011) collected from 4 wells specifically screened within the LGR are presented on **Figure 2.2** as well as the corresponding daily precipitation values. The wells presented in this figure are equipped with transducers set to record water level measurements on a daily basis with increased monitoring during significant rain events. Both CS-MW16-LGR and CS-MW16-CC are omitted from this graphic since they are actively pumping wells for the Bioreactor system, and therefore do not reflect static aquifer conditions. The active drinking water wells were also omitted for the same reason.

CSSA WS-N was down in early January 2011 due to equipment malfunction. It was also relocated from east of the CS-MW16 wells to inside the north pasture fence north-west of the CS-MW16 wells on February 15, 2011. CSSA WS-S reported 56 rainfall events with a total precipitation of 17.24 inches in 2011. Last year, 95 rainfall events were recorded with a total precipitation of 35.75 inches of rain. Rainfall events during 2011 were minimal from January

Figure 2-2, Selected Wells Groundwater Elevations vs Precipitation Data



to September, March and August recorded only 0.01 inches of rainfall. October reported the highest monthly rainfall amount with 5.04 inches and most of that total, 4.84 inches, fell on October 9. September to December reported a majority of the yearly rainfall, 11.71 inches.

Based upon historical data, 2011 rainfall totals ended about 20 inches below average for the year. For comparison, the 1981 to 2010 annual precipitation for the Boerne, Texas area averaged 37.81 inches and the San Antonio area averaged 32.27 inches, as recorded by the weather station operated by the National Weather Service (NWS). Bexar County and surrounding areas remain under an extreme to exceptional drought alert and the Trinity Glen Rose Groundwater Conservation District declared stage 2 severe drought water restrictions, effective June 1, 2011.

Table 2.3 shows the total precipitation received each quarter, average groundwater elevations in each formation, the average groundwater elevation change in each formation, the approximate gradient, and approximate gradient flow direction for all monitoring events. As in the past, the groundwater elevations indicate recharge of the LGR formation immediately after precipitation.

The latter half of 2009 marked the end of a drought cycle that had begun in 2008. Major precipitation events in August and September 2009 recharged the aquifer and began a trend that continued through May 2010. The aquifer surge experienced in the first five months was negated by a summer dry period through August 2010. Rainfall amounts declined September 2010 through September 2011, resulting in regional aquifer level decline of approximately 195 feet. There was an increase in rainfall late in 2011 but due to the already depressed aquifer the drought conditions persist.

2.1.3 Potentiometric Data

The groundwater gradient/potentiometric surface figures presented **Appendix F** incorporate measured groundwater elevations from the LGR, BS, and CC screened wells. The drought conditions which began in late 2010 persisted in 2011. A record low yearly rainfall total of 17 inches sent Bexar County and surrounding areas into one of the worst droughts in Texas history. As shown in **Appendix F**, water levels at CSSA can vary greatly. This variability is associated with several factors:

- Differences in well completion depths and formations screened;
- Differences in recharge rates due to increased secondary porosity associated with the Salado Creek area;
- Differences in recharge rates due to increased secondary porosity associated with local fault zones;
- Pumping from on- and off-post public and private water supply wells; and
- Locations of major faults or fractures.

Table 2.3
Precipitation, Groundwater Elevation and Gradient

Quarterly Report (Month, year)	Quarterly precipitation (inches) North WS	Quarterly precipitation (inches) South WS	Average GW elevation Change (feet)	CS-MW16-LGR GW Elevation Change (feet)	Average GW Elevation			Approximate gradient (ft/ft)	Approximate gradient flow direction
					Lower Glen Rose	Bexar Shale	Cow Creek		
September-99	7.52	--	-188.4	-136.82	979.80	--	--	0.007	Southwest
December-99	2.84	--	-4.9	-8.13	973.10	--	--	0.004	Southwest
March-00	3.58	--	-9.3	-1.28	970.94	--	--	0.009	South-southeast
June-00	11.1	--	11.77	0.29	976.27	--	--	0.006	Southeast
September-00	1.96	--	-6.34	-13.28	967.03	--	--	0.006	Southeast
December-00	14.48	--	122.99	142.19	1118.59	--	--	0.005	South-southeast
March-01	10.13	--	53.19	48.07	1157.20	--	--	0.0125	Southeast
June-01	6.58	--	-47.5	-48.04	1104.00	1106.85	1093.89	0.007	Southeast
September-01	14.73	--	23.96	13.44	1140.55	1098.18	1095.75	0.0067	Southeast
December-01	10.16	--	15.46	28.21	1149.68	1131.36	1125.63	0.0092	Southeast
March-02	2.25	--	-70.97	-74.03	1077.91	1064.46	1059.27	0.0086	Southeast
June-02	4.46	--	-48.29	-53.41	1030.51	1022.51	994.02	0.0137	South-southeast
September-02	30.98	--	104.5	113.27	1130.87	1129.21	1098.34	0.017	South-southeast
December-02	12.91	--	19.48	33.89	1143.98	1148.26	1133.11	0.0061	South-southeast
March-03	6.22	6.68	-8.47	-10.11	1135.18	1140.52	1122.95	0.012	South-southeast
June-03	4.67	4.64	-41.08	-37.1	1097.87	1095.36	1069.02	0.0022	South-southwest
September-03	8.05	10.28	-52.85	-52.21	1046.77	1060.39	1025.61	0.0045	South-southwest
December-03	2.79	2.92	-32.85	-38.68	1011.38	1029.39	1002.07	0.0095	South-southwest
March-04	6.35	5.93	22.89	34.07	1043.68	1026.20	1017.98	0.0046	South-southwest
June-04	12.95	12.33	71.91	84.31	1121.80	1101.85	1074.56	0.0012	South-southwest
September-04	14.3	14.57	-8.05	-19.31	1106.43	1110.17	1074.96	0.003	South-southeast
December-04	21.04	23.12	63.07	74.82	1173.98	1159.46	1135.16	0.004	South-southeast
March-05	7.38	6.48	-6.47	-7.67	1168.46	1151.60	1127.58	0.00436	South-southeast
June-05	NA	5.29	-45.93	-53.66	1119.19	1125.27	1082.40	0.0041	South-southeast
September-05	NA	5.93	-61.24	-62.95	1054.88	1077.87	1033.65	0.0068	South-southwest
December-05	NA	2.41	-57.9	-63.86	994.23	1023.45	980.25	0.0054	South-southwest
March-06	2.52	1.11	-24.81	-7.16	974.10	990.23	948.80	0.0084	South-southwest
June-06	7.65	11.18	-9.46	-3.57	966.16	983.47	933.59	0.0104	South-southwest
September-06	3.42	3.12	-6.66	-1.42	961.07	979.78	922.34	0.0099	South
December-06	4.68	5.9	2.48	0.75	958.87	979.73	933.37	0.0099	South
March-07	9.83		14.53	-0.11	969.87	992.53	958.06	0.0079	South
June-07	11.99		182.09	185.13	1162.17	1119.36	1128.32	0.0016	Southeast
September-07	29.4		15.56	5.46	1168.77	1168.14	1154.47	0.0019	South
December-07	1.95		-70.45	-76.43	1095.68	1101.19	1088.93	0.0052	South-southeast
March-08	2.17	2.31	-42.45	*-134.42	1050.23	1053.76	1047.78	0.0072	South
June-08	1.9	2.69	-51.71	*-3.57	1002.44	1015.93	966.67	0.0047	South
September-08	6.06	6.95	-27.49	*22.67	976.18	991.62	953.41	0.0058	South
December-08	1.69	1.74	-15.48	*-27.30	961.10	981.76	934.26	0.0080	South-southeast
March-09	2.58	3.16	-4.25	*3.61	957.48	973.36	916.24	0.0073	South-southeast
June-09	3.77	4.41	1.25	*-3.21	959.75	971.67	914.68	0.0059	South-southeast
September-09	NA	7.41	-7.76	*4.35	953.49	967.07	903.39	0.0054	South-southeast
December-09	NA	14.63	101.24	*64.20	1051.77	1040.48	1026.64	0.00002	South
March-10	9.23	NA	91.51	*122.70	1144.36	1128.84	1131.78	0.00052	South-southeast
June-10	NA	10.66	3.97	*-22.20	1147.52	1145.30	1114.38	0.00078	South-southeast
September-10	NA	10.91	-37.77	*-4.68	1126.83	1070.13	1059.82	0.00085	South-southeast
December-10	NA	4.45	-63.93	*-113.46	1045.26	1060.79	1011.76	0.00029	South-southeast
March-11	NA	2.57	-41.89	*-16.58	997.07	1020.56	994.18	0.00314	South-southeast
June-11	0.91	0.83	-41.80	*-37.08	957.42	983.63	917.00	0.00532	South-southeast
September-11	2.29	2.13	-8.81	*19.40	952.98	970.34	900.90	0.00533	South-southeast
December-11	9.85	11.71	14.73	*-14.80	963.15	972.51	922.89	0.00536	South-southeast

GW = groundwater, ft MSL = feet above mean sea level, ft/ft = feet per foot
NA = Data not available due to weather station outage.
* Well pump is cycling to feed the B-3 Bioreactor
2007 precipitation data was combined to fill in data gaps due to multiple weather station outages during SCADA installation.

2.1.4 Post-wide Flow Direction and Gradient

An overall average 2011 calculated LGR groundwater gradient is to the south-southeast at 0.00479 ft/ft. Depending which quadrant of the post the measurement is taken, the groundwater gradient varied seasonally from 0.00314 ft/ft (March 2011) to 0.00536 ft/ft (December 2010). General groundwater flow directions and average gradients calculated during past monitoring events are provided in **Table 2.3** for comparison.

Lower Glen Rose

The 2011 potentiometric surface maps for LGR-screened wells **(Appendices F.1, F.4, F.7** and **F.10)** exhibited a wide range of groundwater elevations. Groundwater elevations are generally higher in the northern and central portions of CSSA, and decrease to the south. This is consistent with the natural dip of the formations and the greater fault displacement in the southern portion of CSSA. The removal of well CS-G from the gridding process negates mounding effect is present at well CS-G that disrupts the normal southerly and easterly components of the North Pasture. This well, along with CS-D, CS-2, and CS-4 are not fully penetrating into the LGR and therefore is not considered within this map.

The drought that started in September 2010 continued through September 2011 as evidenced by the hydrographs and LGR potentiometric maps. A typical feature as seen in **Appendix F.1** is the groundwater mounding effect centered around CS-MW4-LGR in the central portion of the base. This is a typical feature during non-drought conditions when the surrounding groundwater elevation is above approximately 970 feet MSL. Unlike the general trend at CSSA, groundwater flow appears to radiate outward from CS-MW4-LGR. Presumably this region has a strong hydraulic connection to significant perched water either associated with Salado Creek or the hillsides to the east.

Historical data has shown that this mounding effect can either be muted or completely removed under distressed aquifer levels. Such is the case of June and September 2011 (**Appendices F.4 and F.7**); this mounding effect subsides as the average groundwater elevation approaches the elevation of the basal production zone of the aquifer. With the advent of precipitation/recharge in the last quarter of 2011, the aquifer rebounds enough to produce the groundwater mound in the central portion of the post (**Appendix F.10**).

A reoccurring trend seen over the years is that the southern third of the post is more susceptible to drought and recharge than the northern third of the post. The changes in groundwater elevation between quarterly events are given in Table 2.1. Between December 2010 and March 2011, most wells at CSSA declined approximately 40 feet during the initial stages of the drought. However, as the drought persisted June 2011, wells in the northern half of CSSA generally declined less than 20 feet over the 3-month period. In fact, CS- MW9-LGR only declined 3.23 feet. In contrast, most wells in the southern portion of the base declined by more than 75 feet over the same time period, with CS-MW11A-LGR declining nearly 85 feet. Conversely, the wells in the southern portion of the post showed larger increases in groundwater elevation in response to the recharging events of the final quarter of the year. This is an indication that overall storage capacity of the aquifer decreases to the south, and therefore is more susceptible to drought and recharge events. This may be related to a change in the stratigraphy and/or porosity, or possibly related to controlling structural features (e.g., faults).

The groundwater drawdown due to the periodic pumping of CS-16-LGR, CS-EXW01-LGR, CS-EXW02-LGR (Bioreactor System) is reoccurring feature in the central portion of the post (**Appendices F.4** and **F.10**). Depending on the current pumping rates at the time of measurement, groundwater in the vicinity of the Bioreactor may be depressed by as much as 50 feet (December 2011). Groundwater in the inner cantonment also shows a drawdown effect from the pumping of water supply well CS-10, and is most notable in March 2011 (**Appendix F.1**).

Bexar Shale

Currently, groundwater head information is limited to four data points (CS-MW1-BS, CS-MW6-BS, CS-MW9-BS, and CS-MW12-BS). Given the paucity of well control, at best, the BS groundwater maps should be considered qualitative. The BS appears to have very limited groundwater that is likely associated with fracturing. Fractured bedrock such as this often results in discordant water levels between neighboring points and may not be a true indicator of flow direction. The appropriateness of preparing potentiometric surface maps for the BS is debatable, but these maps have been generated for completeness. Potentiometric maps for the Bexar Shale in 2011 are presented in **Appendices F.2, F.5, F.8** and **F.11**.

In typical fashion, the potentiometric surface maps for BS-screened wells exhibited groundwater flow in multiple directions throughout 2011. The March 2011 measurements (**Appendix F.2**) indicate a predominately northerly flow, as it was in December 2010. The flow pattern became convergent towards CS-MW12-BS by June 2011 (**Appendix F.5**) as the water levels plummeted another 35 feet. Conversely, the maps for September and December 2011 (**Appendices F.8** and **F.11**) show a gradient flow predominately toward the south-southwest.

Cow Creek

As with the BS, the postwide monitoring of the CC groundwater is limited due to the small number of wells completed only in the CC. Four of the nine CC wells are concentrated in the vicinity of AOC-65. The 2011 potentiometric surface maps for CC-screened wells (**Appendices F.3 F.6, F.9** & **F.12**) exhibited a south-southeasterly flow in all quarters. Throughout 2011, the effects of continuous pumping of CS-MW16-CC influenced groundwater gradients significantly in the CC interval near the Bioreactor. Prior studies have shown measurable pumping influence within the CC at distances of more than 2,000 feet from a CC pumping well. The effects of this pumping are visible in the June, September, and December maps (**Appendices F.6, F.9** & **F.12**) which clearly show the cone of depression surrounding CS-MW16-CC.

2.2 Chemical Characteristics

2.2.1 On-Post Analytical Results

The LTMO study implemented in December 2005 and updated in 2010 determines the frequency that on-post wells are sampled. An overview of sampling frequencies for on-post wells only is given in **Table 2.4**. Ninety-two on-post samples were scheduled to be collected in 2011 (26 in March, 46 in June, 6 in September, and 14 in December). Eighteen of the 92 samples could not be collected due to low water levels or building construction (CS-12). The wells were sampled using either dedicated low-flow pumps, high capacity submersible pumps, or dedicated solar-powered submersible pump. Samples were collected after field parameters (pH, temperature, conductivity) stabilized during well purging. Field parameters were recorded in the field logbook for each sampling event.

Groundwater samples were submitted to Agriculture & Priority Pollutants Laboratories, Inc. (APPL) of Clovis, California for analysis. The analytical program for on-post monitoring wells includes short-list VOC analysis and metals. The short list of VOC analytes included: 1,1-DCE, *cis*-1,2-DCE, *trans*-1,2-DCE, PCE, TCE, and vinyl chloride.

Under the provisions of the groundwater monitoring LTMO study and DQOs, all on-post monitoring wells are sampled for the chromium, cadmium, mercury, and lead. To meet drinking water compliance requirements, drinking water wells are sampled for additional metals arsenic, barium, copper, and zinc.

Each sample is evaluated against either being qualitatively detected in trace amounts above the method detection limit (MDL [F-flagged data]), quantitatively detected above the laboratory reporting limit (RL), or in exceedance of regulatory maximum contaminant level (MCL), action level (AL), or secondary standard (SS) comparison criteria. It is important to note that the RL value is significantly less than the promulgated groundwater standard criteria, and therefore the occurrence of a constituent above the RL does not necessarily indicate that there is an immediate concern, especially with the naturally occurring inorganics (metals) in groundwater. The only exception to this generalization is lead, where the RL (0.025 mg/L) is greater than the AL (0.015 mg/L).

Eighteen wells were not sampled in 2011. One well, CS-12, was not sampled due to well house construction. The other 14 wells or 17 samples [CS-MW2-CC, CS-MW4-LGR, CS-MW6-LGR, CS-MW6-CC, CS-MW7-CC, CS-MW9-CC, CS-MW10-LGR, CS-MW10-CC, CS-MW11B-LGR (2 events), CS-MW12-CC, CS-MW17-LGR, CS-MW18-LGR, CS-4 (2 events), and CS-D (2 events)] were not collected due to water levels falling below the dedicated low-flow QED pumps.

Table 2.4
Overview of the On-Post Monitoring Program

Count	Well ID	*Analytes*	*Last Sample Date*	*Mar-11*	*June-11 (snapshot)*	*Sep-11*	*Dec-11*	*Sampling Frequency **
1	CS-MW1-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	S	S	NS	S	Semi-annual
2	CS-MW1-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
3	CS-MW1-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
4	CS-MW2-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	S	S	NS	S	Semi-annual
5	CS-MW2-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 18 months
6	CS-MW3-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
7	CS-MW4-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	NS	Every 9 months
8	CS-MW5-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
9	CS-MW6-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	NS	Every 9 months
10	CS-MW6-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
11	CS-MW6-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 18 months
12	CS-MW7-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
13	CS-MW7-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 18 months
14	CS-MW8-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	NS	S	NS	S	Semi-annual
15	CS-MW8-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
16	CS-MW9-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 18 months
17	CS-MW9-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 9 months
18	CS-MW9-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 9 months
19	CS-MW10-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	NS	NSWL	NS	S	Semi-annual
20	CS-MW10-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 18 months
21	CS-MW11A-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	S	S	NS	S	Semi-annual
22	CS-MW11B-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NSWL	NSWL	NS	NS	Every 9 months
23	CS-MW12-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 9 months
24	CS-MW12-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
25	CS-MW12-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 18 months
26	CS-MW16-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
27	CS-MW16-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
28	CW-MW17-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	NS	Every 9 months
29	CS-MW18-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	NS	Every 9 months
30	CS-MW19-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
31	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-11	S	S	S	S	Quarterly
32	CS-2	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 9 months
33	CS-3	sampled as needed, no pump	Dec-99	NS	NS	NS	NS	as needed
34	CS-4	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	NSWL	Semi-annual
35	CS-9	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	S	S	S	S	Quarterly
36	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-11	S	S	S	S	Quarterly
37	CS-11	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-09	NS	NS	NS	NS	as needed
38	CS-12	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn,Fe,Al)	Dec-11	NS (due to wellhouse construction)	S	S	S	Quarterly
39	CS-D	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	NSWL	Semi-annual
40	CS-MWG-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
41	CS-MWH-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
42	CS-I	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	NS	Every 18 months
43	CS-MW20-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
44	CS-MW21-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
45	CS-MW22-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
46	CS-MW23-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
47	CS-MW24-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	S	S	NS	S	Semi-annual
48	CS-MW25-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	NS	Every 9 months
54	CS-MW35-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	well installed		S	S	
55	CS-MW36-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-11	well installed		S	S	

* New LTMO sampling frequency implemented June 2011
S = Sample
NS = No Sample
NSWL = No Sample due to low water level

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2.2.1.1 On-Post Monitoring Wells with COC Detections above the MCL

Some wells sampled had concentrations detected that exceeded MCLs. The MCLs for some COCs were exceeded in wells CS-MW16-LGR, CS-MW16-CC, CS-D, CS-MW1-LGR, CS-1, CS-9, CS-MW9-BS, and CS-MW36-LGR in 2011. The respective comparison criteria (MCLs, SS, or AL) for each compound are included in **Table 2.5**. The detected concentrations are summarized as follows:

- **CS-MW16-LGR –** This well was sampled two times in 2011. Concentrations of PCE, TCE, and *cis*-1,2-DCE exceeded their MCLs during the March and June sampling events. *Trans*-1,2-DCE was detected below the MCL in both events. Lead was also above the action level in March 2011. The pump in well CS-MW16-LGR was engaged April 24, 2007 to pump water onto the SWMU B-3 Bioreactor. The well has been cycling continuously since the bioreactor injection was initiated in 2007. In 2011 the pumping rate averaged about 9.24 gallons per minute (gpm) with a range of 1.91 gpm to 19.4 gpm. The pumping rate was adjusted throughout the year to maximize the cycle lengths and the amount of water extracted from this well.
- **CS-MW16-CC –** This well was sampled two times in 2011. Concentrations of TCE exceeded the MCL in March and June 2011. PCE, *cis*-1,2-DCE and *trans*-1,2-DCE were below their respective MCLs but above the RL in March and June 2011. 1,1-DCE was also detected but below the MCL in June 2011. No metals of concern were detected in this well in 2011. The pump in well CS-MW16-CC was engaged April 24, 2007 to pump water onto the SWMU B-3 Bioreactor. The well has been cycling continuously along with CS-MW16-LGR since the bioreactor injection began in 2007. In 2011 the pumping rate averaged about 12.60 gpm with a range of 3.03 to 22.91 gpm. VOC levels in 2011 were at the low end of the historical concentration range for this well.
- **CS-D –** This well was sampled once in 2011. Concentrations of PCE, TCE, and *cis*-1,2-DCE exceeded their MCLs in March 2011. *Trans*-1,2-DCE was detected below its MCL in March 2011. Lead was also detected below the AL in March.
- **CS-MW1-LGR –** This well was sampled three times in 2011. PCE and TCE concentrations were above their MCLs in March, June, and December 2011. *cis*-1,2-DCE was detected below the MCL in all three quarters in 2011 and *trans*-1,2-DCE was below the MCL in March and June 2011. Lead and chromium were also detected below their applicable AL/MCL in December 2011.
- **CS-9 –** This well was sampled all four quarters in 2011. No VOCs were detected in this well in 2011. However, lead and mercury were above the AL/MCL in June, September, and December 2011. Arsenic, barium, chromium, copper, and zinc were also detected below their applicable MCLs in 2011. CS-9 is a former drinking water well that has been taken offline since 2006 due to repeated lead and mercury detections above the MCL.

Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID	Sample Date	Dichloro-ethene, 1,1 (µg/L)	Dichloro-ethene, *cis* -1,2 (µg/L)	Dichloroethene, *trans* -1,2 (µg/L)	Tetra-chloroethene (µg/L)	Tri-chloroethene (µg/L)	Vinyl chloride (µg/L)
Comparison Criteria	MDL	0.12	0.07	0.08	0.06	0.05	0.08
	RL	1.2	1.2	0.6	1.4	1.0	1.1
	MCL	7	70	100	5	5	2
CS-1	3/8/2011	--	--	--	--	0.30F	--
	6/7/2011	--	--	--	--	0.34F	--
	9/14/2011	--	--	--	--	0.25F	--
	12/15/2011	--	--	--	--	0.28F	--
CS-2	6/10/2011	--	--	--	--	--	--
CS-4	3/9/2011	--	1.09F	--	2.36	2.85	--
CS-9	3/9/2011	--	--	--	--	--	--
	6/7/2011	--	--	--	--	--	--
	9/14/2011	--	--	--	--	--	--
	12/15/2011	--	--	--	--	--	--
CS-10	3/9/2011	--	--	--	--	--	--
	6/7/2011	--	--	--	--	--	--
Duplicate	6/7/2011	--	--	--	--	--	--
	9/14/2011	--	--	--	--	--	--
Duplicate	9/14/2011	--	--	--	--	--	--
	12/15/2011	--	--	--	--	--	--
CS-12	6/7/2011	--	--	--	--	--	--
	9/14/2011	--	--	--	--	--	--
	12/15/2011	--	--	--	--	--	--
Duplicate	12/15/2011	--	--	--	--	--	--
CS-MW16-LGR	3/8/2011	--	189.43*	0.24F	131.48*	164.31*	--
	6/7/2011	--	179.14*	0.25F	156.62*	173.11*	--
CS-MW16-CC	3/8/2011	--	29.48	6.81	0.66F	18.3	--
	6/7/2011	0.21F	24.22	6.7	1.54	24.59	--
CS-D	3/8/2011	--	96.47*	2.3	103.41	120.26*	--
CS-MWG-LGR	6/14/2011	--	--	--	--	--	--
CS-MWH-LGR	6/8/2011	--	--	--	--	--	--
CS-I	6/8/2011	--	--	--	--	--	--
CS-MW1-LGR	3/9/2011	--	17.11	0.23F	11.9	29.59	--
Duplicate	3/9/2011	--	16.96	0.26F	12.24	30.15	--
	6/9/2011	--	16.53	0.21F	13.21	31.37	--
	12/14/2011	--	18.93	--	14.11	30.37	--
CS-MW1-BS	6/9/2011	--	1.01F	--	--	--	--
CS-MW1-CC	6/9/2011	--	--	--	--	--	--
CS-MW2-LGR	3/9/2011	--	0.57F	--	--	--	--
	6/10/2011	--	0.74F	--	--	--	--
	12/14/2011	--	0.54F	--	--	--	--
CS-MW3-LGR	3/8/2011	--	--	--	--	--	--
	6/14/2011	--	--	--	--	--	--
CS-MW4-LGR	3/10/2011	--	--	--	--	--	--
CS-MW5-LGR	3/8/2011	--	2.71	--	1.86	3.63	--
	6/13/2011	--	--	--	--	--	--
CS-MW6-LGR	3/10/2011	--	--	--	--	--	--
CS-MW6-BS	6/15/2011	--	--	--	--	--	--
CS-MW7-LGR	3/10/2011	--	--	--	0.26F	--	--
	6/16/2011	--	--	--	--	--	--
CS-MW8-LGR	6/15/2011	--	--	--	--	--	--
	12/13/2011	--	--	--	1.94	--	--
CS-MW8-CC	6/15/2011	--	--	--	--	--	--

Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID	Sample Date	Dichloro-ethene, 1,1 (µg/L)	Dichloro-ethene, *cis* -1,2 (µg/L)	Dichloroethene, *trans* -1,2 (µg/L)	Tetra-chloroethene (µg/L)	Tri-chloroethene (µg/L)	Vinyl chloride (µg/L)
Comparison Criteria	MDL	0.12	0.07	0.08	0.06	0.05	0.08
	RL	1.2	1.2	0.6	1.4	1.0	1.1
	MCL	7	70	100	5	5	2
CS-MW9-LGR	3/8/2011	--	--	--	**0.18F**	--	--
	6/14/2011	--	--	--	--	--	--
CS-MW9-BS	6/15/2011	--	--	--	--	--	--
CS-MW10-LGR	12/13/2011	--	--	--	**1.95**	**0.51F**	--
CS-MW11A-LGR	3/10/2011	--	--	--	**1.20F**	--	--
	6/16/2011	--	--	--	**0.90F**	--	--
	12/13/2011	--	--	--	**1.28F**	--	--
CS-MW12-LGR	6/10/2011	--	--	--	--	--	--
Duplicate	6/10/2011	--	--	--	--	--	--
CS-MW12-BS	6/10/2011	--	--	--	--	--	--
CS-MW18-LGR	3/9/2011	--	--	--	--	--	--
CS-MW19-LGR	3/9/2011	--	--	--	**0.56F**	--	--
	6/16/2011	--	--	--	--	--	--
CS-MW20-LGR	3/10/2011	--	--	--	**1.91**	--	--
Duplicate	3/10/2011	--	--	--	**1.51**	--	--
	6/13/2011	--	--	--	**1.62**	--	--
CS-MW21-LGR	3/10/2011	--	--	--	--	--	--
	6/13/2011	--	--	--	--	--	--
CS-MW22-LGR	3/10/2011	--	--	--	--	--	--
	6/13/2011	--	--	--	--	--	--
CS-MW23-LGR	3/10/2011	--	--	--	--	--	--
Duplicate	3/10/2011	--	--	--	--	--	--
	6/13/2011	--	--	--	--	--	--
CS-MW24-LGR	3/9/2011	--	--	--	--	--	--
	6/9/2011	--	--	--	--	--	--
	12/14/2011	--	--	--	--	--	--
CS-MW25-LGR	3/8/2011	--	--	--	--	--	--
	6/14/2011	--	--	--	--	--	--
Duplicate	6/14/2011	--	--	--	--	--	--

Bold (red)	≥ MCL
Bold (blue)	≥ RL
Bold	≥ MDL

Notes:
- µg/L = micrograms per liter
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B.
- *Duplicate* = field duplicate
- F = The analyte was positively identified but the associated numerical value is below the RL.
- -- = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA

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Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID / Sample Date / Analyte (µg/L)	Comparison Criteria			CS-MW35-LGR		CS-MW36-LGR	
	MDL	RL	MCL	9/15/2011	12/13/2011	9/15/2011	12/13/2011
Benzene	0.07	0.4	5.0	--	NA	--	NA
Bromo-dichloro-methane	0.06	0.8	80*	--	NA	--	NA
Bromoform	0.13	1.2	80*	--	NA	--	NA
Bromo-benzene	0.06	0.3	--	--	NA	--	NA
Bromo-chloro-methane	0.11	0.4	--	--	NA	--	NA
Bromo-methane	0.08	1.1	--	--	NA	--	NA
Butylbenzene, N-	0.17	1.1	--	--	NA	--	NA
Butylbenzene, sec-	0.05	1.3	--	--	NA	--	NA
Butylbenzene, tert-	0.04	1.4	--	--	NA	--	NA
Carbon tetrachloride	0.06	2.1	5	--	NA	--	NA
Chloro-benzene	0.04	0.4	100	--	NA	--	NA
Chloro-ethane	0.07	1	--	--	NA	--	NA
Chloroform	0.06	0.3	80*	--	NA	--	NA
Chlorohexane, 1-	0.04	0.6	--	--	NA	--	NA
Chloro- methane	0.16	1.3	--	--	NA	--	NA
Chloro-toluene, 2-	0.04	0.4	--	--	NA	--	NA
Chlorotoluene, 4-	0.04	0.6	--	--	NA	--	NA
Dibromo-3-chloropropane, 1,2-	0.76	2.6	0.2	--	NA	--	NA
Dibromo-chloro-methane	0.06	0.5	80*	--	NA	--	NA
Dibromomethane	0.06	2.4	--	--	NA	--	NA
Dichlorobenzene, 1,2-	0.02	0.3	600	--	NA	--	NA
Dichlorobenzene, 1,3-	0.03	1.2	--	--	NA	--	NA
Dichlorobenzene, 1,4-	0.07	0.3	75	--	NA	--	NA
Dichlorodifluoromethane	0.11	1	--	--	NA	--	NA
Dichloroethane, 1,2-	0.05	0.6	5	--	NA	--	NA
Dichloro-ethane, 1,1	0.07	0.4	--	--	NA	--	NA
Dichloro-ethene, 1,1	0.12	1.2	7	--	--	--	--
Dichloro-ethene, *cis* -1,2	0.07	1.2	70	--	--	--	--
Dichloro-ethene, *trans* -1,2	0.08	0.6	100	--	--	--	--
Dichloro-methane (methylene chloride)	0.35	2	5	--	NA	--	NA
Dichloropropane, 1,2-	0.06	0.4	5	--	NA	--	NA
Dichloropropane, 1,3-	0.05	0.4	--	--	NA	--	NA
Dichloropropane, 2,2-	0.1	3.5	--	0.10M	NA	--	NA
Dichloropropene, 1,1-	0.1	1	--	--	NA	--	NA
Dichloropropene, cis-1,3-	0.03	1	--	--	NA	--	NA
Dichloropropene, trans-1,3-	0.04	1	--	--	NA	--	NA
Ethylbenzene	0.05	0.6	700	--	NA	--	NA
Ethylene dibromide	0.06	0.6	0.05	--	NA	--	NA
Hexachlorobutadiene	0.17	1.1	--	--	NA	--	NA
Isopropylbenzene	0.04	0.5	--	--	NA	--	NA
)	0.05	1.2	--	--	NA	--	NA
Naphthalene	0.07	1	--	--	NA	--	NA
Propylbenzene, N-	0.03	0.4	--	--	NA	--	NA
Styrene	0.08	0.5	100	--	NA	--	NA
Tetrachloroethane, 1,1,1,2-	0.09	0.5	--	--	NA	--	NA

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Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID / Sample Date / Analyte (µg/L)	Comparison Criteria			CS-MW35-LGR		CS-MW36-LGR	
	MDL	RL	MCL	9/15/2011	12/13/2011	9/15/2011	12/13/2011
Tetrachloroethane, 1,1,2,2-	**0.07**	**0.5**	**--**	--	NA	--	NA
Tetrachloroethene	**0.06**	**1.4**	**5**	**2.01**	**0.95F**	**9.91**	**7.21**
Toluene	**0.06**	**1.1**	**1000**	--	NA	--	NA
Trichlorobenzene, 1,2,3-	**0.24**	**0.5**	**--**	--	NA	--	NA
Trichlorobenzene, 1,2,4-	**0.16**	**0.5**	**70**	--	NA	--	NA
Trichloroethene	**0.05**	**1**	**5**	--	--	**9.33**	**6.23**
Trichloroethane, 1,1,1-	**0.03**	**0.8**	**200**	--	NA	--	NA
Trichloroethane, 1,1,2-	**0.06**	**1**	**5**	--	NA	--	NA
Trichlorofluoromethane	**0.07**	**0.8**	**--**	--	NA	--	NA
Trichloropropane, 1,2,3-	**0.17**	**3.2**	**--**	--	NA	--	NA
Trimethylbenzene, 1,2,4-	**0.04**	**1.3**	**--**	--	NA	--	NA
Trimethylbenzene, 1,3,5-	**0.04**	**0.5**	**--**	--	NA	--	NA
Vinyl chloride	**0.08**	**1.1**	**2**	--	--	--	--
Xylene, m,p-	**0.07**	**1.3**	**10000**	--	NA	--	NA
Xylene, o-	**0.06**	**1.1**	**10000**	--	NA	--	NA

Bold (red)	≥ MCL
Bold (blue)	≥ RL
Bold	≥ MDL

Notes:
- µg/L = micrograms per liter
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- -- = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- NA = Not analyzed for this parameter.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of

Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID	Sample Date	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
Comparison Criteria	MDL	0.00021	0.001	0.0005	0.001	0.0045	0.0019	0.0001	0.0045
	RL	0.02	0.005	0.007	0.01	0.01	0.025	0.001	0.05
	MCL	0.01	2.0	0.005	0.1	1.3	0.015 (AL)	0.002	5.0 (SS)
CS-1	3/8/2011	--	0.0334	--	--	0.004F	--	--	0.137
	6/7/2011	--	0.0332	--	--	0.006F	--	--	0.236
	9/14/2011	0.0012F	0.0316	--	--	0.013J	0.0294	--	0.543
	11/1/2011	--	0.038	--	--	0.035	0.0214F	--	0.397
	12/15/2011	0.003F	0.0318	--	--	0.012	0.0073F	--	0.395
CS-2	6/10/2011	NA	NA	--	--	NA	0.0024F	--	NA
CS-4	3/9/2011	NA	NA	--	--	NA	--	--	NA
CS-9	3/9/2011	0.0003F	0.0374	--	--	0.008F	0.0149F	0.0017	1.19
	6/7/2011	--	0.0435	--	--	0.014J	0.0183F	0.0028	1.825
	9/14/2011	0.0013F	0.0423	--	--	0.005F	0.0190F	0.0051	1.722
	12/15/2011	NA	NA	--	0.005F	NA	0.0581	0.0180*	NA
CS-10	3/9/2011	0.0016F	0.0397	--	--	0.021	--	--	0.122
	6/7/2011	--	0.042	--	--	0.011J	--	--	0.155
Duplicate	6/7/2011	--	0.0473	--	--	0.016J	--	--	0.18
	9/14/2011	0.0014F	0.0413	--	0.002F	0.025J	0.0022F	--	0.106
Duplicate	9/14/2011	0.0025F	0.0403	--	--	0.015J	--	--	0.095
	12/1/2011	0.0011F	0.042	--	--	0.029	--	--	0.078
	12/15/2011	0.0018F	0.0388	--	--	0.004F	--	--	0.063
CS-12	6/7/2011	--	0.0304	--	--	0.011J	--	--	0.481
	9/14/2011	0.0021F	0.0331	--	--	0.015J	0.0053F	--	0.201
	11/15/2011	0.002F	0.035	--	--	0.019	--	0.0002F	0.4
	12/15/2011	0.002F	0.0294	--	--	0.005F	--	--	0.176
Duplicate	12/15/2011	0.0015F	0.0297	--	--	0.008F	--	--	0.18
CS-MW16-LGR	3/8/2011	NA	NA	--	--	NA	0.0157F	--	NA
	6/7/2011	NA	NA	--	--	NA	0.0042F	--	NA
CS-MW16-CC	3/8/2011	NA	NA	--	--	NA	--	--	NA
	6/7/2011	NA	NA	--	--	NA	--	--	NA
CS-D	3/8/2011	NA	NA	--	--	NA	0.0023F	--	NA
CS-MWG-LGR	6/14/2011	NA	NA	--	--	NA	--	--	NA
CS-MWH-LGR	6/8/2011	NA	NA	--	--	NA	0.0047F	--	NA
CS-I	6/8/2011	NA	NA	--	--	NA	--	--	NA
CS-MW1-LGR	3/9/2011	NA	NA	--	--	NA	--	--	NA
Duplicate	3/9/2011	NA	NA	--	--	NA	--	--	NA
	6/9/2011	NA	NA	--	--	NA	--	--	NA
	12/14/2011	NA	NA	--	0.002F	NA	0.0086F	--	NA
CS-MW1-BS	6/9/2011	NA	NA	--	--	NA	--	--	NA
CS-MW1-CC	6/9/2011	NA	NA	--	--	NA	--	--	NA
CS-MW2-LGR	3/9/2011	NA	NA	--	--	NA	--	--	NA
	6/10/2011	NA	NA	--	--	NA	--	--	NA
	12/14/2011	NA	NA	--	--	NA	0.0110F	--	NA
CS-MW3-LGR	3/8/2011	NA	NA	--	--	NA	--	--	NA
	6/14/2011	NA	NA	--	0.007F	NA	--	--	NA
CS-MW4-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
CS-MW5-LGR	3/8/2011	NA	NA	--	--	NA	--	--	NA
	6/13/2011	NA	NA	--	--	NA	0.0020F	--	NA
CS-MW6-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
CS-MW6-BS	6/15/2011	NA	NA	--	0.004F	NA	--	--	NA
CS-MW7-LGR	3/10/2011	NA	NA	--	0.002F	NA	--	--	NA
	6/16/2011	NA	NA	--	0.002F	NA	--	--	NA
CS-MW8-LGR	6/15/2011	NA	NA	--	0.006F	NA	--	--	NA
	12/13/2011	NA	NA	--	--	NA	0.0080F	--	NA
CS-MW8-CC	6/15/2011	NA	NA	--	--	NA	--	--	NA
CS-MW9-LGR	3/8/2011	NA	NA	--	0.062	NA	--	--	NA
	6/14/2011	NA	NA	--	0.061	NA	--	--	NA
CS-MW9-BS	6/15/2011	NA	NA	--	0.003F	NA	0.0751	--	NA
CS-MW10-LGR	12/13/2011	NA	NA	--	--	NA	0.0096F	--	NA

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Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID	Sample Date	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
Comparison Criteria	**MDL**	**0.00021**	**0.001**	**0.0005**	**0.001**	**0.0045**	**0.0019**	**0.0001**	**0.0045**
	RL	**0.02**	**0.005**	**0.007**	**0.01**	**0.01**	**0.025**	**0.001**	**0.05**
	MCL	**0.01**	**2.0**	**0.005**	**0.1**	**1.3**	**0.015 (AL)**	**0.002**	**5.0 (SS)**
CS-MW11A-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
	6/16/2011	NA	NA	--	**0.049**	NA	--	--	NA
	12/13/2011	NA	NA	--	**0.009F**	NA	**0.0082F**	--	NA
CS-MW12-LGR	6/10/2011	NA	NA	--	**0.002F**	NA	**0.0021F**	--	NA
Duplicate	6/10/2011	NA	NA	--	--	NA	**0.0027F**	--	NA
CS-MW12-BS	6/10/2011	NA	NA	--	**0.003F**	NA	**0.0020F**	--	NA
CS-MW18-LGR	3/9/2011	NA	NA	--	**0.039**	NA	--	--	NA
CS-MW19-LGR	3/9/2011	NA	NA	--	--	NA	--	--	NA
	6/16/2011	NA	NA	--	--	NA	--	--	NA
CS-MW20-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
Duplicate	3/10/2011	NA	NA	--	--	NA	--	--	NA
	6/13/2011	NA	NA	--	**0.003F**	NA	**0.0021F**	--	NA
CS-MW21-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
	6/13/2011	NA	NA	--	--	NA	**0.0026F**	--	NA
CS-MW22-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
	6/13/2011	NA	NA	--	--	NA	**0.0020F**	--	NA
CS-MW23-LGR	3/10/2011	NA	NA	--	--	NA	--	--	NA
Duplicate	3/10/2011	NA	NA	--	--	NA	--	--	NA
	6/13/2011	NA	NA	--	**0.002F**	NA	--	**0.0002F**	NA
CS-MW24-LGR	3/9/2011	NA	NA	--	--	NA	--	--	NA
	6/9/2011	NA	NA	--	--	NA	--	--	NA
	12/14/2011	NA	NA	--	--	NA	**0.0096F**	--	NA
CS-MW25-LGR	3/8/2011	NA	NA	--	**0.008F**	NA	--	--	NA
	6/14/2011	NA	NA	--	**0.002F**	NA	--	--	NA
Duplicate	6/14/2011	NA	NA	--	**0.002F**	NA	--	--	NA

Bold (red)	≥ MCL
Bold (blue)	≥ RL
Bold	≥ MDL

Notes:
- mg/L = milligrams per liter
- AL = action level
- SS = secondary standard
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- *Duplicate* = field duplicate
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- -- = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.

Table 2.5
2011 On-post Groundwater COCs and Metals Analytical Results, Detections Only

Well ID	Comparison Criteria			CS-MW35-LGR		CS-MW36-LGR	
Analyte (mg/L)	MDL	RL	MCL	9/15/2011	12/13/2011	9/15/2011	12/13/2011
Arsenic	0.00021	0.02	0.01	0.0009F	NA	0.0014F	NA
Barium	0.001	0.005	2.0	0.0407	NA	0.0354	NA
Cadmium	0.0005	0.007	0.005	--	--	--	--
Chromium	0.001	0.01	0.1	0.004F	0.002F	0.007F	--
Copper	0.0045	0.01	1.3	--	NA	--	NA
Lead	0.0019	0.025	0.015 (AL)	--	0.0084F	--	0.0099F
Mercury	0.0001	0.001	0.002	--	--	--	--
Nickel	0.0078	0.01	--	0.015	NA	0.004F	NA
Zinc	0.0045	0.05	5.0 (SS)	0.1	NA	0.029F	NA
Bromide	0.11	0.5	--	0.6	NA	0.59	NA
Chloride	0.25	1.0	--	18	NA	15	NA
Fluoride	0.06	1.0	4	0.31F	NA	0.37F	NA
Nitrate	0.02	0.2	10	2.33	NA	3.78	NA
Nitrite	0.01	0.1	1.0	--	NA	--	NA
Sulfate	0.23	1.0	--	66	NA	64	NA
TDS	--	--	500	470	NA	360	NA
Alkalinity, Bicarbonate	1.1	5.0	--	310	NA	220	NA
Alkalinity, Total (as CACO3)	1.1	10	--	310	NA	220	NA
Phosphorus, Total Orthophosphate	0.19	1.0	--	--	NA	--	NA

Bold (red)	≥ MCL
Bold (blue)	≥ RL
Bold	≥ MDL

Notes:
- mg/L = milligrams per liter
- AL = action level
- SS = secondary standard
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- F = The analyte was positively identified but the associated numerical value is below the RL.
- -- = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- NA = Not analyzed for this parameter.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc.

- **CS-1 –** This well was sampled all four quarters in 2011 for VOCs and an additional metals sample was collected in November. Concentrations of TCE were detected below the RL in 2011. However, lead was above the AL in September and November 2011. This detection was possibly due to the new pump installation in June 2011. Arsenic, barium, copper, and zinc were also detected below their applicable MCL/SS in 2011.
- **CS-MW9-BS –** This well was sampled once in 2011. No VOCs were detected in this well in 2011. Lead was above the MCL in June 2011. Lead has been detected above the MCL in this well since 2007. Chromium was also detected below the MCL in June 2011.
- **CS-MW36-LGR –** This well was installed in 2011 and sampled September and December 2011. PCE and TCE were above the MCL during both events. Arsenic, barium, chromium, lead, nickel, and zinc were all detected below their applicable MCL/SS in 2011.

2.2.1.2 On-Post Monitoring Wells with COC Detections below the MCL

Groundwater monitoring results included wells where COCs were detected at levels below the applicable MCLs, or ALs but above method detection limits (MDLs). These included wells CS-2, CS-4, CS-10, CS-12, CS-MWH-LGR, CS-MW1-BS, CS-MW2-LGR, CS-MW3-LGR, CS-MW5-LGR, CS-MW6-BS, CS-MW7-LGR, CS-MW8-LGR, CS-MW9-LGR, CS-MW10-LGR, CS-MW11A-LGR, CS-MW12-LGR, CS-MW12-BS, CS-MW18-LGR, CS-MW19-LGR, CS-MW20-LGR, CS-MW21-LGR, CS-MW22-LGR, CS-MW23-LGR, CS-MW24-LGR, CS-MW25-LGR, and CS-MW35-LGR. The detections below the MCLs/ALs but above MDLs are summarized as follows:

- **CS-2 –** Lead was detected below the RL in June 2011.
- **CS-4 –** PCE, TCE, and *cis*-1,2-DCE were detected below the MCL in June 2011. No metals of concern were detected in June 2011.
- **CS-10 –** No VOCs were detected during the 4 quarterly events in 2011. One additional metals sample was collected at the beginning of December 2011. Barium, copper, and zinc were detected above the RL in 2011. Arsenic, chromium, and lead were detected below the RL in 2011.
- **CS-12 –** This well was sampled three quarters in 2011 and one additional metals sample was collected in November. No VOCs were detected in this well in 2011. Arsenic, barium, chromium, copper, lead, and zinc were detected below the MCL in 2011.
- **CS-MWH-LGR –** No VOCs were detected in this well in June 2011. Lead was also detected below the RL in June 2011.
- **CS-MW1-BS –** Concentrations of *cis*-1,2-DCE were detected below the MCL in June 2011. No metals were detected in June 2011.

- **CS-MW2-LGR –** Concentrations of *cis*-1,2-DCE was detected below the MCL and RL in 2011. Lead was detected above the RL in December 2011. The pH at the time of sampling was 10.47, 10.32, and 10.59 respectively, for the March, June, and December events. Grout contamination from the CC twin well (CS-MW2-CC) installed in 2002 is suspected to have played a role in the elevated pH measurements present in CS-MW2-LGR or buried munitions debris with caustic in the vicinity may also factor in to the high pH levels. SWMU excavation work conducted in 2011 confirmed the presence of caustic waste in the vicinity of CS-MW2-LGR. The caustic waste has been removed and trenches backfilled with clean fill. Additional well development is tentatively scheduled for 2012 to determine if the removal of the waste in the vicinity will solve the pH issues with this well.
- **CS-MW3-LGR –** Concentrations of chromium were below the RL in June 2011.
- **CS-MW5-LGR –** Concentrations of PCE, TCE, and *cis*-1,2-DCE were detected below their MCLs and above RLs in March 2011. Low levels of lead were also detected below the RL in June 2011.
- **CS-MW6-BS** - Low levels of chromium below the RL were present in June 2011.
- **CS-MW7-LGR** - Concentrations of PCE were detected below the RL in March 2011. Low levels of chromium below the RL were also detected in March and June 2011.
- **CS-MW8-LGR –** Concentrations of PCE were detected below the MCL and above the RL in December 2011. Chromium was also detected in this well below the RL in June 2011 as well as low levels of lead in December 2011.
- **CS-MW9-LGR –** Concentrations of PCE were detected below the RL in March 2011. Low levels of chromium were present above the RL in March and June 2011.
- **CS-MW10-LGR –** PCE and TCE concentrations were detected below the MCL in December 2011. Lead was also reported below the RL in December 2011.
- **CS-MW11A-LGR –** Concentrations of PCE were detected below the RL in March, June, and December 2011. Chromium was reported below the MCL in June and December 2011. Lead was reported below the RL in December 2011.
- **CS-MW12-LGR** - Cadmium and lead were reported below their respective RLs in June 2011.
- **CS-MW12-BS** - Cadmium and lead were reported below their RL in June 2011.
- **CS-MW18-LGR** - Concentrations of cadmium were below the MCL but above the RL in March 2011.
- **CS-MW19-LGR –** Concentrations of PCE were below the RL in March 2011.
- **CS-MW20-LGR –** Concentrations of PCE were detected below the MCL and above the RL in March and June 2011. In June 2011, chromium and lead were detected below the RL.
- **CS-MW21-LGR –**Lead was detected at concentrations below the RL in June 2011.

- **CS-MW22-LGR –** Lead was detected at concentrations below the RL in June 2011.
- **CS-MW23-LGR –** Concentrations of chromium and mercury were detected below the RL in June 2011.
- **CS-MW24-LGR** - Lead concentrations were detected below the RL in December 2011.
- **CS-MW25-LGR –**Chromium was detected below the RL in March and June 2011.
- **CS-MW35-LGR –** PCE was detected above the RL in September 2011 and below the RL in December 2011. Arsenic, barium, chromium, nickel, and zinc were also detected below the MCL/SS in September 2011. Chromium and lead were detected below the RL in December 2011. This was the first 2 sampling events for this well.

2.2.1.3 On-Post Monitoring Wells with No COC Detections

Of the 40 monitoring wells sampled in 2011, 34 wells reported COC detections. A total of 6 wells (CS-MWG-LGR, CS-I, CS-MW1-CC, CS-MW4-LGR, CS-MW6-LGR, and CS-MW8-CC) reported no VOC or metals detections. Eight wells were not sampled at all in 2011 due to the water levels falling below the pump depths (CS-MW2-CC, CS-MW6-CC, CS-MW7-CC, CS-MW9-CC, CS-MW10-CC, CS-MW11B-LGR, CS-MW12-CC, and CS-MW17-LGR). Well CS-12 was not sampled in March 2011 due to well house construction. Details on the RL, MDLs, field duplicates, MCLs, etc., are described in the tables of detections (**Table 2.5**) and in **Appendix B**.

2.2.1.4 Drinking Water Supply Well Results

Three active CSSA drinking water supply wells CS-1, CS-10, and CS-12 were analyzed for VOCs and the 8 metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, and zinc) in 2011. Under the LTMO study, the drinking water supply wells are scheduled to be sampled quarterly (**Table 2.4**). One additional metals sample was collected from each of these wells in November through December to monitor water quality more closely during the extreme drought conditions. Additional metals were collected from well CS-12 to determine if metals concentrations were still present after well development/purging, see **Appendix I**. Drinking water well CS-12 was connected into the CSSA water supply system in July 2011. The detections are summarized as follows:

- **CS-1 –** Concentrations of TCE were below the RL in all 4 quarter in 2011. Concentrations of lead were above the AL in September and November 2011. Barium, copper, and zinc were above their respective RLs but below their MCL/SS in 2011. Arsenic was below the RL in September and December 2011.
- **CS-10 –** No VOCs were detected in this well in 2011. Arsenic, barium, chromium, copper, lead, and zinc were all detected in this well below the applicable MCL/SSs in 2011. No metals in this well exceeded their applicable MCL/AL/SS in 2011.

- **CS-12 –** No VOCs were detected in this well in 2011. Arsenic, barium, copper and lead were detected in 2011, all below their applicable MCL/AL/SSs. See **Section 3.0** for more information regarding the history of this well.

Well CS-9 remains offline, since June 2007, due to elevated lead and mercury detections. Continued sampling in 2011 has shown that lead and mercury in excess of groundwater standards can still be present in the groundwater. Therefore, well CS-9 continues to be an inactive component of the CSSA distribution system.

As a result of the prolonged drought of 2008, CSSA revised the "trigger levels" for their postwide Drought Contingency Plan. The proposed trigger levels are now based solely on the pumping level of production well CS-10. This is a revision to the previous averaging of water levels from multiple monitoring wells throughout the facility. The extreme drought of 2011 also brought about changes to the Drought Contingency Plan to make the trigger levels even more conservative and invoke on-post water usage restrictions sooner. The trigger levels were raised to 50 feet above the major water producing zone instead of above the pump. These updated Drought Contingency Plan triggers are included in **Appendix E**. In an effort to reduce the impact of the drought in both on- and off-post wells these revised triggers were implemented in March 2011. An increased effort in locating and repairing broken water lines was also conducted to soften the impact of the 2011 drought.

2.2.1.5 Westbay®-equipped Well Results

Eight wells equipped with the Westbay multi-port interval sampling equipment have been installed at CSSA. Four wells (CS-WB05, CS-WB06, CS-WB07, and CS-WB08) are sampled as part of the SWMU B-3 bioreactor treatability study and are not addressed in this report. The remaining four wells (CS-WB01, CS-WB02, CS-WB03, and CS-WB04) are part of the basewide groundwater monitoring program and are included in this report. Under the provisions of the groundwater monitoring DQOs and the 2010 updated LTMO study, the schedule for sampling CS-WB01 and CS-WB03 is every 9 months with 3 additional LTMO selected zones sampled with the 9 month snapshot event. The schedule for sampling CS-WB04 LGR, BS, and CC zones is every 18 months with 5 LTMO selected zones sampled with the 9 month snapshot event. An overview of sampling frequencies for Westbay wells only is given in **Table 2.6**.

Samples were collected from all zones with water in March 2011. The 8 LTMO selected zones were sampled in June 2011 with the 9 month snapshot event. In September 2011 no Westbay samples were collected and in December 2011 all 9 month scheduled zones were sampled. Samples were analyzed for PCE, TCE, *cis*-1,2-DCE, *trans*-1,2-DCE, 1,1-DCE, vinyl chloride and analyzed by APPL. Per the DQOs, the Westbay data are used for screening purposes only, and therefore no quality assurance/quality control samples are collected with the Westbay samples. All intervals with detections of COCs are presented in **Table 2.7**. Full analytical results are presented in **Appendix C**. **Appendix D** illustrates the historical contaminant concentrations and groundwater elevations for each Westbay zone.

Table 2.6 Westbay Sampling Frequency

Westbay Interval	Last Sample Date	Mar-11	Jun-11 (snapshot)	Sep-11	Dec-11	LTMO Sampling Frequency (implemented June '11)
CS-WB01-UGR-01	Dec-04	Dry	NS	NS	Dry	Every 9 months
CS-WB01-LGR-01	Dec-11	Dry	NS	NS	S	Every 9 months
CS-WB01-LGR-02	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-03	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-04	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-05	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-06	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-07	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-08	Dec-11	S	NS	NS	S	Every 9 months
CS-WB01-LGR-09	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB02-UGR-01	Dec-04	Dry	NS	NS	Dry	Every 9 months
CS-WB02-LGR-01	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-02	Mar-10	Dry	NS	NS	Dry	Every 9 months
CS-WB02-LGR-03	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-04	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-05	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-06	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-07	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-08	Dec-11	S	NS	NS	S	Every 9 months
CS-WB02-LGR-09	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB03-UGR-01	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-01	Sep-10	Dry	NS	NS	Dry	Every 9 months
CS-WB03-LGR-02	Oct-07	Dry	NS	NS	Dry	Every 9 months
CS-WB03-LGR-03	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-04	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-05	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-06	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-07	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-08	Dec-11	S	NS	NS	S	Every 9 months
CS-WB03-LGR-09	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB04-UGR-01	Mar-04	Dry	NS	NS	Dry	Every 9 months
CS-WB04-LGR-01	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-LGR-02	Mar-10	Dry	NS	NS	NS	Every 18 months
CS-WB04-LGR-03	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-LGR-04	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-LGR-06	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB04-LGR-07	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB04-LGR-08	Dec-11	S	NS	NS	S	Every 9 months
CS-WB04-LGR-09	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB04-LGR-10	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB04-LGR-11	Dec-11	S	S	NS	S	Every 9 months + snapshot
CS-WB04-BS-01	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-BS-02	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-CC-01	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-CC-02	Mar-11	S	NS	NS	NS	Every 18 months
CS-WB04-CC-03	Mar-11	S	NS	NS	NS	Every 18 months

Profiling performed quarterly, in conjunction with post wide water levels.

Table 2.7
2011 Westbay® Groundwater COCs Analytical Results, Detections Only

Well ID	Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	TCE	PCE	Vinyl Chloride
Comparison Criteria	MDL	0.3	0.16	0.19	0.16	0.15	0.23
	RL	1.2	1.2	0.6	1.0	1.4	1.1
	MCL	7.0	70	100	5.0	5.0	2.0
CS-WB01-UGR-01	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	8-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB01-LGR-01	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	8-Dec-11	--	--	--	0.28F	5.64	--
CS-WB01-LGR-02	14-Mar-11	--	--	--	3.71	13	--
	8-Dec-11	--	--	--	3.21	13.2	--
CS-WB01-LGR-03	14-Mar-11	--	--	--	14.16	4.18	--
	8-Dec-11	--	--	--	8.93	3.9	--
CS-WB01-LGR-04	14-Mar-11	--	--	--	--	--	--
	8-Dec-11	--	--	--	--	--	--
CS-WB01-LGR-05	14-Mar-11	--	--	--	0.35	--	--
	8-Dec-11	--	--	--	0.22F	--	--
CS-WB01-LGR-06	14-Mar-11	--	0.34	--	1.95	0.22	--
	8-Dec-11	--	0.35F	--	1.07	--	--
CS-WB01-LGR-07	14-Mar-11	--	0.2	--	13.14	13.54	--
	8-Dec-11	--	--	--	14.45	18.91	--
CS-WB01-LGR-08	14-Mar-11	--	1.62	--	3.08	0.16	--
	8-Dec-11	--	1.03F	--	6.62	2.86	--
CS-WB01-LGR-09	14-Mar-11	--	0.31	--	21.82	17.09	--
	6-Jun-11	--	0.34	--	19.56	16.32	--
	8-Dec-11	--	--	--	20.7	16.91	--
CS-WB02-UGR-01	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	7-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-01	14-Mar-11	--	--	--	1.34	0.48	--
	7-Dec-11	--	--	--	0.84F	--	--
CS-WB02-LGR-02	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	7-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-03	14-Mar-11	--	--	--	--	3.02	--
	7-Dec-11	--	--	--	--	4.68	--
CS-WB02-LGR-04	14-Mar-11	--	--	--	5.87	2.05	--
	7-Dec-11	--	--	--	9.15	3.61	--
CS-WB02-LGR-05	14-Mar-11	--	--	0.2	2.78	0.71	--
	7-Dec-11	--	--	--	3.06	1.02F	--
CS-WB02-LGR-06	14-Mar-11	--	1.02	2.82	4.05	1.08	--
	7-Dec-11	--	--	--	2.95	1.12F	--
CS-WB02-LGR-07	14-Mar-11	--	0.16	--	0.51	0.65	--
	7-Dec-11	--	--	--	--	--	--
CS-WB02-LGR-08	14-Mar-11	--	3.7	1.41	0.58	0.19	--
	7-Dec-11	--	1.65	--	1.06	1.09F	--
CS-WB02-LGR-09	14-Mar-11	--	0.2	--	10.34	11.58	--
	6-Jun-11	--	0.32	--	13.22	18.2	--
	7-Dec-11	--	--	--	11.23	13.12	--
CS-WB03-UGR-01	16-Mar-11	--	--	--	22.30*	1767.03*	--
	5-Dec-11	--	--	--	32.76F*	2514.83*	--
CS-WB03-LGR-01	16-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	5-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB03-LGR-02	16-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	5-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB03-LGR-03	16-Mar-11	--	0.17	--	9.03	14.41	--
	5-Dec-11	--	0.34F	--	14.51	31.71	--
CS-WB03-LGR-04	16-Mar-11	--	--	--	5.58	16.22	--
	5-Dec-11	--	--	--	12.39	27.28	--
CS-WB03-LGR-05	16-Mar-11	--	--	--	5.43	22.49	--
	5-Dec-11	--	--	--	8.84	27.14	--
CS-WB03-LGR-06	16-Mar-11	--	--	--	0.86	5.86	--
	5-Dec-11	--	0.25F	--	0.86F	5.86	--
CS-WB03-LGR-07	16-Mar-11	--	2.32	--	7	8.03	--

Table 2.7
2011 Westbay® Groundwater COCs Analytical Results, Detections Only

Well ID	Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	TCE	PCE	Vinyl Chloride
Comparison Criteria	MDL	0.3	0.16	0.19	0.16	0.15	0.23
	RL	1.2	1.2	0.6	1.0	1.4	1.1
	MCL	7.0	70	100	5.0	5.0	2.0
	5-Dec-11	--	**3.66**	--	**5.17**	**4.56**	--
CS-WB03-LGR-08	16-Mar-11	--	**7.41**	--	**1.67**	**7.82**	--
	5-Dec-11	--	**8.3**	--	**1.58**	**3.83**	--
CS-WB03-LGR-09	16-Mar-11	--	**0.26**	--	**4.04**	**4.73**	--
	6-Jun-11	--	**35.36**	--	**3.84**	**6.83**	--
	5-Dec-11	--	**45.73**	--	**4.05**	**11.75**	--
CS-WB04-UGR-01	15-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	6-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-01	15-Mar-11	--	--	--	--	**0.39**	--
CS-WB04-LGR-02	15-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-03	15-Mar-11	--	--	--	--	**0.17**	--
CS-WB04-LGR-04	15-Mar-11	--	--	--	**0.25**	**0.2**	--
CS-WB04-LGR-06	15-Mar-11	--	**2.87**	**0.36**	**14.62**	**22.35**	--
	6-Jun-11	--	**3.02**	**0.32**	**13.68**	**28.74**	--
	6-Dec-11	--	**2.81**	--	**9.39**	**28.76**	--
CS-WB04-LGR-07	15-Mar-11	--	**3.82**	**0.31**	**19.26**	**9.21**	--
	6-Jun-11	--	**2.24**	**0.23**	**11.15**	**17.91**	--
	6-Dec-11	--	**2.81**	--	**9.91**	**24.41**	--
CS-WB04-LGR-08	15-Mar-11	--	**0.15**	--	**1.02**	**0.38**	--
	6-Dec-11	--	--	--	**0.84F**	--	--
CS-WB04-LGR-09	15-Mar-11	--	--	--	**5.77**	**7.15**	--
	6-Jun-11	--	--	--	**7.29**	**9.75**	--
	6-Dec-11	--	--	--	**7.09**	**9.25**	--
CS-WB04-LGR10	15-Mar-11	--	--	--	**0.57**	**0.8**	--
	6-Jun-11	--	--	--	**0.5**	**1.01**	--
	6-Dec-11	--	--	--	--	**1.16F**	--
CS-WB04-LGR-11	15-Mar-11	--	--	--	--	--	--
	6-Jun-11	--	--	--	--	**0.24**	--
	6-Dec-11	--	--	--	--	--	--
CS-WB04-BS-01	15-Mar-11	--	--	--	--	--	--
CS-WB04-BS-02	15-Mar-11	--	**0.15**	--	--	--	--
CS-WB04-CC-01	15-Mar-11	--	**0.41**	--	--	--	--
CS-WB04-CC-02	15-Mar-11	--	--	--	--	--	--
CS-WB04-CC-03	15-Mar-11	--	--	--	--	--	--

BOLD	≥ MDL
BOLD (blue)	≥ RL
BOLD (red)	≥ MCL

Notes:
- All values reported in micrograms per liter (µg/L).
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B and reported as screening data.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- -- = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA
- * = A dilution was run for this sample.
- DCE = Dichloroethene

J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2011\Annual Rpt\Table 2-7 2011 Westbay Analytical.xlsx

Due to a decrease in groundwater elevations, certain zones (CS-WB01-UGR-01, CS-WB01-LGR-01, CS-WB02-UGR-01, CS-WB02-LGR-02, CS-WB03-LGR-01, CS-WB03-LGR-02, CS-WB04-UGR-01, and CS-WB04-LGR-02) could not be sampled in March because they were dry. Zones CS-WB01-UGR-01, CS-WB02-UGR-01, CS-WB02-LGR-02, CS-WB03-LGR-01, CS-WB03-LGR-02, and CS-WB04-UGR-01 were not sampled in December because they were dry. CS-WB04-LGR-05 was not sampled due to a non-operational sampling port. The remaining 77 zones contained water and were sampled. The Westbay-equipped wells are sampled using Westbay Instruments, Inc., equipment and sampling methods.

The following Westbay intervals reported detections of PCE and/or TCE above the MCL in 2011.

CS-WB01	**CS-WB02**	**CS-WB03**	**CS-WB04**
• LGR-01	• LGR-04	• UGR-01	• LGR-06
• LGR-02	• LGR-09	• LGR-03	• LGR-07
• LGR-03		• LGR-04	• LGR-09
• LGR-07		• LGR-05	
• LGR-08		• LGR-06	
• LGR-09		• LGR-07	
		• LGR-08	
		• LGR-09	

Figures 2.3, 2.4, 2.5, and **2.6** present the vertical distribution of the VOC plume within the multi-port wells for the most pervasive contaminants, PCE and TCE. The contaminant conditions in the profiles occurred during a below-average saturation in the aquifer, where the post had received approximately 17 inches of rainfall through December 2011. The following discussion presents general observations that have been noted since the inception of Westbay monitoring at AOC-65.

In 2011, the VOC plume originating from AOC-65 is generally similar in concentration and distribution as in prior years. Near the source area (CS-WB03 and –WB02), the solvent contamination is persistent throughout the entire thickness of the LGR, with the greatest concentrations near the land surface. As the plume disperses to the south and west, the contaminants seem to preferentially migrate in stratified lobes (LGR-01, -02, and -03), (LGR-06 and -07) and LGR-09. As in prior years, the BS and CC zones at CS-WB04 generally have little to no contamination present. In 2011, only trace detections of *cis*-1,2-DCE was reported in CS-WB04-BS-02 and –CC01 intervals. The contention is that the trace contamination in the BS and CC at CS-WB04 is the result of the vertical mixing of contaminated LGR water within the nearby RFR-10 wellbore under a naturally downward vertical gradient.

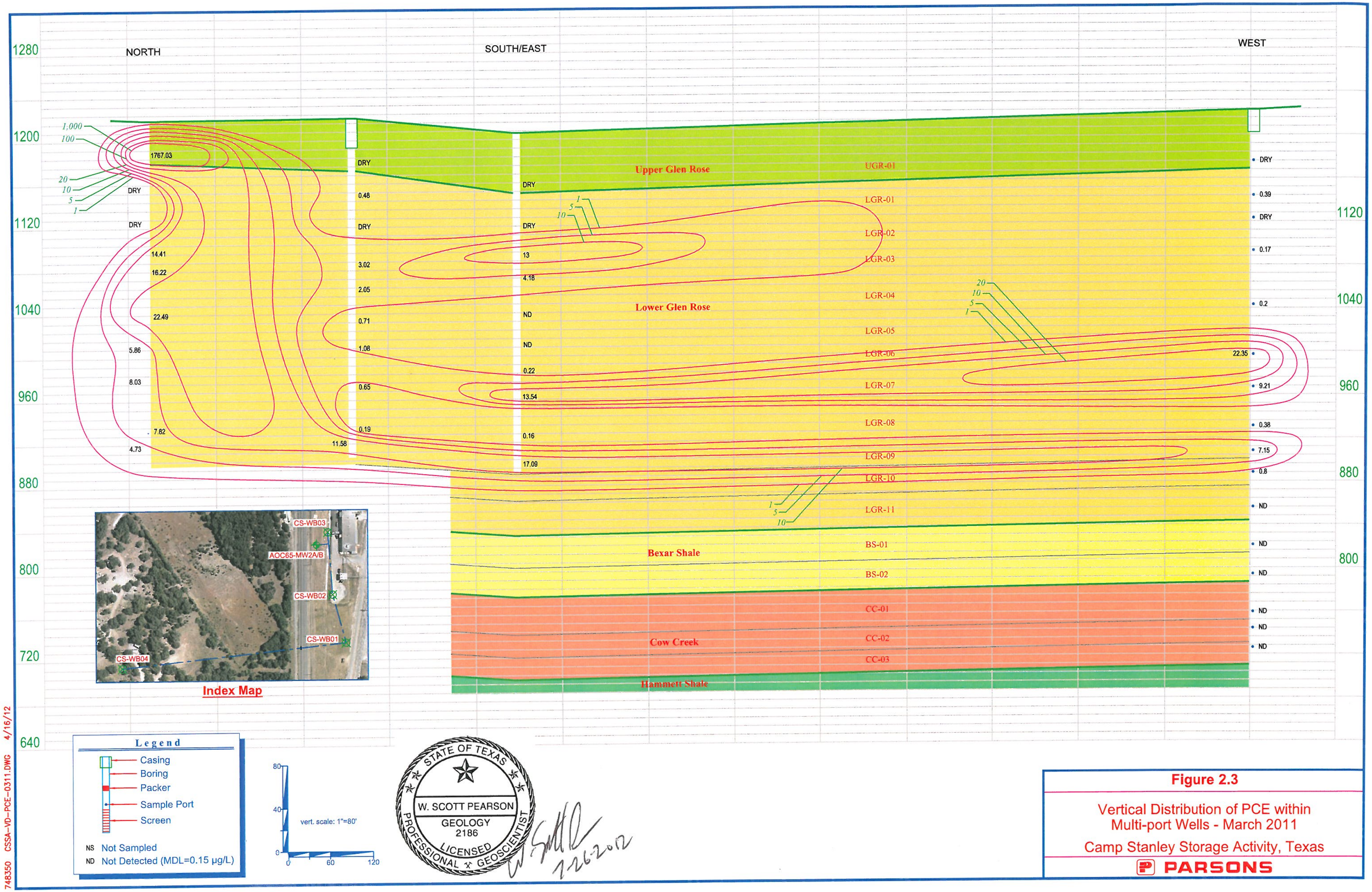


Figure 2.3

Vertical Distribution of PCE within Multi-port Wells - March 2011

Camp Stanley Storage Activity, Texas

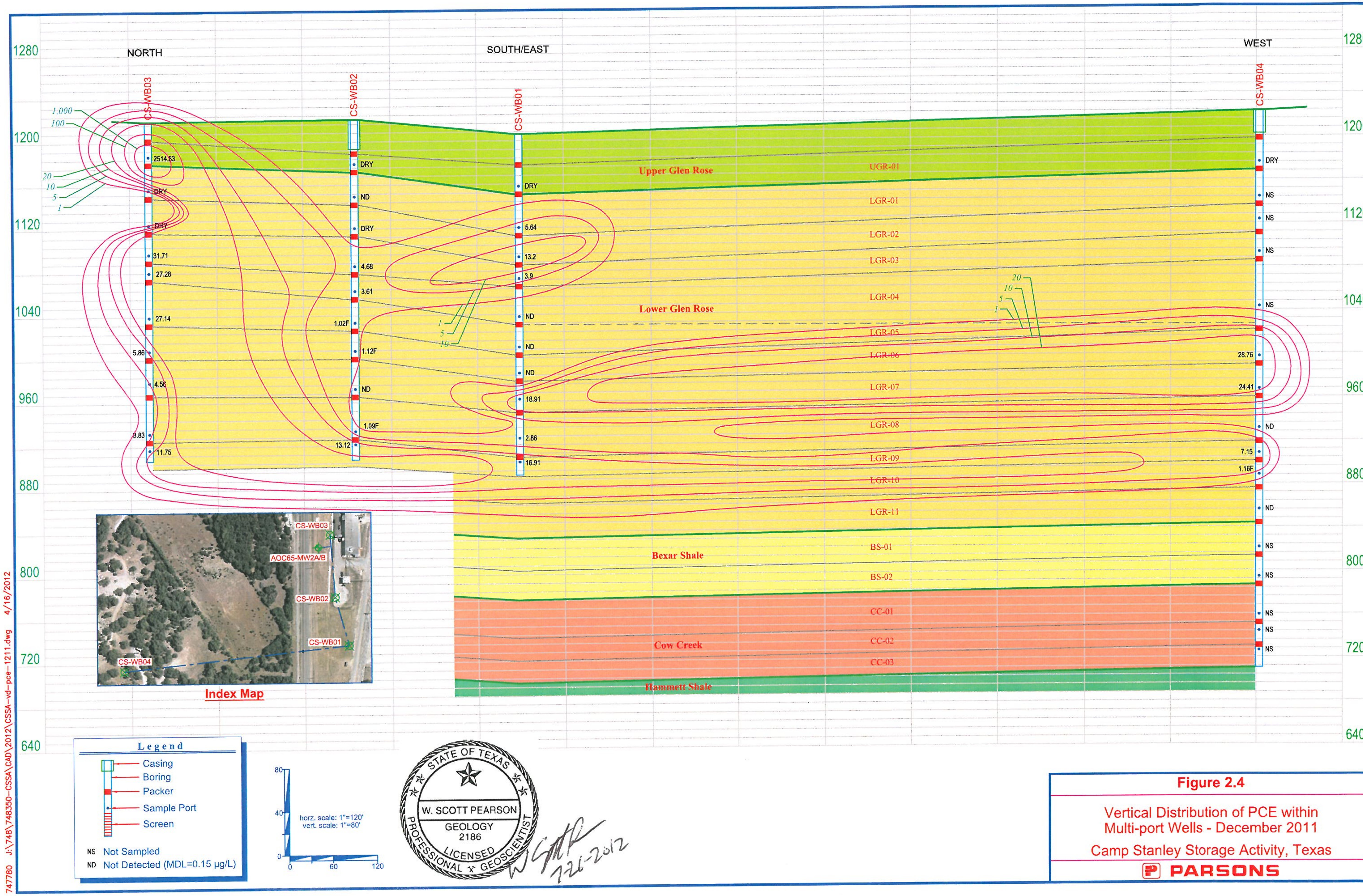


Figure 2.4

Vertical Distribution of PCE within Multi-port Wells - December 2011

Camp Stanley Storage Activity, Texas

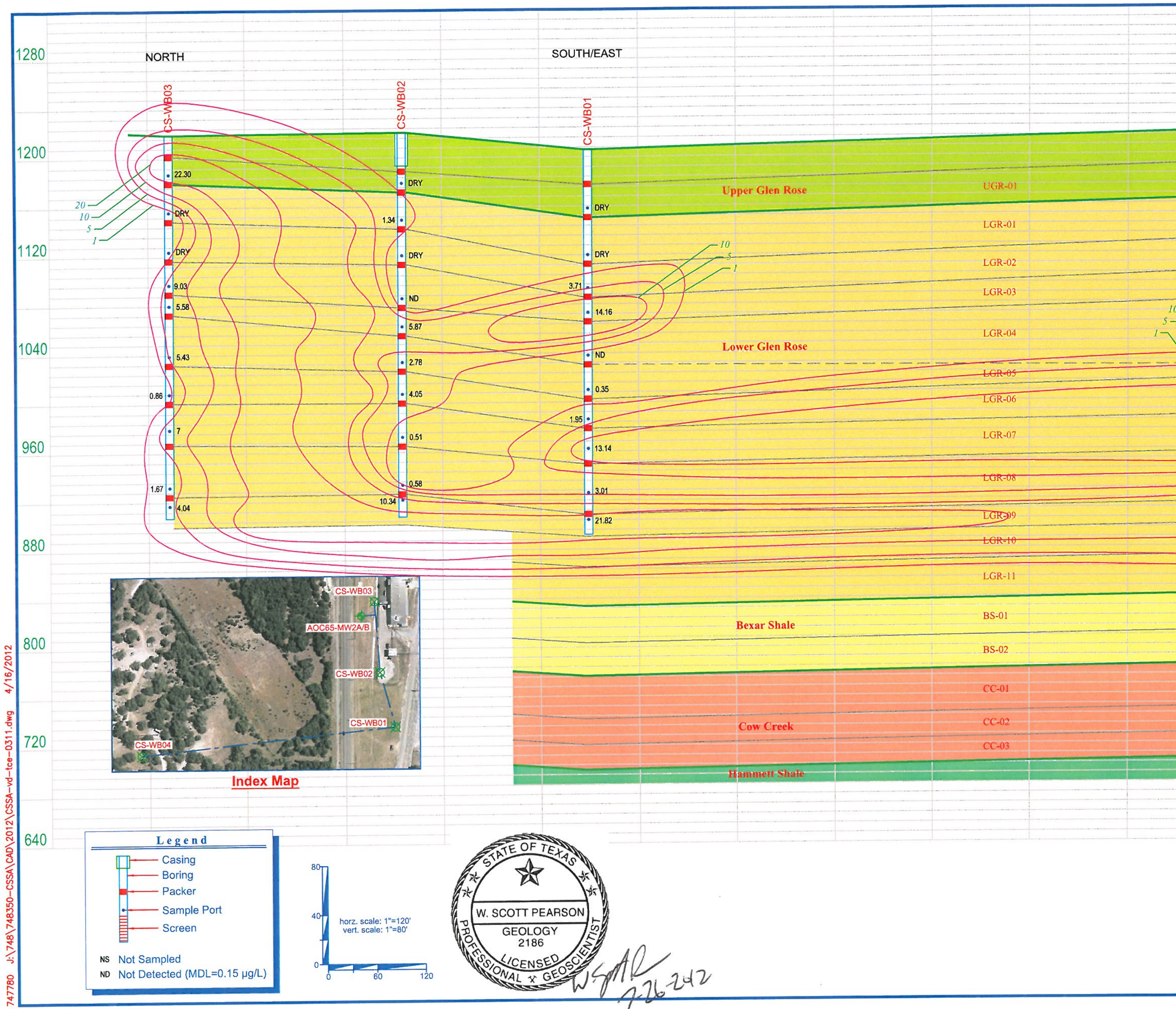


Figure 2.5

Vertical Distribution of TCE within Multi-port Wells - March 2011

Camp Stanley Storage Activity, Texas

PARSONS

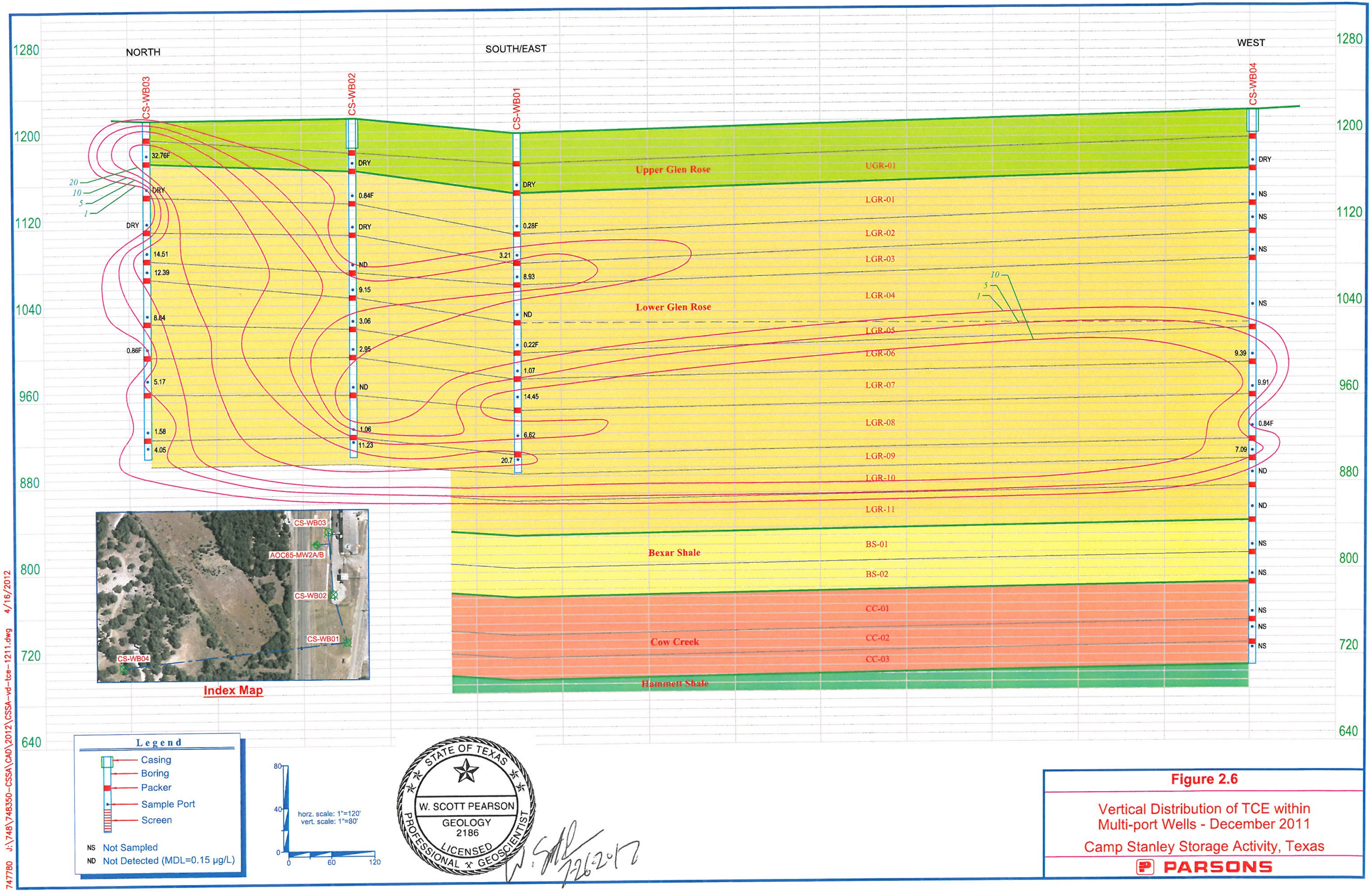


Figure 2.6

Vertical Distribution of TCE within Multi-port Wells - December 2011

Camp Stanley Storage Activity, Texas

PARSONS

CS-WB03 is located closest to the Building 90 source area, and consistently records the highest concentrations of contaminants (**Appendix D.3**). The uppermost zones (CS-WB03-UGR-01 and -LGR-01) are typically dry and only have water after significant rain. Because of frequent droughts and set sampling schedules, these zones have been sampled only a handful of times. In 2011, only the UGR zone contained water in the uppermost intervals of CS-WB03. Significant contamination is still present in the UGR zone, but is an order of magnitude less than it was in 2008. In 2011, it was confirmed that a potable water leak did exist at the north end of Building 90, and may have been contributing to the presence of water seen in shallow monitoring wells in the vicinity, including CS-WB03. This leak was repaired near the end of 2011.

The results indicate that a persistent source of contamination still exists, and that periodic flushing by intense rainfall and suspected plumbing leaks near Building 90 can mobilize these perched contaminants that are probably otherwise bound to the matrix during the rest of the year. CS-WB01-UGR, CS-WB02-UGR, and CS-WB04-UGR zones were all dry during the 2011 sampling events, this is further indication that something more than just rainfall is mobilizing the high concentrations of contaminants to the WB03-UGR-01 zone. The lower zones of CS-WB03 typically range between 10 µg/L and 40 µg/L of PCE, with significantly lesser amounts of TCE being reported. In general, the 2011 results found in CS-WB03 are consistent with those results from prior years.

CS-WB02 was installed nearly 300 feet south of CS-WB03 and the Building 90 source area. Compared to CS-WB03 and CS-WB01, relatively equal levels of PCE and TCE are present throughout the CS-WB02 vertical profile. Historically, PCE and TCE concentrations range between 15 µg/L to less than 5 µg/L in any given CS-WB02 monitoring interval (**Appendix D.2**). In 2011, zones UGR-01 and LGR-02 were dry for both sampling events.

Multi-port well CS-WB01 is located approximately 500 ft south of CS-WB03 and the Building 90 source area. Once again, for the zones that are normally saturated, historical PCE and TCE are present at concentrations less than 35 µg/L. Since mid-2005, there has been a general trend of increasing contaminant concentrations in zones CS-WB02-LGR02, -LGR07, and -LGR09. The 2011 shows that these increasing trends have stabilized in the past couple years. These noted increases seem to correspond with increases observed in several upgradient CS-WB02 zones, and may be associated with a "flushing" event in which a slug of contaminated groundwater is moving downgradient away from the source zone (**Appendix D.1**). At CS-WB01, the trend has been that TCE concentrations generally exceed PCE for most zones. The zone with the relatively highest concentration is typically -LGR09. The results of CS-WB01 indicate that the contamination becomes preferentially stratified such that greater contamination is found above and below zones LGR-04 and -05, to the south and west.

Off-post at CS-WB04, trace detections of less than 1 µg/L PCE are generally reported in the LGR-01, LGR-02, LGR-03, LGR-04, and LGR-08 zones. WB04-LGR-05 was not sampled due to a sample port malfunction. Since September 2006, TCE has been reported above the MCL in zones LGR-06 and LGR-07 at concentrations less than 16 µg/L and even lesser detections of PCE. In 2009, the concentration of PCE in both LGR-06 and LGR-07 more than doubled compared to September 2008 while the TCE concentrations slightly increased (**Appendix D.4**). In 2010, PCE in LGR-06 decreased from 33 µg/L to 11 µg/L while the LGR-07 PCE concentration has decreased from 19 µg/L to 1.7 µg/L. But in 2011, the PCE concentration in LGR-06 has increased to 28.76 µg/L PCE, which rivals the 33 µg/L reported in 2009. Zone LGR-07 also increased its PCE concentration to 24.41 µg/L, which is the greatest level of PCE ever reported in this zone. The increasing trends in LGR-06 and -07 are evident on the graphs presented in **Appendix D**. These two zones have been the most dynamic in change of all the multiport zones monitored in this program, and are a clear indication that contaminant mass is migrating westward in these intervals.

Historically, the off-post zone with the most persistent contamination is CS-WB04-LGR-09. Nearly equivalent levels of PCE and TCE are found at concentrations that generally range above the MCL between 8 µg/L and 14 µg/L. Below this depth, any solvent contamination in the remainder of the LGR, BS, and CC are at concentrations less than 1.5 µg/L. Since the wellbore has stabilized, only isolated minimal detections of PCE have been reported in the LGR-11 zone, and the BS zones have essentially been contaminant-free, except for a single occurrence of *cis*-1,2-DCE (0.25 µg/L) in October 2007 and PCE (0.18 µg/L) in March 2009. *Cis*-1,2-DCE is consistently reported in interval CC-01, otherwise isolated PCE detections below 1.50 µg/L have detected in either CC-02 or CC-03. Recent detections of TCE in several zones appear to be the result of the MDL being lowered from 0.6 µg/L to 0.16 µg/L in 2007.

2.2.2 Off-Post Analytical Results

The frequencies for sampling off-post wells in 2011 were determined by the recently updated *Three-Tiered Long Term Monitoring Network Optimization Evaluation* (Parsons 2010), compliance with *The Plan*, and *DQOs for the Groundwater Monitoring Program* (Parsons 2010). An overview of sampling frequencies for off-post wells is given in **Table 2.8**. Fifty-four off-post wells were sampled during the 2011 quarterly monitoring events, and their locations are illustrated on **Figure 1.1**. In June 2011 the LTMO study was implemented to sampling frequencies off-post. The TCEQ and EPA approval for implementing the LTMO off-post was received in February 2011, see **Appendix K**.

Off-post wells sampled during the quarterly monitoring events were selected based on previous sampling results and proximity to both the CSSA boundary and wells with detections of PCE and TCE. Public and private supply wells located west and south of CSSA were selected for these events. Samples were also collected from the off-post well granular activated carbon (GAC) filtration systems after treatment during the March and September events.

Off-post wells sampled in 2011 include (see **Figure 1.1** for well locations):

- Four public supply wells in the Fair Oaks area (FO-8, FO-J1, FO-17, and FO-22).
- Three public wells in the Hidden Springs Estates subdivision (HS-1, HS-2 & HS-3).

Table 2-8
Off-Post Sampling Rationale for 2011

Well ID	2011 Mar	June	Sept	Dec	Sampling Frequency
FO-8			NS	NS	9-month (snapshot)
FO-17	NS		NS	NS	9-month (snapshot)
FO-22			NS	NS	9-month (snapshot)
FO-J1			NS	NS	9-month (snapshot)
HS-1			NS	NS	9-month (snapshot)
HS-2	NS		NS	NS	9-month (snapshot)
HS-3	NS		NS	NS	9-month (snapshot)
I10-2	NS		NS	NS	9-month (snapshot)
I10-4					Quarterly
I10-5			NS	NS	9-month (snapshot)
I10-7	NS		NS	NS	9-month (snapshot)
I10-8			NS	NS	9-month (snapshot)
I10-9			FT		Quarterly
JW-5			NS	NS	9-month (snapshot)
JW-6	NS		NS	NS	9-month (snapshot)
JW-7			NS	NS	9-month (snapshot)
JW-8			NS	NS	9-month (snapshot)
JW-9	NS		NS	NS	9-month (snapshot)
JW-13	NS		NS	NS	9-month (snapshot)
JW-14			NS	NS	9-month (snapshot)
JW-15			NS	NS	9-month (snapshot)
JW-26	NS		NS	NS	9-month (snapshot)
JW-27			NS	NS	9-month (snapshot)
JW-28			NS	NS	9-month (snapshot)
JW-29			NS	NS	9-month (snapshot)
JW-30			NS	NS	9-month (snapshot)
JW-31	NS		NS	NS	9-month (snapshot)
LS-1			NS	NS	9-month (snapshot)
LS-4			NS	NS	9-month (snapshot)
LS-5					Quarterly
LS-5-A2	GAC installed 10/6/11			NS	Biannually (Mar & Sept)
LS-6					Quarterly
LS-6-A2		NS		NS	Biannually (Mar & Sept)
LS-7					Quarterly
LS-7-A2		NS		NS	Biannually (Mar & Sept)
OFR-1			NS	NS	9-month (snapshot)
OFR-3	NS				Quarterly
OFR-3-A2	NS	NS		NS	Biannually (Mar & Sept)
OFR-4			NS	NS	9-month (snapshot)
OW-HH1					4 consecutive events, then 9-month (snapshot
OW-HH2					4 consecutive events, then Quarterly
OW-CE1					4 consecutive events, then 9-month (snapshot
OW-CE2					4 consecutive events, then 9-month (snapshot
OW-MT2					4 consecutive events, then 9-month (snapshot
OW-BARNOWL					4 consecutive events, then Quarterly
OW-DAIRYBARN					4 consecutive events, then 9-month (snapshot
OW-HH3					4 consecutive events, then 9-month (snapshot
RFR-3	NS		NS	NS	9-month (snapshot)
RFR-4	NS		NS	NS	9-month (snapshot)
RFR-5	NS		NS	NS	9-month (snapshot)
RFR-8	NS		NS	NS	9-month (snapshot)
RFR-9	NS		NS	NS	9-month (snapshot)
RFR-10					Quarterly
RFR-10-A2		NS		NS	Biannually (Mar & Sept)
RFR-10-B2		NS		NS	Biannually (Mar & Sept)
RFR-11					Quarterly
RFR-11-A2		NS		NS	Biannually (Mar & Sept)
RFR-12	NS			NS	9-month (snapshot)
RFR-13	NS		NS	NS	9-month (snapshot)
RFR-14			NS	NS	9-month (snapshot)
SLD-01			FT	NS	No access agreement, one time sampl

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.

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
*JW-9-A2 is the well owner's system, not a CSSA GAC.

NS
Not sampled for that event.

No VOCs detected. Sample on an as needed basis.

FT
First sampling event for this well.

J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2011\Annual Rpt\Table 2-8 2011 Off-Post Sampling Rationale.xlsx

- Three wells used by the general public (I10-2, I10-5 & I10-8) and three privately-owned wells in the Interstate I-10 area (I10-4, I10-7 & I10-9).
- Fourteen privately-owned wells in the Jackson Woods subdivision (JW-5, JW-6, JW-7, JW-8, JW-9, JW-13, JW-14, JW-15, JW-26, JW-27, JW-28, JW-29, JW-30, and JW-31).
- Five wells in the Leon Springs Villa area (two public supply wells removed from service: LS-1, and LS-4; and three privately-owned wells: LS-5, LS-6, and LS-7).
- Privately-owned wells on Old Fredericksburg Road (OFR-1, OFR-3, & OFR-4).
- Ten privately-owned wells in the Ralph Fair Road area (RFR-3, RFR-4, RFR-5, RFR-8, RFR-9, RFR-10, RFR-11, RFR-12, RFR-13, and RFR-14);
- Eight public supply wells from The Oaks Water Supply System (OW-HH1, OW-HH2, OW-HH3, OW-CE1, OW-CE2, OW-MT2, OW-BARNOWL, OW-DAIRYBARN);
- One public supply well in the Scenic Loop Drive area, SLD-01.

All wells were sampled from a tap located as close to the wellhead as possible. Most taps were installed by CSSA to obtain a representative groundwater sample before pressurization, storage, or 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. Purging measurements were recorded in the field logbook for each sampling event.

All groundwater samples were submitted to APPL for analysis. Groundwater samples were analyzed for the short list of VOCs (*cis*-1,2-DCE, *trans*-1,2-DCE, 1,1-DCE, PCE, TCE, and vinyl chloride) using SW-846 Method 8260B. Off-post wells are not analyzed for metals.

The data packages containing the analytical results for the 2011 sampling events were reviewed and verified according to the guidelines outlined in the CSSA QAPP. After the data packages were received by Parsons, quarterly data verification reports were submitted to CSSA as an attachment in the Quarterly Groundwater Reports.

Based on historical detections, the lateral extent of VOC contamination extends approximately 1.5 miles beyond the south and west boundaries of CSSA (well OW-BARNOWL to the west and LS-4 to the south). Information such as well depth, pump depth, and other pertinent data necessary to properly characterize the vertical extent of migration is not readily available for most off-post wells. However, the typical well construction for the area is open borehole completions that penetrate the full thickness of the Middle Trinity aquifer (Lower Glen Rose Limestone, Bexar Shale, and Cow Creek Limestone).

Concentrations of VOCs detected in 2011 are presented in **Table 2.9**. Full analytical results from the 2011 sampling events are presented in **Appendix G**. Concentration trends are illustrated on **Figure 2.7** for wells LS-6, LS-7, OFR-3, RFR-10, and RFR-11 for PCE and

Table 2.9
2011 Off-Post Groundwater COCs Analytical Results, Detections Only

Well ID	Sample Date	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Tetra-chloroethene (ug/L)	Tri-chloroethene (ug/L)	Vinyl chloride (ug/L)
Comparison Criteria	MDL	0.12	0.07	0.08	0.06	0.05	0.08
	RL	1.2	1.2	0.6	1.4	1.0	1.1
	MCL	7	70	100	5	5	2
FO-8	3/2/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
FO-17	6/1/2011	--	--	--	--	--	--
Duplicate	6/1/2011	--	--	--	--	--	--
FO-22	3/2/2011	--	--	--	--	--	--
Duplicate	3/2/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
FO-J1	3/3/2011	--	--	--	0.22F	--	--
	6/2/2011	--	--	--	0.41F	--	--
HS-1	3/3/2011	--	--	--	0.15F	--	--
Duplicate	3/3/2011	--	--	--	0.15F	--	--
	6/3/2011	--	--	--	0.16F	--	--
HS-2	6/3/2011	--	--	--	--	--	--
HS-3	6/3/2011	--	--	--	--	--	--
I10-2	6/13/2011	--	--	--	--	--	--
I10-4	3/1/2011	--	--	--	6	2.26	--
	5/31/2011	--	--	--	5.56J	1.97J	--
	9/7/2011	--	--	--	4.12	1.84	--
	12/6/2011	--	--	--	6.87	2.85	--
I10-5	3/2/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
Duplicate	6/2/2011	--	--	--	--	--	--
I10-7	6/15/2011	--	--	--	--	--	--
I10-8	3/2/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
I10-9	9/6/2011	--	--	--	--	0.57F	--
Duplicate	9/6/2011	--	--	--	--	0.32F	--
	12/19/2011	--	--	--	--	1.29	--
JW-5	3/1/2011	--	--	--	0.12F	--	--
	6/1/2011	--	--	--	--	--	--
JW-6	6/1/2011	--	--	--	--	--	--
JW-7	3/3/2011	--	--	--	0.37F	--	--
	6/7/2011	--	--	--	0.43F	--	--
JW-8	3/1/2011	--	--	--	0.31F	--	--
	6/1/2011	--	--	--	0.16F	--	--
JW-9	6/7/2011	--	--	--	--	--	--
JW-13	6/2/2011	--	--	--	--	--	--
JW-14	3/3/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
JW-15	3/1/2011	--	--	--	--	--	--
	6/7/2011	--	--	--	--	--	--
Duplicate	6/7/2011	--	--	--	--	--	--
JW-26	6/7/2011	--	--	--	--	--	--
JW-27	3/3/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
JW-28	3/1/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
JW-29	3/1/2011	--	--	--	--	--	--
	6/2/2011	--	--	--	--	--	--
JW-30	3/1/2011	--	--	--	--	--	--
	6/3/2011	--	--	--	--	--	--
Duplicate	6/3/2011	--	--	--	--	--	--
JW-31	6/3/2011	--	--	--	--	--	--
LS-1	3/2/2011	--	--	--	0.28F	--	--
	5/31/2011	--	--	--	0.49F	--	--
LS-4	3/2/2011	--	--	--	--	--	--
	5/31/2011	--	--	--	--	--	--
LS-5	3/2/2011	--	--	--	1.10F	2.59	--
	5/31/2011	--	--	--	0.66F	2.36	--
	9/6/2011	--	--	--	1.38F	4.8	--
	9/28/2011	--	--	--	1.11F	2.54	--
	12/5/2011	--	--	--	1.05F	3.87	--

Table 2.9
2011 Off-Post Groundwater COCs Analytical Results, Detections Only

Well ID	Sample Date	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Tetra-chloroethene (ug/L)	Tri-chloroethene (ug/L)	Vinyl chloride (ug/L)
Comparison Criteria	MDL	0.12	0.07	0.08	0.06	0.05	0.08
	RL	1.2	1.2	0.6	1.4	1.0	1.1
	MCL	7	70	100	5	5	2
LS-6	2/28/2011	--	--	--	0.76F	0.85F	--
	5/31/2011	--	--	--	0.68F	0.90F	--
	9/6/2011	--	--	--	1.43	1.87	--
	12/5/2011	--	--	--	1.16F	2.41	--
LS-6-A2	2/28/2011	--	--	--	--	--	--
	9/6/2011	--	--	--	--	--	--
LS-7	2/28/2011	--	--	--	2.88	0.43F	--
	5/31/2011	--	--	--	2.05	--	--
	9/6/2011	--	--	--	4.35	1.02	--
	12/5/2011	--	--	--	2.48	1.03	--
LS-7-A2	2/28/2011	--	--	--	--	--	--
	9/6/2011	--	--	--	--	--	--
OFR-1	3/3/2011	--	--	--	0.24F	--	--
	6/1/2011	--	--	--	0.17F	--	--
OFR-3	5/31/2011	--	--	--	3.33	1.91	--
	9/6/2011	--	--	--	7.72	5.14	--
	12/5/2011	--	--	--	3.67	3.14	--
OFR-3-A2	9/6/2011	--	--	--	--	--	--
OFR-4	3/3/2011	--	--	--	--	--	--
	6/7/2011	--	--	--	--	--	--
OW-BARNOWL	2/28/2011	--	--	--	0.15F	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
Duplicate	12/7/2011	--	--	--	--	--	--
OW-CE1	2/28/2011	--	--	--	--	--	--
Duplicate	2/28/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
OW-CE2	2/28/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
OW-DAIRYWELL	2/28/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
OW-HH1	2/28/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
Duplicate	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
Duplicate	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
OW-HH2	2/28/2011	--	--	--	0.20F	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
OW-HH3	2/28/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
OW-MT2	2/28/2011	--	--	--	--	--	--
	6/1/2011	--	--	--	--	--	--
	9/8/2011	--	--	--	--	--	--
	12/7/2011	--	--	--	--	--	--
RFR-3	6/2/2011	--	--	--	--	--	--
RFR-4	6/2/2011	--	--	--	--	--	--
RFR-5	6/2/2011	--	--	--	--	--	--
RFR-8	6/3/2011	--	--	--	--	--	--
RFR-9	6/13/2011	--	--	--	--	--	--

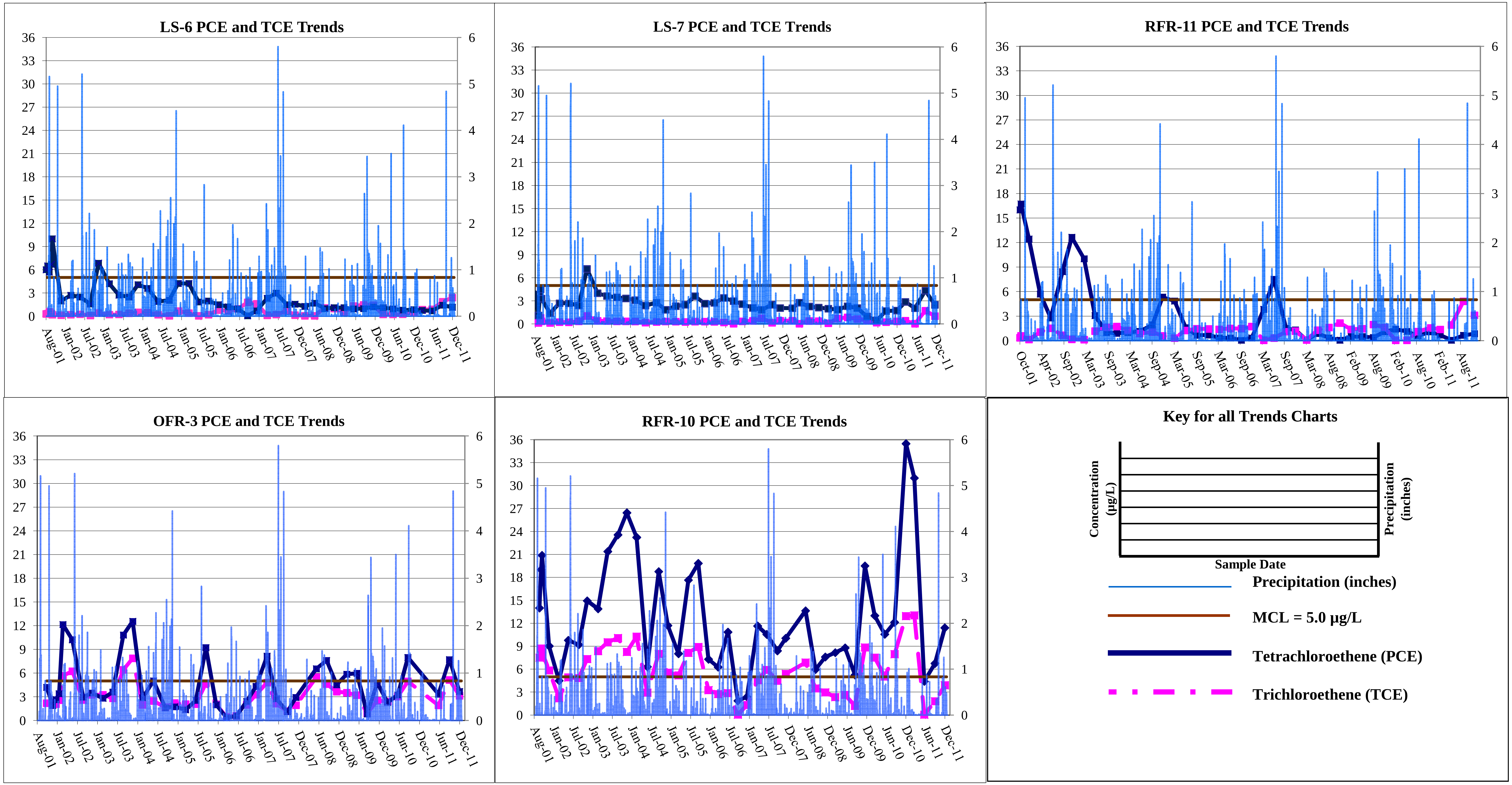
Table 2.9
2011 Off-Post Groundwater COCs Analytical Results, Detections Only

Well ID	Sample Date	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Tetra-chloroethene (ug/L)	Tri-chloroethene (ug/L)	Vinyl chloride (ug/L)
Comparison Criteria	**MDL**	**0.12**	**0.07**	**0.08**	**0.06**	**0.05**	**0.08**
	RL	**1.2**	**1.2**	**0.6**	**1.4**	**1.0**	**1.1**
	MCL	**7**	**70**	**100**	**5**	**5**	**2**
RFR-10	2/28/2011	--	**0.39F**	--	**30.98**	**13.03**	--
	5/31/2011	--	--	--	**4.4**	--	--
	9/6/2011	--	--	--	**6.75**	**1.79**	--
	12/5/2011	--	--	--	**11.41**	**3.9**	--
RFR-10-A2	2/28/2011	--	--	--	--	--	--
	9/6/2011	--	--	--	--	--	--
RFR-10-B2	2/28/2011	--	--	--	--	--	--
Duplicate	2/28/2011	--	--	--	--	--	--
	9/6/2011	--	--	--	--	--	--
RFR-11	2/28/2011	--	--	--	**0.68F**	**1.37**	--
	5/31/2011	--	--	--	--	**1.92**	--
	9/6/2011	--	--	--	**0.64F**	**4.81**	--
	12/5/2011	--	--	--	**0.62F**	**2.69**	--
Duplicate	12/5/2011	--	--	--	**0.84F**	**3.11**	--
RFR-11-A2	2/28/2011	--	--	--	--	--	--
	9/6/2011	--	--	--	--	--	--
RFR-12	6/15/2011	--	--	--	**0.20F**	**0.63F**	--
	9/7/2011	--	--	--	--	--	--
RFR-13	6/3/2011	--	--	--	--	--	--
RFR-14	3/3/2011	--	--	--	**0.11F**	--	--
	6/3/2011	--	--	--	**0.20F**	--	--
SLD-01	9/8/2011	--	--	--	--	--	--

BOLD (red)	≥ MCL
BOLD (blue)	≥ RL
BOLD	≥ MDL

Notes:
Notes:
- µg/L = micrograms per liter
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B.
- *Duplicate* = field duplicate
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- -- = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA

Figure 2.7, PCE and TCE Concentration Trends and Precipitation



TCE. These wells were selected because they have had detections of PCE and TCE that approach and/or exceed MCLs. **Figure 2.7** also includes precipitation data from the weather stations located at CSSA, WS-N and WS-S. This figure suggests VOC concentrations in OFR-3 and RFR-10 are very sensitive to significant rain events and that VOC concentrations in LS-6 and LS-7 are less sensitive to rainfall.

Data from RFR-11 presents a mixed picture. From October 2001 through December 2007, RFR-11 VOC concentrations peaks showed a good correlation to significant rainfall events, but after 2007, this correlation is less pronounced. It may be coincidental, but the changes in rainfall/VOC concentration correlations in RFR-11 happened when SAWS abandoned pumping of the Bexar Met public supply wells in Leon Springs Villas (LS-1, LS-2, LS-3, LS-4). **Figure 2.8** shows PCE and TCE concentrations with monthly water usage at each off-post well. The off-post GAC systems are equipped with flowmeters that track the gallons of water treated by the units. Data in this figure suggests little correlation between VOC concentrations and well pumping volumes.

2.2.2.1 Off-Post Wells with COC Detections above the MCL

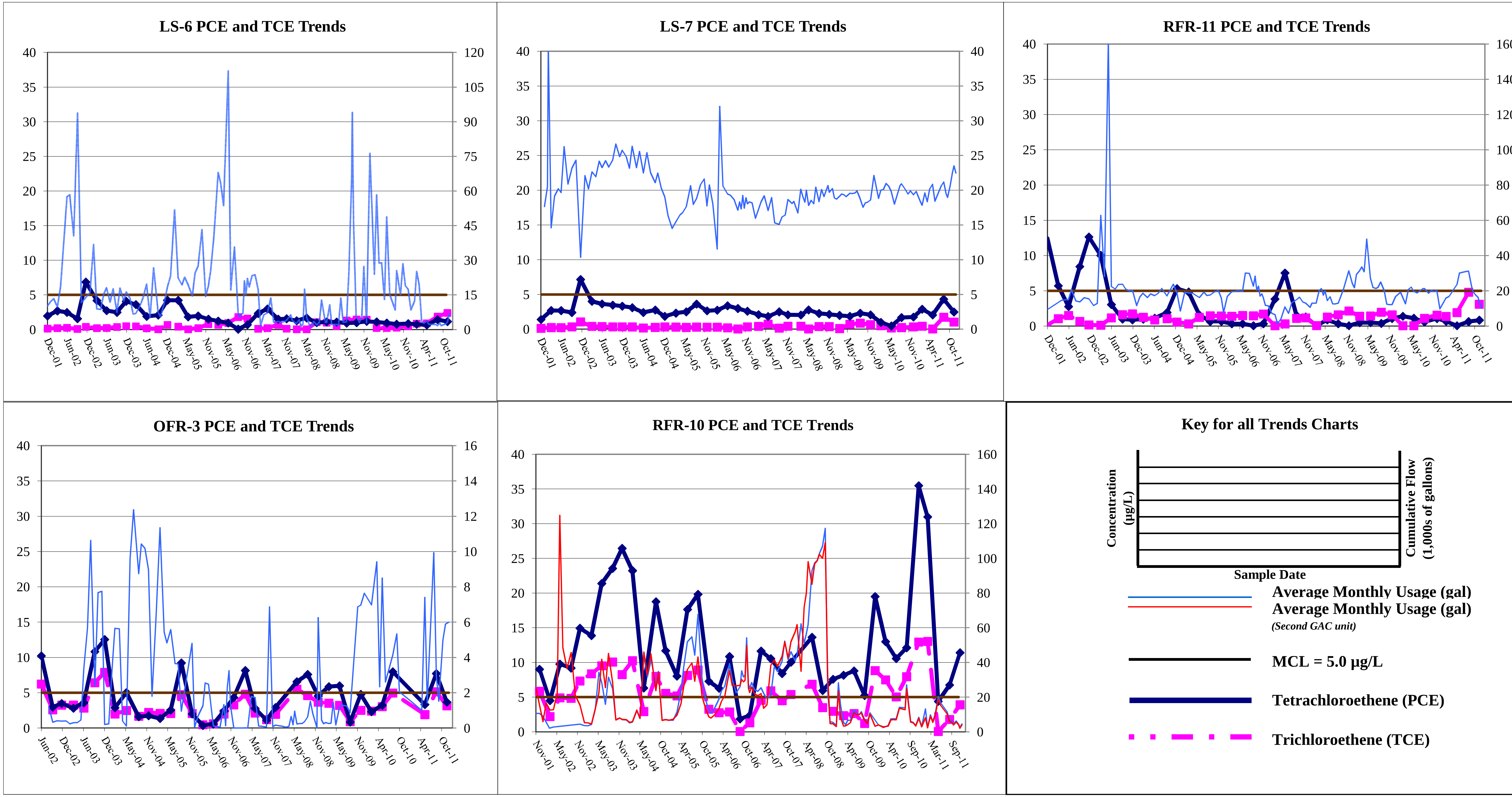
All off-post drinking water wells that historically exceeded MCLs have already been equipped with GAC filtration systems. In 2011 well LS-5 was equipped with a GAC filtration system due to the increase in TCE concentrations in this well. These wells, and the date the filtration system was installed, are listed in **Table 2.10**. CSSA maintains and operates these GAC filtration systems at no cost or inconvenience to the well owners.

Table 2.10 GAC Filtration Systems Installed

Well	Date Installed
LS-6	August 2001
LS-7	August 2001
OFR-3	April 2002
RFR-10	October 2001
RFR-11	October 2001
LS-5	October 2011

During 2011, wells I10-4, OFR-3, and RFR-10 had concentrations exceeding the MCL. Well RFR-10 concentrations exceeded the MCL for PCE and TCE during the March event, and only PCE exceeded the MCL during the September and December events. PCE and TCE exceeded the MCL in September 2011 in well OFR-3. An evaluation of concentration trends through 2011 are included in **Figures 2.7** and **2.8**.

Figure 2.8, PCE and TCE Concentration Trends and Monthly Water Usage



Well I10-4 is not in service and the property is currently for sale. Although the electricity and pump have been removed from the well, samples are collected using a bailer sampling device. PCE was above the MCL in March, June, and December 2011 events, normally a GAC filtration system would have been installed on this well. However, since the well is not being used as a drinking water source a GAC unit is not installed at this time. If at any point the status of the well changes appropriate action will be taken to ensure that the landowner receives drinking water that meets EPA drinking water standards.

2.2.2.2 GAC Filtration Systems

Semi-annual post-GAC confirmation samples are collected from all wells equipped with GAC filtration systems (**Appendix H**). The samples confirm that the GAC filtration systems are working effectively and that VOCs are reduced to concentrations below the applicable drinking water MCLs.

To date, no COCs have been detected above RLs in the GAC-filtered samples. These samples were collected during the March and September 2011 events in accordance with project DQOs. The pre- and post-GAC samples from well OFR-3 were not collected in March 2011 due to an expired access agreement. See **Appendix H** for pre- and post-GAC sample comparisons.

Regular GAC maintenance/inspection occurs every 3 weeks. This task includes changing pre-filters and troubleshooting problems occurring with the systems. On January 18, 2011 and July 19, 2011 the carbon in the GAC filtration systems (LS-6, LS-7, OFR-3, RFR-10, and RFR-11) was changed out. The GAC filtration system at OFR-3 was not serviced during the January visit due to an expired access agreement. The property had been foreclosed upon and vacated. The new owner was identified in April 2011 and an access agreement was obtained. During the July carbon exchange at OFR-3 it was discovered that recent changes to the plumbing were not being processed through the GAC unit. In other words, the owner had added an additional sink and plumbed it to the system prior to GAC filtration. The current tenants informed us that an entire apartment would be added to the existing building. With this information it was determined that the current GAC system would need to be moved to the well head to ensure any additional plumbing changes would occur after GAC filtration. On July 28, 2011 the OFR-3 GAC system was moved to the wellhead.

2.2.2.3 Off-Post Wells with COC Detections below the MCL

Detections from all wells sampled off-post are presented in **Table 2.9** and complete 2011 results are included in **Appendix G**. The groundwater monitoring results include wells where COCs were detected at levels below applicable MCLs. These detections occurred in wells I10-9, LS-5, LS-6, LS-7 and RFR-11. The detections below the MCL and above the RL are summarized as follows:

- **I10-9 –** This well was sampled for the first time in September 2011. Concentrations of TCE we detected below the RL. In December 2011 the concentrations increase to above the RL but below the MCL. This well will remain on a quarterly sampling schedule.

- **LS-5 –**Concentration of TCE exceeded the RL in March, June, September, and December 2011. TCE levels ranged from 2.36 to 4.8 µg/L. PCE was also detected below the RL during these sampling events. These contamination levels are at the upper range of VOC concentrations that have been seen during the history of sampling at this well. After the September sampling event when levels exceeded 90% of the MCL the well owner was provided with bottled water. A follow up sample was collected which showed a decrease in the TCE concentration. A GAC filtration system was installed in October 2011.
- **LS-6 –** Concentrations of PCE and TCE exceeded the RL in September 2011 and TCE again in December 2011. PCE and TCE concentrations were below the RL in every other sampling event.
- **LS-7 –** Concentrations of PCE exceeded the RL in all four quarterly sampling events. Concentrations of TCE were also present in March 2011 but below the RL. TCE was reported above the RL in September and December 2011.
- **RFR-11** - Concentration of TCE exceeded the RL in all four quarterly sampling events. PCE was detected below the RL in March, September, and December 2011.

2.2.2.4 Off-Post Wells with COC Detections below the Reporting Limits

The off-post results include detections in wells for which the analyte is identified, but at a concentration below the RL. These results are assigned an “F” flag under the CSSA QAPP. In 2011, this included wells FO-J1, HS-1, JW-5, JW-7, JW-8, LS-1, OFR-1, OW-BARNOWL, OW-HH2, RFR-12 and RFR-14. The detections below the reporting limit are summarized as follows:

- **FO-J1 –** Concentrations of PCE detected below the RL in March and June 2011.
- **HS-1 –** Concentrations of PCE detected below the RL in March and June 2011.
- **JW-5 –** Concentrations of PCE detected below the RL in March 2011.
- **JW-7 –** Concentrations of PCE detected below the RL in March and June 2011.
- **JW-8 –** Concentrations of PCE detected below the RL in March and June 2011.
- **LS-1 –** Concentrations of PCE detected below the RL in March and June 2011.
- **OFR-1 –** Concentrations of PCE detected below the RL in March and June 2011.
- **OW-BARNOWL –** Concentrations of PCE detected below the RL in March 2011.
- **OW-HH2 –** Concentrations of PCE detected below the RL in March 2011.
- **RFR-12 –** Concentrations of PCE and TCE detected below the RL in June 2011.
- **RFR-14 –** Concentrations of PCE detected below the RL in March and June 2011.

2.2.3 Isoconcentration Mapping

2.2.3.1 PCE, TCE, and *cis*-1,2-DCE

In annual reports prior to 2010, the maximum concentration detected during any quarterly event in the LGR wells (on-post and off-post) were contoured into isoconcentration contour maps for PCE, TCE, and cis-1,2-DCE. The reason for creating these "composite" maps resulted from the LTMO sampling frequency enacted in 2005. No single quarterly event included all of the wells in the sampling program. The LTMO program was updated in 2010 to include a "snapshot" sampling event in which all on- and off-post wells were sampled during the same event. These snapshot events began in September 2010, and now occur every 9 months. Annual reports now only include isoconcentration maps of contaminants collected during a single sampling event. Because the 9-month schedule, two snapshot events will occur in every third calendar year. The next time that will happen will be in 2012.

Another new development in the representation of contamination in groundwater came in March 2012. At the direction of the USEPA (**Appendix L**), isoconcentration maps depicting groundwater contamination will no longer present isoconcentration contour lines below the laboratory RL, which is considered quantifiable data. Trace detections of contamination (F-flagged data) reported by the lab are considered qualitative results and therefore are not suitable for demonstrating the extent of contaminant plumes. Results below the RL are still presented on the maps, but are not contained within an isoconcentration contour line. For the compounds reported, the RL (and lowest isoconcentration line) are as follows: *cis*-1,2-DCE (1.2 µg/L), PCE (1.4 µg/L), and TCE (1.0 µg/L).

To better represent the plume source areas, data from deepest LGR zone of the Westbay wells were also composited into the isoconcentration maps. The LGR-09 zone from Westbay wells CS-WB01 through CS-WB04 were sampled in June 2011 and are included in the maps to help delineate Plume 2. The LGR04 zone of Westbay wells CS-WB05 through CS-WB08 were sampled in July 2011 as part of the SWMU B-3 Bioreactor operations, and assist in delineating the central portion of Plume 1. These isoconcentration maps are provided in **Figures 2.9, 2.10,** and **2.11** to illustrate the extent of contamination as measured from analytical results and inferred from those results.

The 2011 extent of COCs above the RL (approximately 1 µg/L) for each of PCE, TCE and cis-1,2-DCE can be determined by reviewing the figures. PCE concentrations above 1.4 µg/L are detected on-post in wells CS-MW16-LGR, CS-EXW01-LGR, CS-EXW02-LGR, CS-MW1-LGR, CS-MW8-LGR, and CS-MW20-LGR. Additionally, the LGR-09 zone from CS-WB01 and CS-WB03 and the LGR-04 zones from CS-WB05 through CS-WB08 are all above the PCE RL of 1.4 µg/L(**Figure 2.9**). It is notable that CS-4, CS-D, and CS-MW10-LGR typically exceed the RL as well, but are not included since they were not sampled in June 2011 due to the fact that water levels were below the sampling pumps. Off-post detections of PCE above 1.0 µg/L include I10-4, LS-7, OFR-3, RFR-10, and CS-WB04-LGR-09.

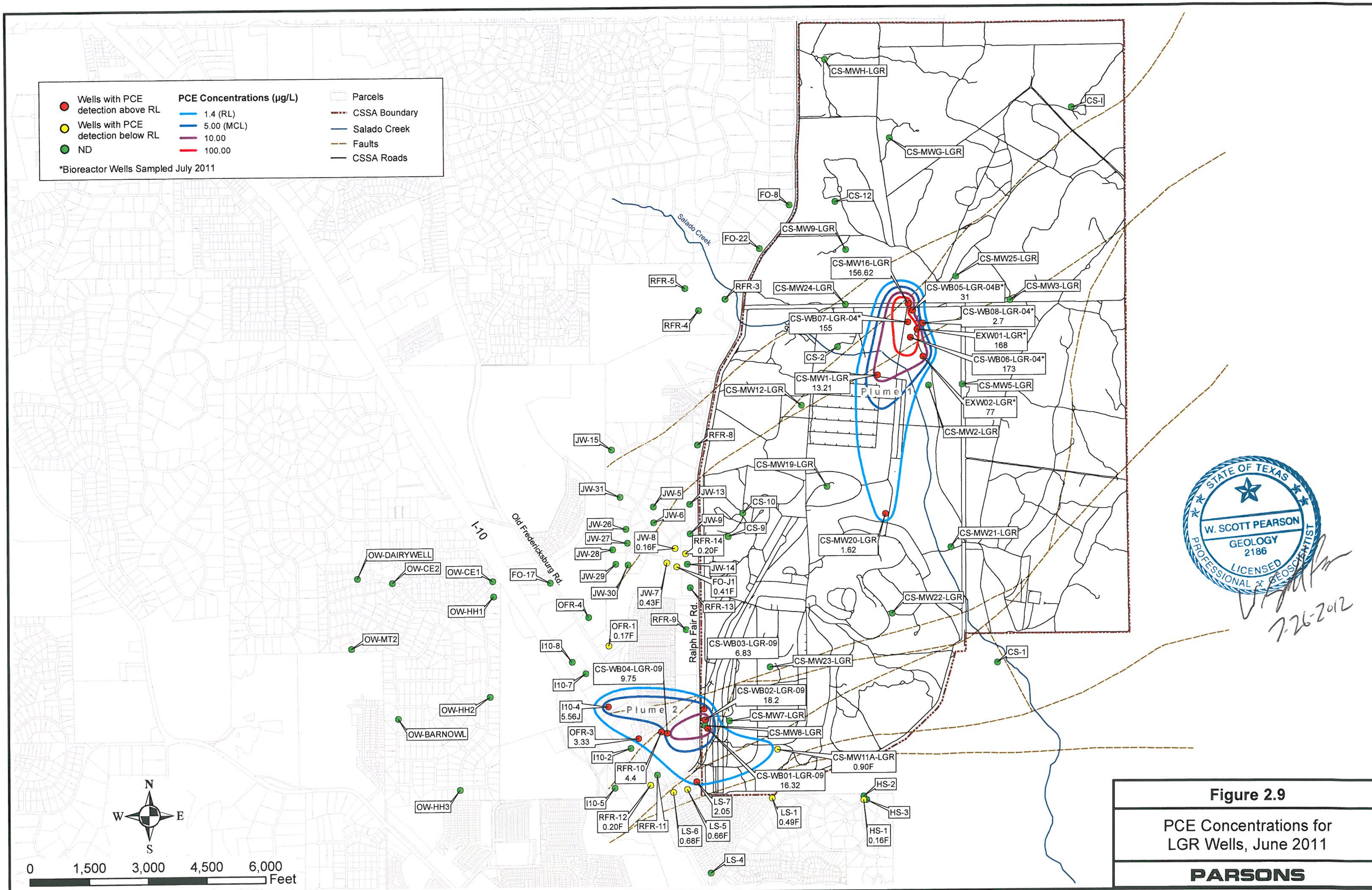


Figure 2.9

PCE Concentrations for LGR Wells, June 2011

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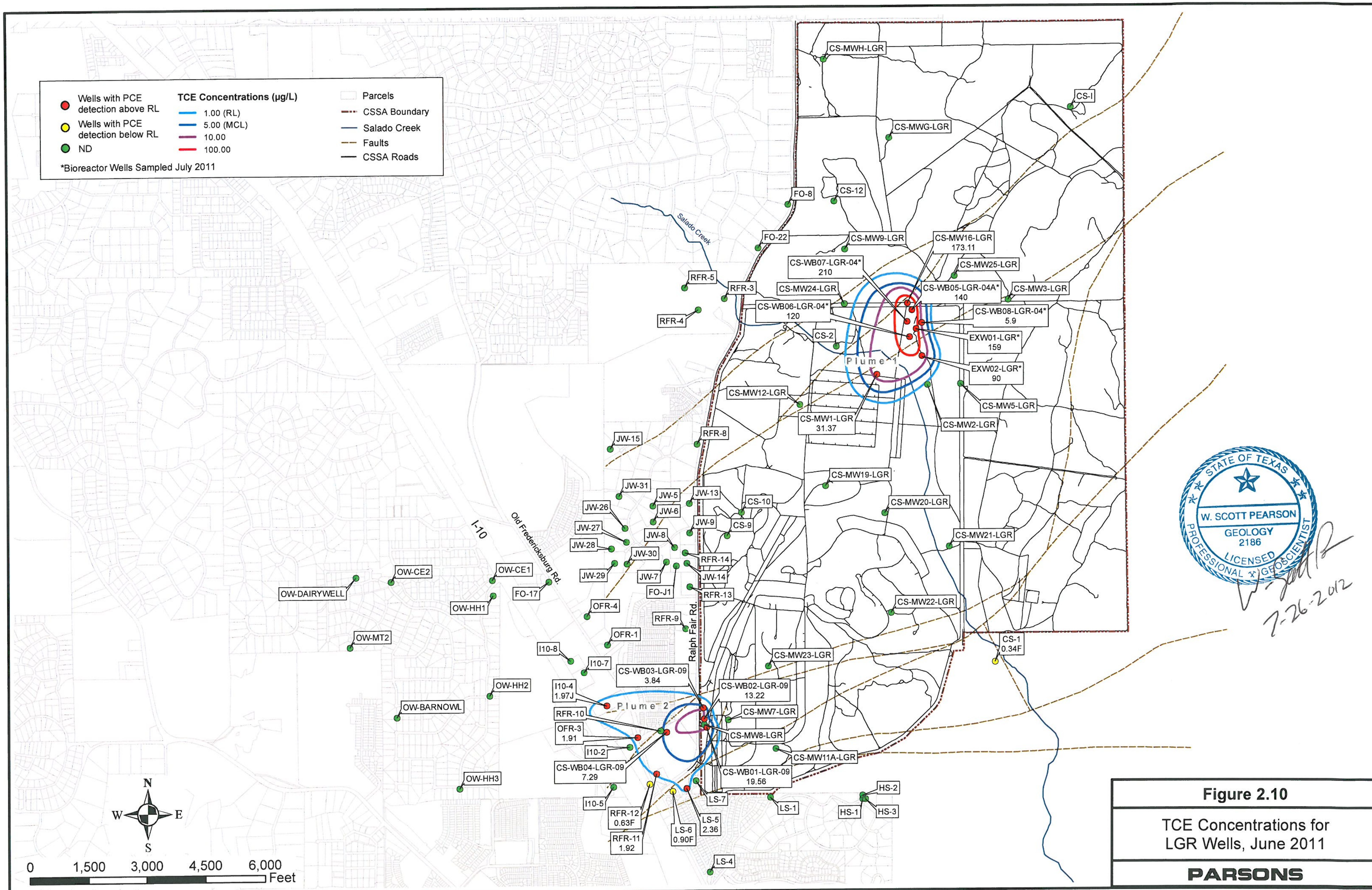

Figure 2.10

TCE Concentrations for LGR Wells, June 2011

PARSONS

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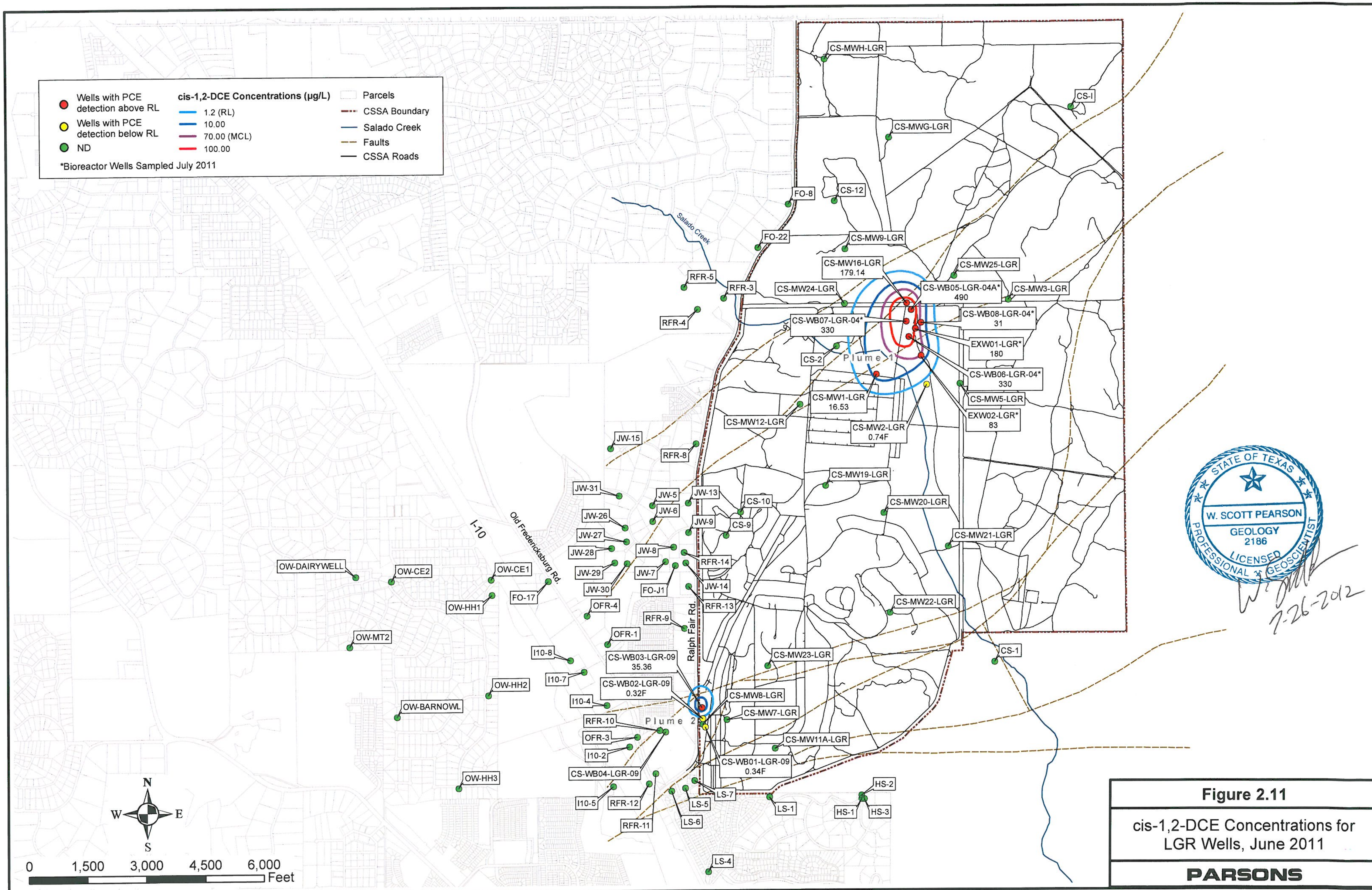

Figure 2.11

cis-1,2-DCE Concentrations for LGR Wells, June 2011

PARSONS

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TCE follows a similar pattern, and has been detected above 1.0 µg/L in Plume 1 wells CS-MW16-LGR, CS-EXW01-LGR, CS-EXW02-LGR, and CS-MW1-LGR. Additionally, the LGR-04 zones from CS-WB05 through CS-WB08 are all above 1.0 µg/L TCE (**Figure 2.10**). The LGR-09 zone for the on-post Westbay wells CS-WB01, CS-WB02, and CS-WB-03, within Plume 2 were all above 1.0 µg/L TCE during 2011. Off-post wells with a TCE concentration reported above 1.0 µg/L include wells I10-4, OFR-3, RFR-10, RFR-11, LS-5, and CS-WB04-LGR-09.

Cis-1,2-DCE was not detected off-post above the RL of 1.2 µg/L, however, it was reported at levels above 1.0 µg/L in on-post wells CS-MW16-LGR, CS-MW1-LGR, CS-EXW01-LGR, CS-EXW02-LGR and the LGR-04 zones of CS-WB05 through CS-WB08 (**Figure 2.11**).

Isoconcentration maps have also been prepared based on analytical data collected in 2006, 2007, 2008, 2009, and 2010. Those isoconcentration maps are available for review in the ***CSSA Environmental Encyclopedia, Volume 5 Groundwater***, in the *2006*, *2007*, *2008*, *2009* and *2010 Annual Groundwater Reports*. In general, the plume extent and geometry is consistent with 2010 data.

Finally, the maximum annual concentrations detected near the plume centers are generally lower than in 2010, and are comparable with 2009, given in previous Annual Reports. See **Table 2.11** for comparison of the 2010 and 2011 data near the plume centers.

Table 2.11 Comparison of 2010 & 2011 PCE, TCE, and *cis*-1,2-DCE Max. Levels

	PCE		TCE		*cis*-1,2-DCE	
	2010	*2011*	*2010*	*2011*	*2010*	*2011*
B-3 Plume 1						
CS-MW16-LGR	236.28	156.62	293.04	173.11	239.84	179.14
CS-D	110.02	103.41	153.76	120.26	122.82	96.47
CS-MW1-LGR	37.85	14.11	51.15	31.37	54.84	18.93
CS-4	6.39	2.36	10.03	2.85	5.99	1.09
AOC-65 Plume 2						
RFR-10	35.48	30.98	12.94	13.03	0.45	0.39
OFR-3	7.97	7.72	4.96	5.14	ND	ND
I10-4	7.86	6.87	3.55	2.85	ND	ND

3.0 CS-12 SUPPLY WELL

3.1 Background

After the drought of 2006, CSSA funded the installation of a new water supply well (CS-12) for the facility. Ideally, the new well would produce enough groundwater to sustain the entire daily demand of the post, if needed. Based on a prior technical evaluation, CSSA opted for a location in the North Pasture, which is essentially undeveloped acreage that serves as "safety fan" for projectile testing that occurs in the East Pasture. CS-12 was placed upgradient of both known groundwater plumes and is not expected to be impacted by past solvent releases.

In January 2008, a test well (TW-1) was constructed at the proposed location in the North Pasture of CSSA. TW-1 was 460 feet deep, penetrating the full thickness of the Middle Trinity Aquifer. During a pumping test, TW-1 was pumped steadily at 85.4 gpm over a 46.5-hour period. Groundwater results from the test well indicate that groundwater quality meets the standards required for interim approval. The anticipated production of TW-1 more than exceeded the average daily facility consumption of 36,000 gallons per day.

On November 21, 2008, Parsons submitted an Engineering Report containing plans and specifications for the construction of CS-12 to the TCEQ, and those plans were approved on December 29, 2008. The approval of those plans allowed the test well to be overdrilled and converted into fully-functional supply well with disinfection systems.

The new supply well (CS-12) was drilled in February 2009. As an additional step in the construction process, "acidizing", was undertaken to further develop and enhance the water-bearing strata penetrated by the well following the receipt of approval from the TCEQ. Following the acidizing process, the well was developed and the pump was set. Construction of the proposed supply well CS-12 was completed in March 2009.

Between March 24 and May 5, 2009 four attempts of disinfection and BACT sampling were undertaken. Samples were analyzed for BACT contaminants using the SM9222B method. All four attempts to disinfect the well resulted in a failure to remove Total Coliform and E. Coli from the well. As a result, representatives from TCEQ, CSSA, and Parsons met on June 4, 2009 to discuss options for rehabilitating the well, or engineered solutions for additional disinfection and treatment as a public water supply. Based upon the input received during the meeting, CSSA opted to implement a long-term pumping program from CS-12 as an extended development technique.

As suggested by the TCEQ, CSSA also collected Microscopic Particulate Analysis (MPA) samples to assist in the determination if the local aquifer was "groundwater under the influence (GUI) of surface water. CSSA followed the protocol of collecting samples under both drought and recharge conditions. On August 19, 2009, samples were collected for MPA and BACT analyses under a "drought" condition. The samples passed both the MPA and BACT testing. The MPA results were free of *Cryptosporidium* and *Giardia*. Only

Nematodes and Rotifers were reported in the sample, and the result was scored a "Low Risk" per the EPA *Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water using Microscopic Particulate Analysis* (EPA, 1992). No coliform growth was found in BACT samples collected during the same event.

In support of an un-related environmental pilot study, a long-term pumping action was initiated at CS-12. Between September 14, 2009 and February 11, 2010, approximately 13 million gallons of groundwater was pumped from CS-12 to a Bioreactor remediation system nearly 4,000 feet to the southeast. A follow-up BACT sample on September 17, 2009 confirmed the lack of presence of Coliform in the well during this pumping event.

Samples were collected at the conclusion of the four-month purging period in 2010 to assess if CS-12 had remained free of microbial contaminants. By mid-January the aquifer was beginning to recover from the prolonged drought. Between January 13-18, 2010 an additional 2.54 inches of precipitation was received and the aquifer was notably recharging in response to the rainfall. A MPA sample was collected on January 19, 2010 as the aquifer was visibly rebounding to the precipitation event. The results were free of *Cryptosporidium* and *Giardia*, and only Nematodes were present in the sample. As before the result was given a "Low Risk" score. The findings seemed conclusive that the aquifer is not under the direct influence of surface water.

Consistent with the requirements of 30 TAC Chapter 290, Subchapter D "*Rules and Regulations for Public Water Systems*", three daily consecutive samples for BACT were collected between January 19-21, 2010. All BACT sampling results were reported as "Not Found" for total coliforms and *E. Coli*.

Based on microbiological sampling results since August 2009, there is no further indication of Coliform contamination at CS-12. MPA results indicate "Low Risk" of groundwater under the influence (GUI) of surface water per EPA Consensus Method. Finally, the well passed the requirement for three consecutive days free of Coliform detections.

In April 2010, CSSA requested concurrence from the TCEQ to move forward with the planned construction of the well facility. TCEQ approved the request on May 12, 2010. For the remainder of the year, CSSA secured the funding and contracting mechanisms necessary to construct the well facility in 2011. The construction was substantially completed in May, and the well was put on-line in July 2011.

3.2 CS-12 Activities in 2011

No samples were collected from well CS-12 January to May 2011 due to well house construction. In June 2011aluminum and iron were added to the metals analyte list to follow up on detections above the secondary standard (SS) during the initial sampling in March 2009. Aluminum was not detected and iron was above the SS at a concentration of 2.0 mg/L. In July only aluminum and iron were tested. Aluminum was detected below the SS and iron was again above the SS at a concentration of 2.0 mg/L. Aluminum and iron were again added to the quarterly sampling analyte list in September 2011 and both analytes fell below their applicable SS. These metals were also tested in October and December 2011 and both metals remained below their applicable SS, see **Appendix I**.

4.0 GROUNDWATER MONITORING PROGRAM CHANGES

4.1 Access Agreements Obtained in 2011

Access agreements are signed by off-post well owners to grant permission to CSSA to collect groundwater samples from each well. In April 2011, 3 access agreements (I10-2, I10-7, & RFR-12) were mailed out to former participants in the groundwater program whose agreements had expired. All three agreements have been signed and returned to CSSA. The other 2 outstanding agreements (JW-9 & OFR-3) from 2010 were signed and received by CSSA in 2011.

Based on the 2010 Well Survey Report, CSSA mailed out new right-of-entry agreements to properties identified beyond the initial ¼ mile perimeter identified in the original Off-Post Well Survey completed in 2001. Four property owners containing 7 wells were identified to the west of the CSSA boundary. Four access agreements were mailed out in August 2011, one agreement (BSR-03) was returned but contact with the well owner and access to this well has yet to be established.

Eight wells supplying The Oaks Water System were added in March 2011. Four consecutive quarterly samples have been collected from these wells to date. A signed access agreement was received from the well owner of I10-9 in July 2011; this well was sampled in September and December 2011. One additional well (SLD-01) was sampled in September 2011 but without an access agreement. This well is over 2.5 miles from the post boundary and as long as there were no detections future sampling was not anticipated. An agreement for SLD-01 will be pursed in 2012 in order to add this well to the 9 month snapshot sampling schedule per the client’s request.

4.2 Wells Added to or Removed From Program

Of the three outstanding access agreements mailed out in 2011 additional attempts will be made in 2012 to obtain these agreements.

4.3 USGS Well Logging

In February 2011 additional access agreements were pursued in order to assist the USGS in gathering data from privately owned off-post wells around CSSA. Wells I10-4, LS-4, LS-5, and OFR-1 were logging off-post. On-post wells B3-EXW02, B3-MW27, B3-MW32, CS-1, CS-11, CS-MW35-LGR, and CS-MW36-LGR were also logged. Details from this work are in the *2011 Well Installation Report* (Parsons, 2011).

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the on- and off-post groundwater monitoring program data collected in 2011, the following conclusions and recommendations can be made:

- On-post wells CS-MW16-LGR, CS-MW16-CC, CS-D, CS-MW1-LGR, and CS-MW36-LGR all exceeded VOC MCLs in 2011 and should remain on the sampling schedule in the future.
- Well CS-4 was only sampled once in 2011 due to low water levels. It was scheduled to be sampled 3 quarters but low water levels prevented samples to be collected in June and December 2011. Well CS-4 showed VOC levels above the MCL for PCE and TCE in June and September 2010. There was speculation that the TCE spike of 86.89 µg/L in December 2009 was a result of the Flood Test being performed at the B-3 Bioreactor. In an effort to determine how and when this condition occurs the sampling frequency was increased from annually to semiannual. Increasing the sampling frequency during rain events or during above-average aquifer levels is recommended.
- CS-1, CS-9, CS-MW16-LGR, and CS-MW9-BS had AL/MCL exceedances for lead and/or mercury at different times throughout 2011. Samples of the water distribution system were collected since CS-1 is part of the drinking water system and it did not detect these exceedances in the public water system. CSSA will maintain these wells on the sampling schedule for the foreseeable future.
- Continue with the initiative to collect a "snapshot" event from all on- and off-post wells as well as selected Westbay zones. The current recommendation is to collect a snapshot event every 9 months so that the changes in the plume can be monitored seasonally.
- Nineteen Westbay intervals had detections above the MCL in 2011. These intervals should remain on the 9 month sampling schedule in the future as recommended in the LTMO study.
- The Westbay wells at AOC-65 continue to indicate the strong presence of contamination near the source area (CS-WB03). Significant contamination above the MCLs continues to exist near-surface and in the lower-yielding upper strata of aquifer. In most cases throughout the post, VOC contamination in the main portion of aquifer remains at concentrations below the MCLs.
- Wells OFR-3 and RFR-10 exceeded the MCL for PCE and/or TCE in 2011 off-post. These wells, along with wells LS-5, LS-6, LS-7, and RFR-11, are equipped with a GAC filtration system and should remain on the quarterly sampling schedule in the future. The GAC filtration systems will continue to be maintained by CSSA.
- Well I10-9 was added to the program midyear and sampled twice in 2011. The latest sample reported an increase in TCE above the RL. This well should remain on the quarterly sampling schedule and if concentrations near 90% of the MCL (4.0 µg/L) a GAC system should be installed.

- From the 2010 Well Survey, ten additional active wells were identified in the lands west, further than ½-mile, of IH-10 that are relevant to ongoing efforts associated with VOC plume migration away from CSSA. Nine of these wells were added to the quarterly sampling program in 2011. Further efforts to obtain an access agreement for privately owned well I10-10 should be undertaken in 2012.
- The 8 active supply wells operated by The Oaks Water Supply Corporation (TOWSC) have been sampled for 4 consecutive quarterly events in 2011. Two (OW-BARNOWL & OW-HH2) of these wells reported low levels of PCE in March 2011. These 2 wells should remain on the quarterly sampling schedule to further track Plume 2 VOC migration westward below Interstate Highway 10.
- For future sampling events, off-post wells where no VOCs were detected will be sampled as needed, depending on historical detections, or during the 9 month 'snapshot' event.
- Production well CS-9 continues to have lead and mercury issues above regulatory standards. CS-9 will be physically removed from the public water supply system and it will be used exclusively for monitoring and firefighting emergencies.
- Analytical data indicates CS-MW16-CC is at the low end of historical VOC contamination levels for this well. This data suggests nearly continuous pumping of CS-MW16- CC to the SWMU B3 Bioreactor is having a positive impact on Cow Creek aquifer restoration and that seals between LGR and CC zones in the CS-MW16 vicinity are effective.
- **Figure 2.7** shows VOC concentrations in RFR-10 and OFR-3 are very sensitive to rainfall events while VOC concentrations in LS-6, LS-7 and RFR-11 show less fluctuations after significant precipitation. This observation suggests RFR-10 and OFR-3 may be located along a fracture pattern that ties into the AOC-65 source area.

6.0 REFERENCES

CSSA 2002. *CSSA Quality Assurance Program Plan.*

CSSA 2002a. *Off-Post Monitoring Program and Response Plan.*

CSSA 2008. *CSSA Environmental Encyclopedia*, www.stanley.army.mil

EPA, 1992. *Consensus Method for Determining Groundwaters under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA). USEPA. Prot Orchard, WA. EPA 910/9-92-029.*

Parsons 2001. *Offsite Well Survey Report*.

Parsons 2005. *Final Three-Tiered Long Term Monitoring Network Optimization Evaluation.*

Parsons 2006. *Final Data Quality Objectives for the Groundwater Monitoring Program.*

Parsons 2010. *2010 Update: Final Three-Tiered Long Term Monitoring Network Optimization Evaluation.*

Parsons 2010. *Final Data Quality Objectives for the Groundwater Monitoring Program. Revised November 2010.*

Parsons 2010. *Off-Post Well Survey Report*.

NOAA, National Weather Service Forecast Office, Monthly/Annual/Average Precipitation San Antonio, Texas (1871 - 2011), http://www.srh.noaa.gov/ewx/?n=satclidata.htm.

APPENDIX A

ON- AND OFF-POST EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT

Appendix A. On-Post 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, and HSP.	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 in 2011.	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 2011 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 9 months with additional samples collected during the "snapshot" event. Selected zones from these wells will be sampled in 2012.	Yes.	Continue sampling.

Activity	Objectives	Action	Objective Attained?	Recommendations
	Identify any temporal changes in hydraulic gradients due to seasonal influences (2.1.5).	Downloaded data from continuous-reading transducer in wells: CS-1, CS-10, CS-MW1-LGR, CS-MW1-BS, CS-MW1-CC, CS-MW2-LGR, CS-MW4-LGR, CS-MW6-LGR, CS-MW6-BS, CS-MW6-CC, CS-MW9-LGR, CS-MW9-BS, CS-MW9-CC, CS-MW10-LGR, CS-MW10-CC, CS-MW12-LGR, CS-MW12-BS, CS-MW12-CC, CS-MW16-LGR, CS-MW16-CC, CS-MW21-LGR, and CS-MW24-LGR. Data was also downloaded from the northern and southern continuous-reading weather stations WS-N and WS-S. Water levels will be graphed from selected wells against precipitation through 2011 and will be included in this annual groundwater report.	Yes.	Continue collection of transducer data and possibly install transducers in other cluster wells.
Contamination Characterization (Groundwater 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 40 of 55 CSSA wells. Of the 92 samples scheduled to be collected in 2011 74 samples were actually collected. Seventeen of the 18 samples not collected were due to the water levels falling below the dedicated pumps. Well CS-12 was not sampled in March 2011 due to well house construction.	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 (COCs) 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.	Samples were analyzed for the selected VOCs using USEPA method SW8260B and metals (Cd, Cr, Pb, Hg). Drinking water wells were also sampled for additional metals (As, Ba, Cu, Zn). Analyses were conducted in accordance with the AFCEE QAPP and approved variances. All RLs were below MCLs, as listed below: **ANALYTE** / **RL (µg/L)** / **MCL (µg/L)** 1,1-DCE / 1.2 / 7 *cis*-1,2-DCE / 1.2 / 70 *trans*-1,2-DCE / 0.6 / 100 Vinyl Chloride / 1.1 / 2 PCE / 1.4 / 5 TCE / 1.0 / 5	Yes.	Continue sampling.

Activity	Objectives	Action	Objective Attained?	Recommendations
Contamination Characterization (Groundwater Contamination) (Continued)		**ANALYTE** / **RL (µg/L)** / **MCL (µg/L)** Arsenic 5 10 Barium 5 2000 Chromium 10 100 Copper 10 1300 Zinc 50 5000 (SS) Cadmium 1 5 Lead 5 15 (AL) Mercury 1 2		
	Meet AFCEE QAPP quality assurance requirements.	Samples were analyzed in accordance with the CSSA QAPP and approved variances. Parsons chemists verified all data and performed data validation according to the CSSA QAPP and approved variances.	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
		An 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.

Activity	Objectives	Action	Objective Attained?	Recommendations
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 A Off-Post 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, and HSP.	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 (§2.3.1 of the DQOs for the Groundwater Contamination Investigation, revised November 2010).	Samples for laboratory analysis were collected from selected off-post public and private wells, which are located within a ½ mile radius of CSSA. Also, selected wells outside the ½ mile radius were sampled at the request of the EPA.	Partially	Replace wells where no VOCs were detected with wells that may be identified in the future, located to the west and southwest of 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. Parsons chemists verified all data and performed data validation according to the CSSA QAPP and approved variances.	Yes	NA
		All data flagged with a “U”, “M”, and “J” are usable for characterizing contamination.	Yes	NA

Activity	Objectives	Action	Objective Attained?	Recommendations
	Evaluate CSSA monitoring program and expand as necessary (§2.3.1 of the DQOs for the Groundwater Contamination Investigation, revised November 2010). Determine locations of future monitoring locations.	Evaluation of data collected is ongoing and is reported in this annual 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.	Yes	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.
Project schedule/ Reporting	The quarterly monitoring project schedule shall provide a schedule for sampling, analysis, validation, verification, reviews, and reports for monitoring events off-post.	A schedule for sampling, analysis, validation, verification, data review and reports is provided in this annual 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.	Yes	Continue quarterly and annual reporting to include a schedule for sampling, analysis, validation, verification, data review and data reports.

Activity	Objectives	Action	Objective Attained?	Recommendations
Remediation	Evaluate the effectiveness of GACs (§3.2.3) and install as needed (§3.2.5 both of the DQOs for the Groundwater Contamination Investigation, revised November 2010).	Perform maintenance as needed. Install new GACs as needed.	Yes	Maintenance to the off-post GAC systems to be continued by Parsons' personnel approximately every 3 weeks. Semi annual (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

2011 QUARTERLY ON-POST GROUNDWATER ANALYTICAL RESULTS

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Dichloro-ethene, 1,1 (ug/L)	Dichloro-ethene, *cis* - 1,2 (ug/L)	Dichloro-ethene, *trans* - 1,2 (ug/L)	Tetra-chloroethene (ug/L)	Tri-chloroethene (ug/L)	Vinyl chloride (ug/L)	pH	Temp. (deg. C)	Specific Conductivity (mS)
								Field Measurements		
CS-1	3/8/2011	0.12U	0.07U	0.08U	0.06U	**0.30F**	0.08U	7.29	21.60	0.485
	6/7/2011	0.12U	0.07U	0.08U	0.06U	**0.34F**	0.08U	7.19	21.60	0.506
	9/14/2011	0.12U	0.07U	0.08U	0.06U	**0.25F**	0.08U	7.47	21.60	0.498
	12/15/2011	0.12U	0.07U	0.08U	0.06U	**0.28F**	0.08U	8.10	21.10	0.570
CS-2	6/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.25	20.80	0.597
CS-4	3/9/2011	0.12U	**1.09F**	0.08U	**2.36**	**2.85**	0.08U	7.44	20.50	0.500
CS-9	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.09	21.60	0.549
	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.23	23.40	0.594
	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.30	21.60	0.633
	12/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.94	21.00	0.603
CS-10	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.01	22.20	0.558
	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.02	22.10	0.577
Duplicate	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.02	22.10	0.577
	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.21	22.20	0.557
Duplicate	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.21	22.20	0.557
	12/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.96	21.70	0.561
CS-12	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.58	22.00	0.501
	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.53	21.90	0.489
	12/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.88	21.50	0.487
Duplicate	12/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.88	21.50	0.487
CS-MW16-LGR	3/8/2011	0.12U	**189.43***	**0.24F**	**131.48***	**164.31***	0.08U	7.27	22.70	0.512
	6/7/2011	0.12U	**179.14***	**0.25F**	**156.62***	**173.11***	0.08U	7.15	24.20	0.520
CS-MW16-CC	3/8/2011	0.12U	**29.48**	**6.81**	**0.66F**	**18.3**	0.08U	7.40	23.00	0.609
	6/7/2011	**0.21F**	**24.22**	**6.7**	**1.54**	**24.59**	0.08U	7.20	23.70	0.642
CS-D	3/8/2011	0.12U	**96.47***	**2.3**	**103.41**	**120.26***	0.08U	7.46	22.20	0.423
CS-MWG-LGR	6/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.50	21.10	0.427
CS-MWH-LGR	6/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.68	21.60	0.491
CS-I	6/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.00	21.40	0.518
CS-MW1-LGR	3/9/2011	0.12U	**17.11**	**0.23F**	**11.9**	**29.59**	0.08U	7.00	21.00	0.480
Duplicate	3/9/2011	0.12U	**16.96**	**0.26F**	**12.24**	**30.15**	0.08U	7.00	21.00	0.480
	6/9/2011	0.12U	**16.53**	**0.21F**	**13.21**	**31.37**	0.08U	7.09	21.50	0.505
	12/14/2011	0.12U	**18.93**	0.08U	**14.11**	**30.37**	0.08U	6.25	20.60	0.512
CS-MW1-BS	6/9/2011	0.12U	**1.01F**	0.08U	0.06U	0.05U	0.08U	7.40	21.60	0.506
CS-MW1-CC	6/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.36	24.70	0.684
CS-MW2-LGR	3/9/2011	0.12U	**0.57F**	0.08U	0.06U	0.05U	0.08U	10.47	21.20	0.483
	6/10/2011	0.12U	**0.74F**	0.08U	0.06U	0.05U	0.08U	10.32	21.30	0.486
	12/14/2011	0.12U	**0.54F**	0.08U	0.06U	0.05U	0.08U	10.59	20.70	0.444
CS-MW3-LGR	3/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.43	21.80	0.442
	6/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.46	22.30	0.382
CS-MW4-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.02	20.90	0.588
CS-MW5-LGR	3/8/2011	0.12U	**2.71**	0.08U	**1.86**	**3.63**	0.08U	7.31	22.40	0.474
	6/13/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.75	22.70	0.492
CS-MW6-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.22	22.10	0.511
CS-MW6-BS	6/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.06	22.90	0.687
CS-MW7-LGR	3/10/2011	0.12U	0.07U	0.08U	**0.26F**	0.05U	0.08U	6.91	21.40	0.586
	6/16/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.87	25.40	0.597
CS-MW8-LGR	6/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	9.06	22.30	0.630
	12/13/2011	0.12U	0.07U	0.08U	**1.94**	0.05U	0.08U	6.95	20.60	0.632
CS-MW8-CC	6/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.76	26.60	0.584
CS-MW9-LGR	3/8/2011	0.12U	0.07U	0.08U	**0.18F**	0.05U	0.08U	7.16	21.10	0.487
	6/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.01	22.10	0.307
CS-MW9-BS	6/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.97	22.10	0.574
CS-MW10-LGR	12/13/2011	0.12U	0.07U	0.08U	**1.95**	**0.51F**	0.08U	7.03	20.80	0.615
CS-MW11A-LGR	3/10/2011	0.12U	0.07U	0.08U	**1.20F**	0.05U	0.08U	6.92	21.30	0.528
	6/16/2011	0.12U	0.07U	0.08U	**0.90F**	0.05U	0.08U	7.41	23.00	0.554
	12/13/2011	0.12U	0.07U	0.08U	**1.28F**	0.05U	0.08U	6.65	20.50	0.564
CS-MW12-LGR	6/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.08	25.80	0.327
Duplicate	6/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.08	25.80	0.327
CS-MW12-BS	6/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.34	22.70	0.379

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Dichloro-ethene, 1,1 (ug/L)	Dichloro-ethene, *cis* - 1,2 (ug/L)	Dichloro-ethene, *trans* - 1,2 (ug/L)	Tetra-chloroethene (ug/L)	Tri-chloroethene (ug/L)	Vinyl chloride (ug/L)	pH	Temp. (deg. C)	Specific Conductivity (mS)
								Field Measurements		
CS-MW18-LGR	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	10.77	21.80	0.375
CS-MW19-LGR	3/9/2011	0.12U	0.07U	0.08U	**0.56F**	0.05U	0.08U	6.45	21.60	0.554
	6/16/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.28	22.90	0.311
CS-MW20-LGR	3/10/2011	0.12U	0.07U	0.08U	**1.91**	0.05U	0.08U	6.80	21.10	0.550
Duplicate	3/10/2011	0.12U	0.07U	0.08U	**1.51**	0.05U	0.08U	6.80	21.10	0.550
	6/13/2011	0.12U	0.07U	0.08U	**1.62**	0.05U	0.08U	7.52	21.70	0.577
CS-MW21-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.68	21.10	0.506
	6/13/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.09	21.80	0.527
CS-MW22-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.32	20.80	0.506
	6/13/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.60	22.10	0.537
CS-MW23-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.19	21.40	0.474
Duplicate	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.19	21.40	0.474
	6/13/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.49	23.00	0.494
CS-MW24-LGR	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.96	21.30	0.509
	6/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.32	21.70	0.524
	12/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.76	20.80	0.526
CS-MW25-LGR	3/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.49	21.90	0.399
	6/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.43	21.80	0.460
Duplicate	6/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.43	21.80	0.460
Comparison Criteria	MCL	7	70	100	5	5	2			
	RL	1.2	1.2	0.6	1.4	1.0	1.1			
	MDL	0.12	0.07	0.08	0.06	0.05	0.08			

Bold	≥ MCL
Bold	≥ RL
Bold	≥ MDL

Notes:
- µg/L = micrograms per liter
- mS = millisiemans
- deg. C = degrees Celsius
- F = The analyte was positively identified but the associated numerical value is below the RL.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- * = A dilution was run for this sample.
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B.

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

	CS-MW35-LGR		CS-MW36-LGR	
Analyte (µg/L)	9/15/2011	12/13/2011	9/15/2011	12/13/2011
Benzene	0.07U	NA	0.07U	NA
Bromo-dichloro-methane	0.06U	NA	0.06U	NA
Bromoform	0.13U	NA	0.13U	NA
Bromo-benzene	0.06U	NA	0.06U	NA
Bromo-chloro-methane	0.11U	NA	0.11U	NA
Bromo-methane	0.08U	NA	0.08U	NA
Butylbenzene, N-	0.17U	NA	0.17U	NA
Butylbenzene, sec-	0.05U	NA	0.05U	NA
Butylbenzene, tert-	0.04U	NA	0.04U	NA
Carbon tetrachloride	0.06U	NA	0.06U	NA
Chloro-benzene	0.04U	NA	0.04U	NA
Chloro-ethane	0.07U	NA	0.07U	NA
Chloroform	0.06U	NA	0.06U	NA
Chlorohexane, 1-	0.04U	NA	0.04U	NA
Chloro- methane	0.16U	NA	0.16U	NA
Chloro-toluene, 2-	0.04U	NA	0.04U	NA
Chlorotoluene, 4-	0.04U	NA	0.04U	NA
Dibromo-3-chloropropane, 1,2-	0.76U	NA	0.76U	NA
Dibromo-chloro-methane	0.06U	NA	0.06U	NA
Dibromomethane	0.06U	NA	0.06U	NA
Dichlorobenzene, 1,2-	0.02U	NA	0.02U	NA
Dichlorobenzene, 1,3-	0.03U	NA	0.03U	NA
Dichlorobenzene, 1,4-	0.07U	NA	0.07U	NA
Dichlorodifluoromethane	0.11U	NA	0.11U	NA
Dichloroethane, 1,2-	0.05U	NA	0.05U	NA
Dichloro-ethane, 1,1	0.07U	NA	0.07U	NA
Dichloro-ethene, 1,1	0.12U	0.12U	0.12U	0.12U
Dichloro-ethene, *cis* -1,2	0.07U	0.07U	0.07U	0.07U
Dichloro-ethene, *trans* -1,2	0.08U	0.08U	0.08U	0.08U
Dichloro-methane (methylene chloride)	0.35U	NA	0.35U	NA
Dichloropropane, 1,2-	0.06U	NA	0.06U	NA
Dichloropropane, 1,3-	0.05U	NA	0.05U	NA
Dichloropropane, 2,2-	0.10M	NA	0.10U	NA
Dichloropropene, 1,1-	0.10U	NA	0.10U	NA
Dichloropropene, cis-1,3-	0.03U	NA	0.03U	NA
Dichloropropene, trans-1,3-	0.04U	NA	0.04U	NA
Ethylbenzene	0.05U	NA	0.05U	NA
Ethylene dibromide	0.06U	NA	0.06U	NA
Hexachlorobutadiene	0.17U	NA	0.17U	NA
Isopropylbenzene	0.04U	NA	0.04U	NA
Isopropyltoluene, 4- (Cymene, p-	0.05U	NA	0.05U	NA
Naphthalene	0.07U	NA	0.07U	NA
Propylbenzene, N-	0.03U	NA	0.03U	NA
Styrene	0.08U	NA	0.08U	NA
Tetrachloroethane, 1,1,1,2-	0.09U	NA	0.09U	NA
Tetrachloroethane, 1,1,2,2-	0.07U	NA	0.07U	NA
Tetrachloroethene	**2.01**	**0.95F**	**9.91**	**7.21**

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

	CS-MW35-LGR		CS-MW36-LGR	
Analyte (µg/L)	9/15/2011	12/13/2011	9/15/2011	12/13/2011
Toluene	0.06U	NA	0.06U	NA
Trichlorobenzene, 1,2,3-	0.24U	NA	0.24U	NA
Trichlorobenzene, 1,2,4-	0.16U	NA	0.16U	NA
Trichloroethene	0.05U	0.05U	**9.33**	**6.23**
Trichloroethane, 1,1,1-	0.03U	NA	0.03U	NA
Trichloroethane, 1,1,2-	0.06U	NA	0.06U	NA
Trichlorofluoromethane	0.07U	NA	0.07U	NA
Trichloropropane, 1,2,3-	0.17U	NA	0.17U	NA
Trimethylbenzene, 1,2,4-	0.04U	NA	0.04U	NA
Trimethylbenzene, 1,3,5-	0.04U	NA	0.04U	NA
Vinyl chloride	0.08U	0.08U	0.08U	0.08U
Xylene, m,p-	0.07U	NA	0.07U	NA
Xylene, o-	0.06U	NA	0.06U	NA
pH	7.08	7.16	6.48	7.36
Temp. (deg. C)	21.90	20.20	22.90	21.50
Specific Conductivity (mS)	0.780	0.616	0.574	0.614

Bold	≥ MCL
Bold	≥ RL
Bold	≥ MDL

Notes:
- µg/L = micrograms per liter
- mS = milliseimens
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.

All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
Comparison Criteria	MCL	0.01	2.0	0.005	0.1	1.3	0.015 (AL)	0.002	5.0 (SS)
	RL	0.02	0.005	0.007	0.01	0.01	0.025	0.001	0.05
	MDL	0.0002	0.001	0.0005	0.001	0.0045	0.0019	0.0001	0.0045
CS-1	3/8/2011	0.0002U	**0.0334**	0.0005U	0.001U	**0.004F**	0.0019U	0.0001U	**0.137**
	6/7/2011	0.0002U	**0.0332**	0.0005U	0.001U	**0.006F**	0.0019U	0.0001U	**0.236**
	9/14/2011	**0.0012F**	**0.0316**	0.0005U	0.001U	**0.013J**	**0.0294**	0.0001U	**0.543**
	11/1/2011	0.00022U	**0.0379**	0.0005U	0.001U	**0.035**	**0.0214F**	0.0001U	**0.397**
	12/15/2011	**0.003F**	**0.0318**	0.0005U	0.001U	**0.012**	**0.0073F**	0.0001U	**0.395**
CS-2	6/10/2011	NA	NA	0.0005U	0.001U	NA	**0.0024F**	0.0001U	NA
CS-4	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-9	3/9/2011	**0.0003F**	**0.0374**	0.0005U	0.001U	**0.008F**	**0.0149F**	**0.0017**	**1.19**
	6/7/2011	0.0002U	**0.0435**	0.0005U	0.001U	**0.014J**	**0.0183F**	**0.0028**	**1.825**
	9/14/2011	**0.0013F**	**0.0423**	0.0005U	0.001U	**0.005F**	**0.0190F**	**0.0051**	**1.722**
	12/15/2011	NA	NA	0.0005U	**0.005F**	NA	**0.0581**	**0.0180***	NA
CS-10	3/9/2011	**0.0016F**	**0.0397**	0.0005U	0.001U	**0.021**	0.0019U	0.0001U	**0.122**
	6/7/2011	0.0002U	**0.042**	0.0005U	0.001U	**0.011J**	0.0019U	0.0001U	**0.155**
Duplicate	6/7/2011	0.0002U	**0.0473**	0.0005U	0.001U	**0.016J**	0.0019U	0.0001U	**0.18**
	9/14/2011	**0.0014F**	**0.0413**	0.0005U	**0.002F**	**0.025J**	**0.0022F**	0.0001U	**0.106**
Duplicate	9/14/2011	**0.0025F**	**0.0403**	0.0005U	0.001U	**0.015J**	0.0019U	0.0001U	**0.095**
	12/1/2011	**0.0011F**	**0.042**	0.0005U	0.001U	**0.029**	0.0019U	0.0001U	**0.078**
	12/15/2011	**0.0018F**	**0.0388**	0.0005U	0.001U	**0.004F**	0.0019U	0.0001U	**0.063**
CS-12	6/7/2011	0.0002U	**0.0304**	0.0005U	0.001U	**0.011J**	0.0019U	0.0001U	**0.481**
	9/14/2011	**0.0021F**	**0.0331**	0.0005U	0.001U	**0.015J**	**0.0053F**	0.0001U	**0.201**
	11/15/2011	**0.002F**	**0.035**	0.0005U	0.001U	**0.019**	0.0019U	**0.0002F**	**0.4**
	12/15/2011	**0.002F**	**0.0294**	0.0005U	0.001U	**0.005F**	0.0019U	0.0001U	**0.176**
Duplicate	12/15/2011	**0.0015F**	**0.0297**	0.0005U	0.001U	**0.008F**	0.0019U	0.0001U	**0.18**
CS-MW16-LGR	3/8/2011	NA	NA	0.0005U	0.001U	NA	**0.0157F**	0.0001U	NA
	6/7/2011	NA	NA	0.0005U	0.001U	NA	**0.0042F**	0.0001U	NA
CS-MW16-CC	3/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/7/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-D	3/8/2011	NA	NA	0.0005U	0.001U	NA	**0.0023F**	0.0001U	NA
CS-MWG-LGR	6/14/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MWH-LGR	6/8/2011	NA	NA	0.0005U	0.001U	NA	**0.0047F**	0.0001U	NA
CS-I	6/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW1-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
Duplicate	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	12/14/2011	NA	NA	0.0005U	**0.002F**	NA	**0.0086F**	0.0001U	NA
CS-MW1-BS	6/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW1-CC	6/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW2-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	12/14/2011	NA	NA	0.0005U	0.001U	NA	**0.0110F**	0.0001U	NA
CS-MW3-LGR	3/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/14/2011	NA	NA	0.0005U	**0.007F**	NA	0.0019U	0.0001U	NA
CS-MW4-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW5-LGR	3/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/13/2011	NA	NA	0.0005U	0.001U	NA	**0.0020F**	0.0001U	NA
CS-MW6-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW6-BS	6/15/2011	NA	NA	0.0005U	**0.004F**	NA	0.0019U	0.0001U	NA
CS-MW7-LGR	3/10/2011	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
	6/16/2011	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW8-LGR	6/15/2011	NA	NA	0.0005U	**0.006F**	NA	0.0019U	0.0001U	NA
	12/13/2011	NA	NA	0.0005U	0.001U	NA	**0.0080F**	0.0001U	NA
CS-MW8-CC	6/15/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW9-LGR	3/8/2011	NA	NA	0.0005U	**0.062**	NA	0.0019U	0.0001U	NA
	6/14/2011	NA	NA	0.0005U	**0.061**	NA	0.0019U	0.0001U	NA
CS-MW9-BS	6/15/2011	NA	NA	0.0005U	**0.003F**	NA	**0.0751**	0.0001U	NA
CS-MW10-LGR	12/13/2011	NA	NA	0.0005U	0.001U	NA	**0.0096F**	0.0001U	NA

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Zinc (mg/L)
CS-MW11A-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/16/2011	NA	NA	0.0005U	**0.049**	NA	0.0019U	0.0001U	NA
	12/13/2011	NA	NA	0.0005U	**0.009F**	NA	**0.0082F**	0.0001U	NA
CS-MW12-LGR	6/10/2011	NA	NA	0.0005U	**0.002F**	NA	**0.0021F**	0.0001U	NA
Duplicate	6/10/2011	NA	NA	0.0005U	0.001U	NA	**0.0027F**	0.0001U	NA
CS-MW12-BS	6/10/2011	NA	NA	0.0005U	**0.003F**	NA	**0.0020F**	0.0001U	NA
CS-MW18-LGR	3/9/2011	NA	NA	0.0005U	**0.039**	NA	0.0019U	0.0001U	NA
CS-MW19-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/16/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW20-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
Duplicate	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/13/2011	NA	NA	0.0005U	**0.003F**	NA	**0.0021F**	0.0001U	NA
CS-MW21-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/13/2011	NA	NA	0.0005U	0.001U	NA	**0.0026F**	0.0001U	NA
CS-MW22-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/13/2011	NA	NA	0.0005U	0.001U	NA	**0.0020F**	0.0001U	NA
CS-MW23-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
Duplicate	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/13/2011	NA	NA	0.0005U	**0.002F**	NA	0.0019U	**0.0002F**	NA
CS-MW24-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	6/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	12/14/2011	NA	NA	0.0005U	0.001U	NA	**0.0096F**	0.0001U	NA
CS-MW25-LGR	3/8/2011	NA	NA	0.0005U	**0.008F**	NA	0.0019U	0.0001U	NA
	6/14/2011	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
Duplicate	6/14/2011	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA

Bold (shaded box)	≥ MCL
Bold (outlined box)	≥ RL
Bold	≥ MDL

Notes:
- mg/L = miligrams per liter
- AL = action level
- SS = secondary standard
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- *Duplicate* = field duplicate
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.

Appendix B
2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Comparison Criteria			CS-MW35-LGR		CS-MW36-LGR	
Analyte (mg/L)	MDL	RL	MCL	9/15/2011	12/13/2011	9/15/2011	12/13/2011
Arsenic	**0.00021**	**0.02**	**0.01**	**0.0009F**	NA	**0.0014F**	NA
Barium	**0.001**	**0.005**	**2.0**	**0.0407**	NA	**0.0354**	NA
Cadmium	**0.0005**	**0.007**	**0.005**	0.0005U	0.0005U	0.0005U	0.0005U
Chromium	**0.001**	**0.01**	**0.1**	**0.004F**	**0.002F**	**0.007F**	0.001U
Copper	**0.003**	**0.01**	**1.3**	0.003U	NA	0.003U	NA
Lead	**0.0019**	**0.025**	**0.015 (AL)**	0.0019U	**0.0084F**	0.0019U	**0.0099F**
Mercury	**0.0001**	**0.001**	**0.002**	0.0001U	0.0001U	0.0001U	0.0001U
Nickel	**0.0078**	**0.01**	**--**	**0.015**	NA	**0.004F**	NA
Zinc	**0.0045**	**0.05**	5.0 (SS)	**0.1**	NA	**0.029F**	NA
Bromide	**0.11**	**0.5**	**--**	**0.6**	NA	**0.59**	NA
Chloride	**0.25**	**1.0**	**--**	**18**	NA	**15**	NA
Fluoride	**0.06**	**1.0**	**4**	**0.31F**	NA	**0.37F**	NA
Nitrate	**0.02**	**0.2**	**10**	**2.33**	NA	**3.78**	NA
Nitrite	**0.01**	**0.1**	**1.0**	0.01M	NA	0.01U	NA
Sulfate	**0.23**	**1.0**	**--**	**66**	NA	**64**	NA
TDS	**--**	**--**	**500**	**470**	NA	**360**	NA
Alkalinity, Bicarbonate	**1.1**	**5.0**	**--**	**310**	NA	**220**	NA
Alkalinity, Total (as CACO3)	**1.1**	**10**	**--**	**310**	NA	**220**	NA
Phosphorus, Total Orthophosphate	**0.13**	**1.0**	**--**	0.13U	NA	0.13U	NA

Bold	≥ MCL
Bold	≥ RL
Bold	≥ MDL

Notes:
- mg/L = miligrams per liter
- AL = action level
- SS = secondary standard
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- NA = Not analyzed for this parameter.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA

APPENDIX C

2011 WESTBAY® ANALYTICAL RESULTS

Appendix C
2011 Westbay® Analytical Results

Well ID	Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	TCE	PCE	Vinyl Chloride
Comparison Criteria	**MDL**	**0.3**	**0.16**	**0.19**	**0.16**	**0.15**	**0.23**
	RL	**1.2**	**1.2**	**0.6**	**1.0**	**1.4**	**1.1**
	MCL	**7.0**	**70**	**100**	**5.0**	**5.0**	**2.0**
CS-WB01-UGR-01	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	8-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB01-LGR-01	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	8-Dec-11	<0.12	<0.07	<0.08	**0.28F**	**5.64**	<0.08
CS-WB01-LGR-02	14-Mar-11	<0.12	<0.07	<0.08	**3.71**	**13**	<0.08
	8-Dec-11	<0.12	<0.07	<0.08	**3.21**	**13.2**	<0.08
CS-WB01-LGR-03	14-Mar-11	<0.12	<0.07	<0.08	**14.16**	**4.18**	<0.08
	8-Dec-11	<0.12	<0.07	<0.08	**8.93**	**3.9**	<0.08
CS-WB01-LGR-04	14-Mar-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
	8-Dec-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
CS-WB01-LGR-05	14-Mar-11	<0.12	<0.07	<0.08	**0.35**	<0.06	<0.08
	8-Dec-11	<0.12	<0.07	<0.08	**0.22F**	<0.06	<0.08
CS-WB01-LGR-06	14-Mar-11	<0.12	**0.34**	<0.08	**1.95**	**0.22**	<0.08
	8-Dec-11	<0.12	**0.35F**	<0.08	**1.07**	<0.06	<0.08
CS-WB01-LGR-07	14-Mar-11	<0.12	**0.2**	<0.08	**13.14**	**13.54**	<0.08
	8-Dec-11	<0.12	<0.07	<0.08	**14.45**	**18.91**	<0.08
CS-WB01-LGR-08	14-Mar-11	<0.12	**1.62**	<0.08	**3.08**	**0.16**	<0.08
	8-Dec-11	<0.12	**1.03F**	<0.08	**6.62**	**2.86**	<0.08
CS-WB01-LGR-09	14-Mar-11	<0.12	**0.31**	<0.08	**21.82**	**17.09**	<0.08
	6-Jun-11	<0.12	**0.34**	<0.08	**19.56**	**16.32**	<0.08
	8-Dec-11	<0.12	<0.07	<0.08	**20.7**	**16.91**	<0.08
CS-WB02-UGR-01	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	7-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-01	14-Mar-11	<0.12	<0.07	<0.08	**1.34**	**0.48**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	**0.84F**	<0.06	<0.08
CS-WB02-LGR-02	14-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	7-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-03	14-Mar-11	<0.12	<0.07	<0.08	<0.05	**3.02**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	<0.05	**4.68**	<0.08
CS-WB02-LGR-04	14-Mar-11	<0.12	<0.07	<0.08	**5.87**	**2.05**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	**9.15**	**3.61**	<0.08
CS-WB02-LGR-05	14-Mar-11	<0.12	<0.07	**0.2**	**2.78**	**0.71**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	**3.06**	**1.02F**	<0.08
CS-WB02-LGR-06	14-Mar-11	<0.12	**1.02**	**2.82**	**4.05**	**1.08**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	**2.95**	**1.12F**	<0.08
CS-WB02-LGR-07	14-Mar-11	<0.12	**0.16**	<0.08	**0.51**	**0.65**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
CS-WB02-LGR-08	14-Mar-11	<0.12	**3.7**	**1.41**	**0.58**	**0.19**	<0.08
	7-Dec-11	<0.12	**1.65**	<0.08	**1.06**	**1.09F**	<0.08
CS-WB02-LGR-09	14-Mar-11	<0.12	**0.2**	<0.08	**10.34**	**11.58**	<0.08
	6-Jun-11	<0.12	**0.32**	<0.08	**13.22**	**18.2**	<0.08
	7-Dec-11	<0.12	<0.07	<0.08	**11.23**	**13.12**	<0.08
CS-WB03-UGR-01	16-Mar-11	<3.00*	<1.75*	<2.00*	**22.30***	**1767.03***	<2.00*
	5-Dec-11	<6.00*	<3.50*	<4.00*	**32.76F***	**2514.83***	<4.00*
CS-WB03-LGR-01	16-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	5-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB03-LGR-02	16-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	5-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB03-LGR-03	16-Mar-11	<0.12	**0.17**	<0.08	**9.03**	**14.41**	<0.08
	5-Dec-11	<0.12	**0.34F**	<0.08	**14.51**	**31.71**	<0.08
CS-WB03-LGR-04	16-Mar-11	<0.12	<0.07	<0.08	**5.58**	**16.22**	<0.08
	5-Dec-11	<0.12	<0.07	<0.08	**12.39**	**27.28**	<0.08
CS-WB03-LGR-05	16-Mar-11	<0.12	<0.07	<0.08	**5.43**	**22.49**	<0.08
	5-Dec-11	<0.12	<0.07	<0.08	**8.84**	**27.14**	<0.08
CS-WB03-LGR-06	16-Mar-11	<0.12	<0.07	<0.08	**0.86**	**5.86**	<0.08
	5-Dec-11	<0.12	**0.25F**	<0.08	**0.86F**	**5.86**	<0.08

Appendix C
2011 Westbay® Analytical Results

Well ID	Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	TCE	PCE	Vinyl Chloride
Comparison Criteria	**MDL**	**0.3**	**0.16**	**0.19**	**0.16**	**0.15**	**0.23**
	RL	**1.2**	**1.2**	**0.6**	**1.0**	**1.4**	**1.1**
	MCL	**7.0**	**70**	**100**	**5.0**	**5.0**	**2.0**
CS-WB03-LGR-07	16-Mar-11	<0.12	**2.32**	<0.08	**7**	**8.03**	<0.08
	5-Dec-11	<0.12	**3.66**	<0.08	**5.17**	**4.56**	<0.08
CS-WB03-LGR-08	16-Mar-11	<0.12	**7.41**	<0.08	**1.67**	**7.82**	<0.08
	5-Dec-11	<0.12	**8.3**	<0.08	**1.58**	**3.83**	<0.08
CS-WB03-LGR-09	16-Mar-11	<0.12	**0.26**	<0.08	**4.04**	**4.73**	<0.08
	6-Jun-11	<0.12	**35.36**	<0.08	**3.84**	**6.83**	<0.08
	5-Dec-11	<0.12	**45.73**	<0.08	**4.05**	**11.75**	<0.08
CS-WB04-UGR-01	15-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
	6-Dec-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-01	15-Mar-11	<0.12	<0.07	<0.08	<0.05	**0.39**	<0.08
CS-WB04-LGR-02	15-Mar-11	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-03	15-Mar-11	<0.12	<0.07	<0.08	<0.05	**0.17**	<0.08
CS-WB04-LGR-04	15-Mar-11	<0.12	<0.07	<0.08	**0.25**	**0.2**	<0.08
CS-WB04-LGR-06	15-Mar-11	<0.12	**2.87**	**0.36**	**14.62**	**22.35**	<0.08
	6-Jun-11	<0.12	**3.02**	**0.32**	**13.68**	**28.74**	<0.08
	6-Dec-11	<0.12	**2.81**	<0.08	**9.39**	**28.76**	<0.08
CS-WB04-LGR-07	15-Mar-11	<0.12	**3.82**	**0.31**	**19.26**	**9.21**	<0.08
	6-Jun-11	<0.12	**2.24**	**0.23**	**11.15**	**17.91**	<0.08
	6-Dec-11	<0.12	**2.81**	<0.08	**9.91**	**24.41**	<0.08
CS-WB04-LGR-08	15-Mar-11	<0.12	**0.15**	<0.08	**1.02**	**0.38**	<0.08
	6-Dec-11	<0.12	<0.07	<0.08	**0.84F**	<0.06	<0.08
CS-WB04-LGR-09	15-Mar-11	<0.12	<0.07	<0.08	**5.77**	**7.15**	<0.08
	6-Jun-11	<0.12	<0.07	<0.08	**7.29**	**9.75**	<0.08
	6-Dec-11	<0.12	<0.07	<0.08	**7.09**	**9.25**	<0.08
CS-WB04-LGR10	15-Mar-11	<0.12	<0.07	<0.08	**0.57**	**0.8**	<0.08
	6-Jun-11	<0.12	<0.07	<0.08	**0.5**	**1.01**	<0.08
	6-Dec-11	<0.12	<0.07	<0.08	<0.05	**1.16F**	<0.08
CS-WB04-LGR-11	15-Mar-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
	6-Jun-11	<0.12	<0.07	<0.08	<0.05	**0.24**	<0.08
	6-Dec-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
CS-WB04-BS-01	15-Mar-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
CS-WB04-BS-02	15-Mar-11	<0.12	**0.15**	<0.08	<0.05	<0.06	<0.08
CS-WB04-CC-01	15-Mar-11	<0.12	**0.41**	<0.08	<0.05	<0.06	<0.08
CS-WB04-CC-02	15-Mar-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08
CS-WB04-CC-03	15-Mar-11	<0.12	<0.07	<0.08	<0.05	<0.06	<0.08

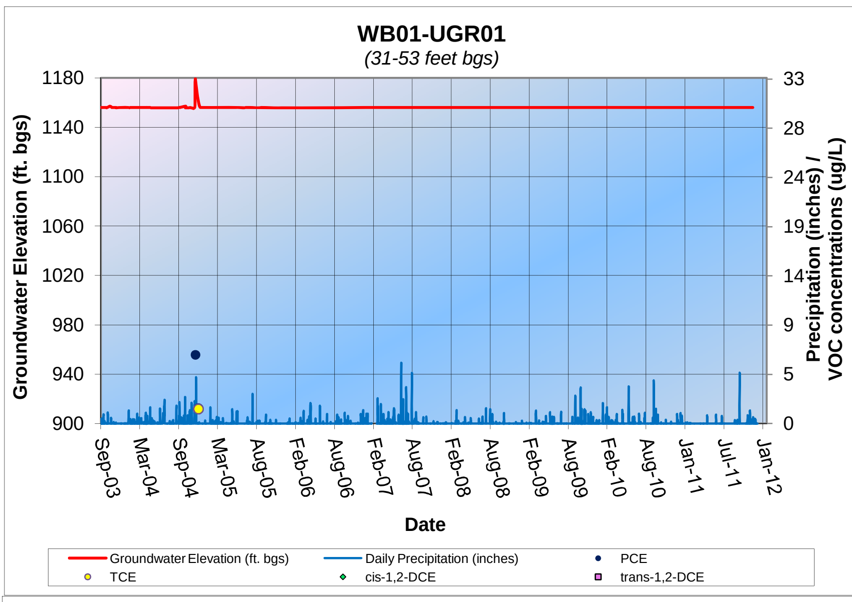
BOLD	≥ MDL
BOLD	≥ RL
BOLD	≥ MCL

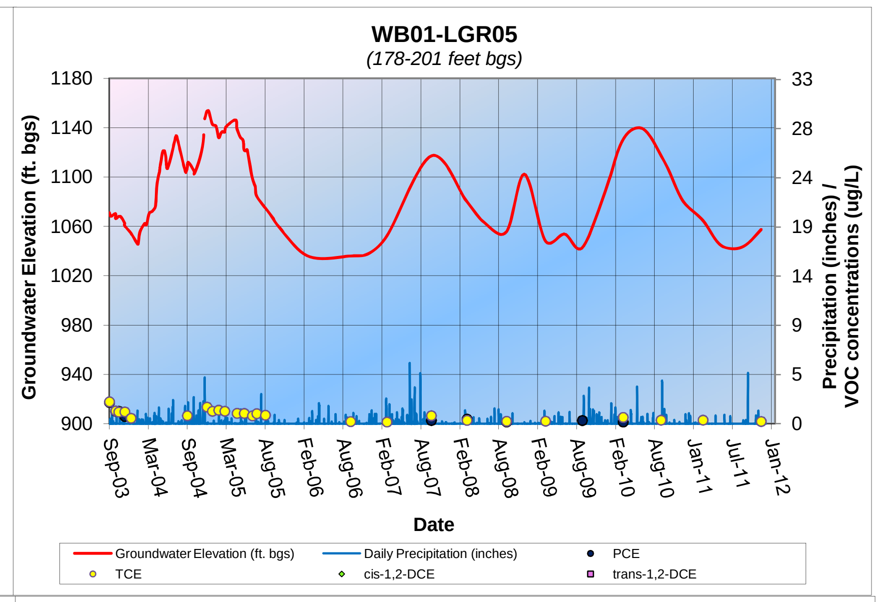
Notes:
- All values reported in micrograms per liter (µg/L).
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B and reported as screening data.
- F = The analyte was positively identified but the associated numerical value is below the RL.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA
- * = A dilution was run for this sample.
- DCE = Dichloroethene
- TCE = Trichloroethene

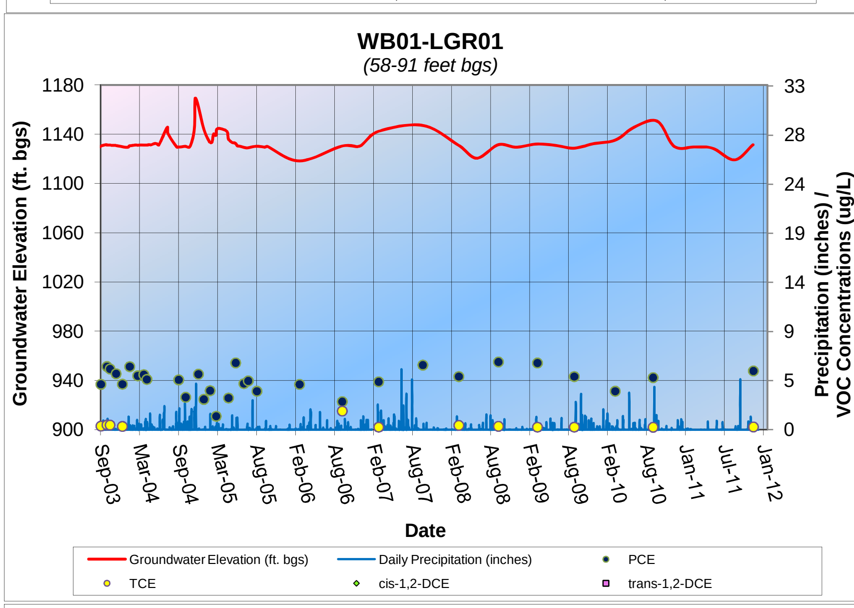
APPENDIX D

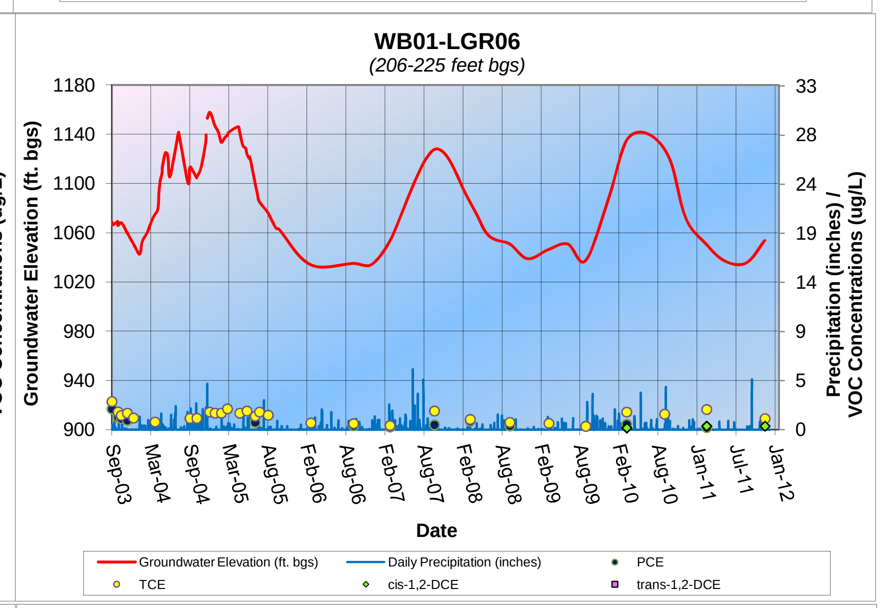
CUMULATIVE WESTBAY® ANALYTICAL GRAPHS

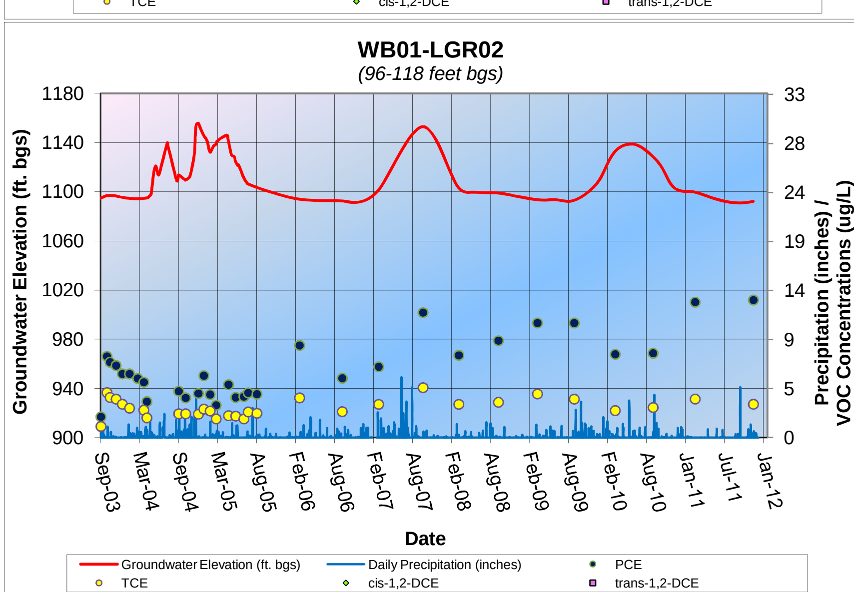
Appendix D.1
CS-WB01
VOC Concentrations / Precipitaiton / Groundwater Elevation
(VOC concentrations in micrograms / liter)

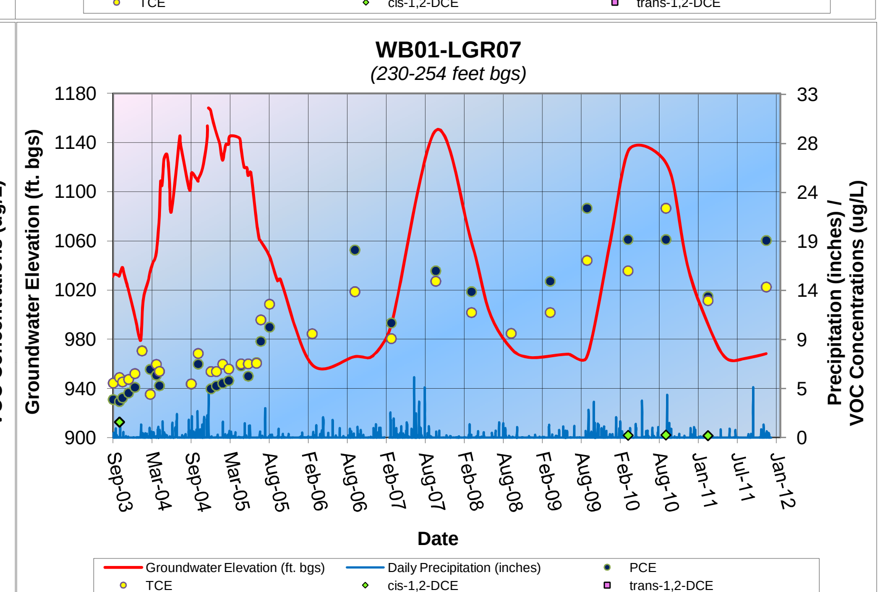


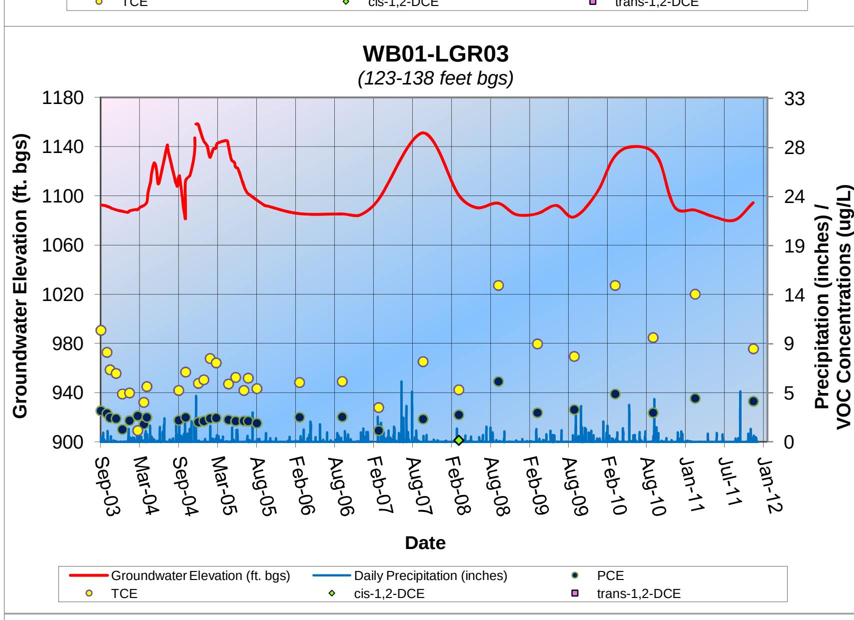


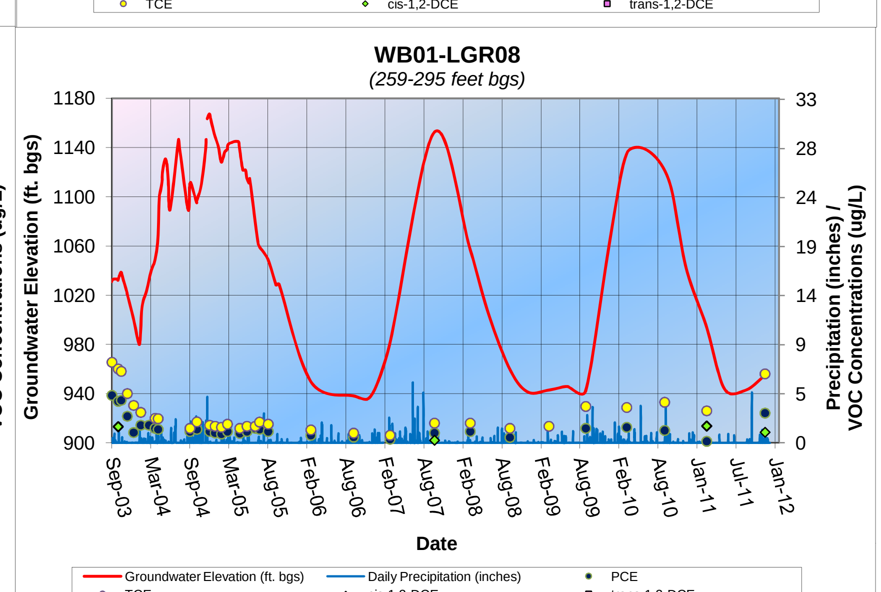


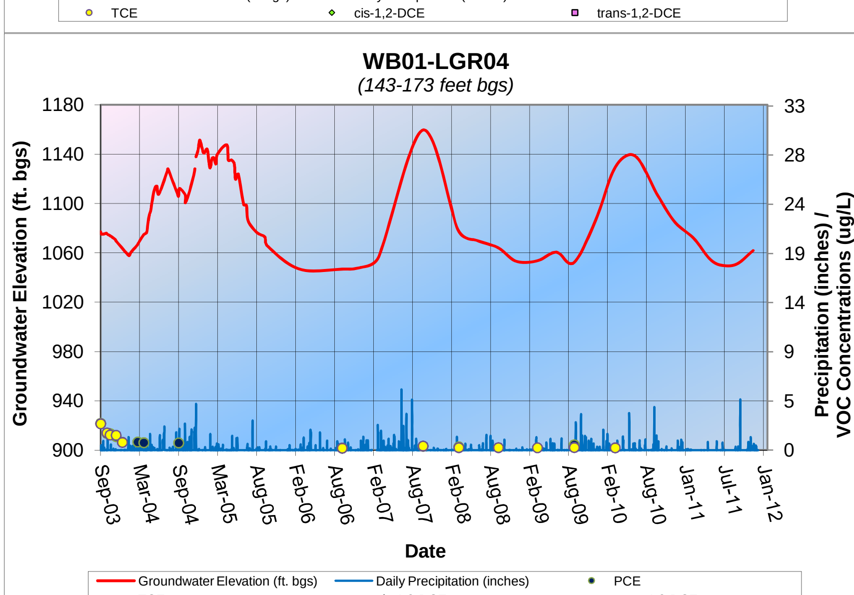


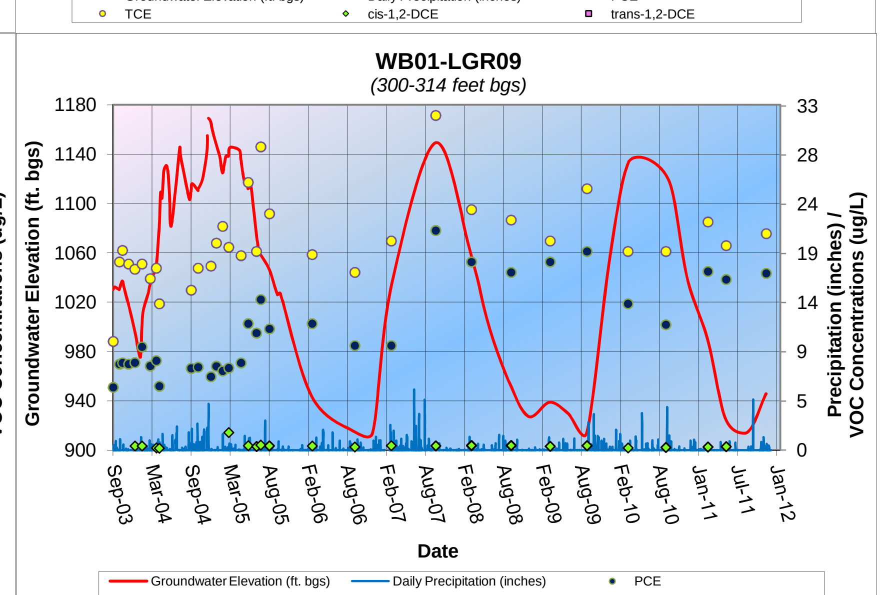






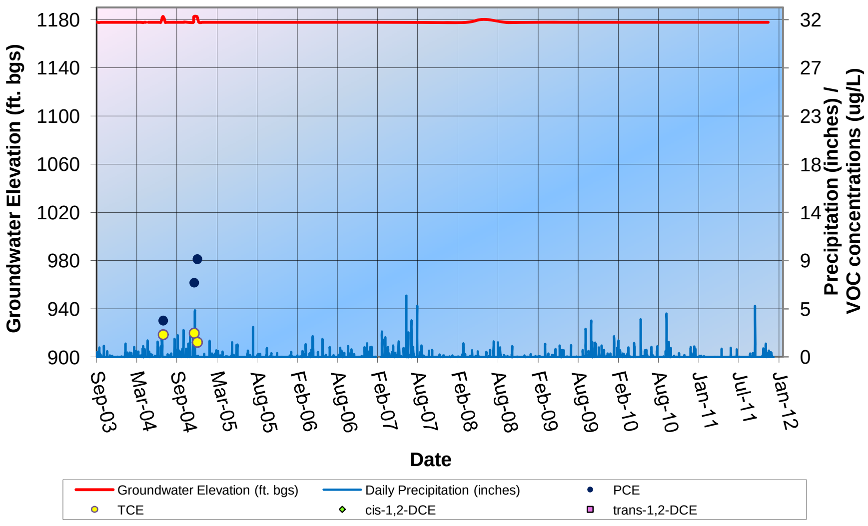




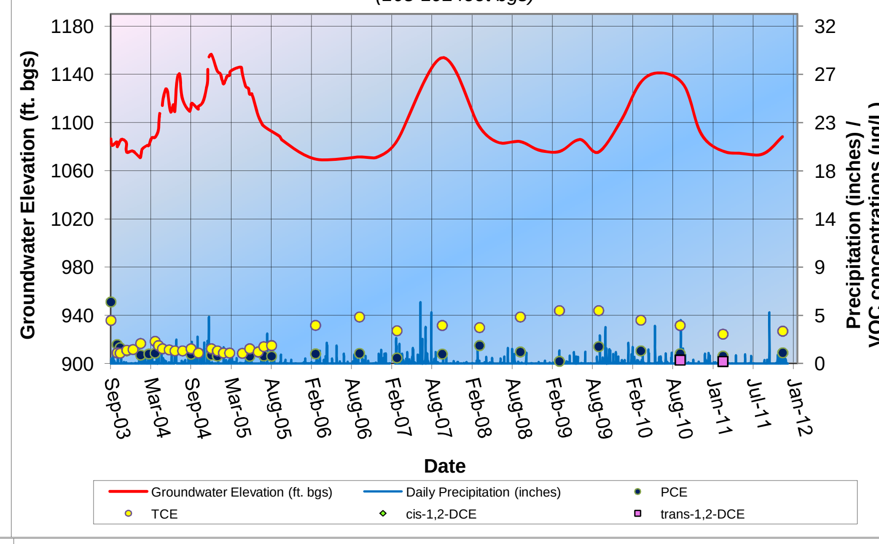


Appendix D.2
CS-WB02
VOC Concentrations / Precipitaiton / Groundwater Elevation

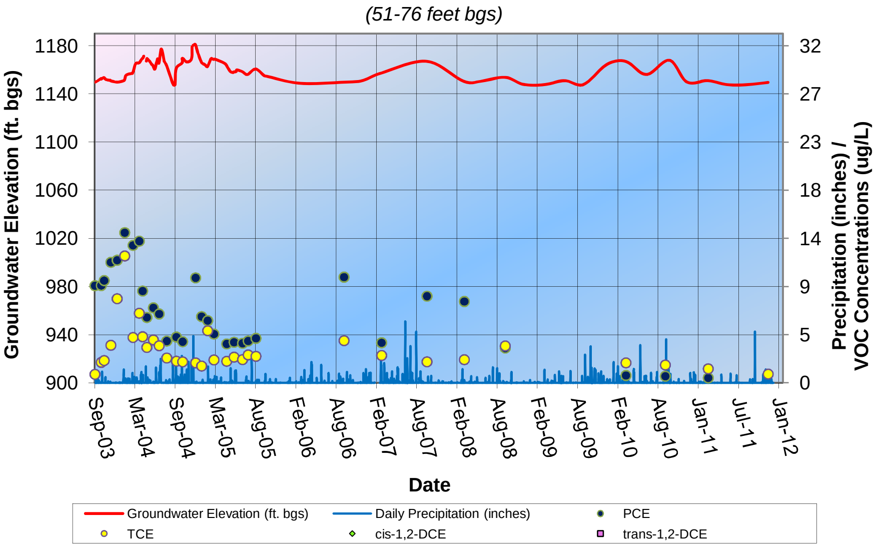
WB02-UGR01
(34-46 feet bgs)



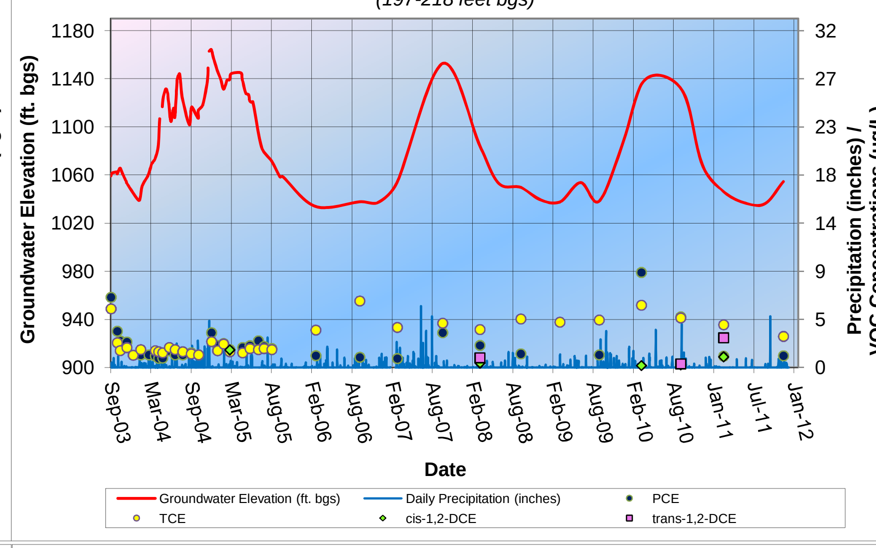
WB02-LGR05
(168-192 feet bgs)



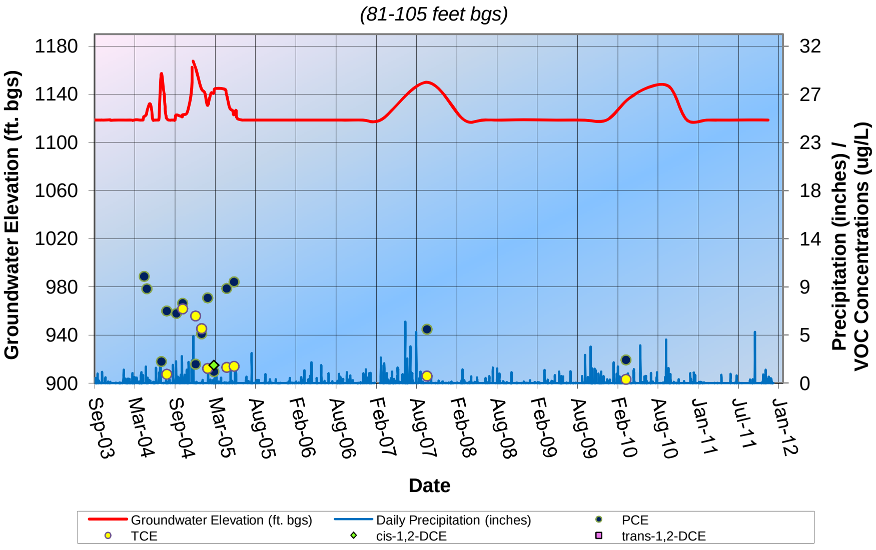
WB02-LGR01
(51-76 feet bgs)



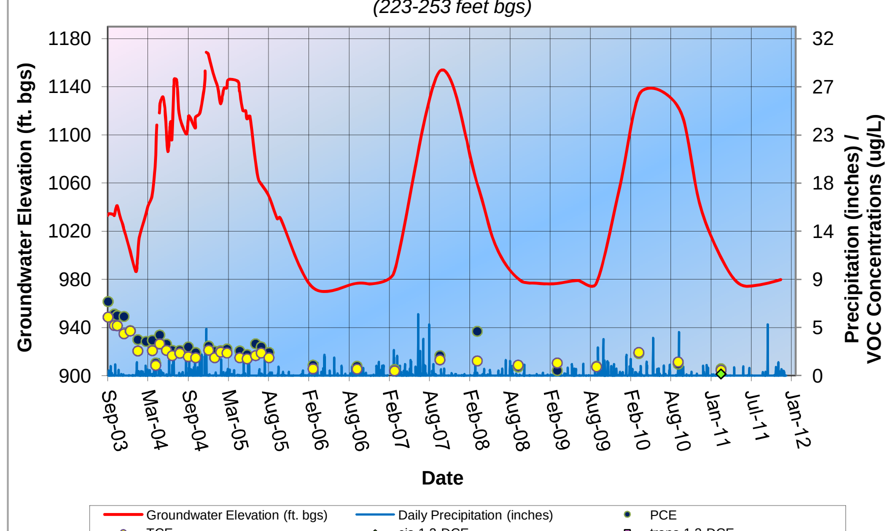
WB02-LGR06
(197-218 feet bgs)



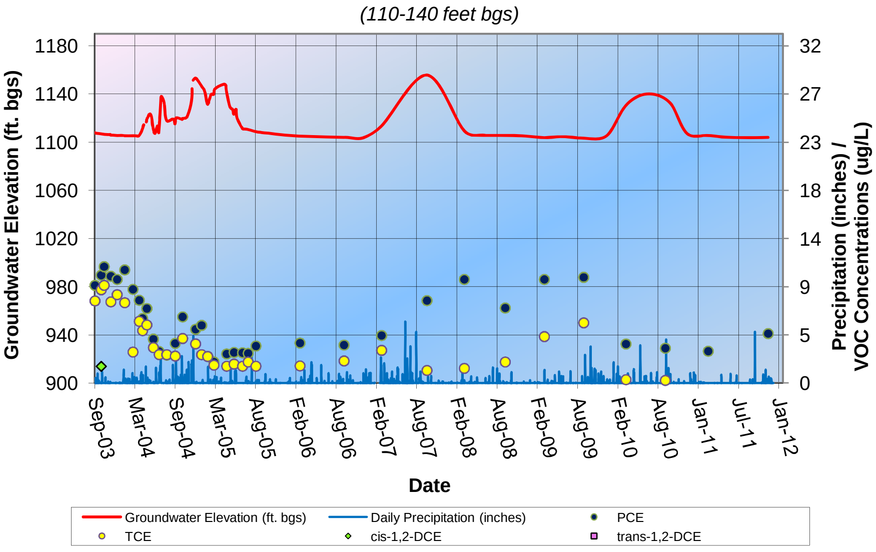
WB02-LGR02
(81-105 feet bgs)



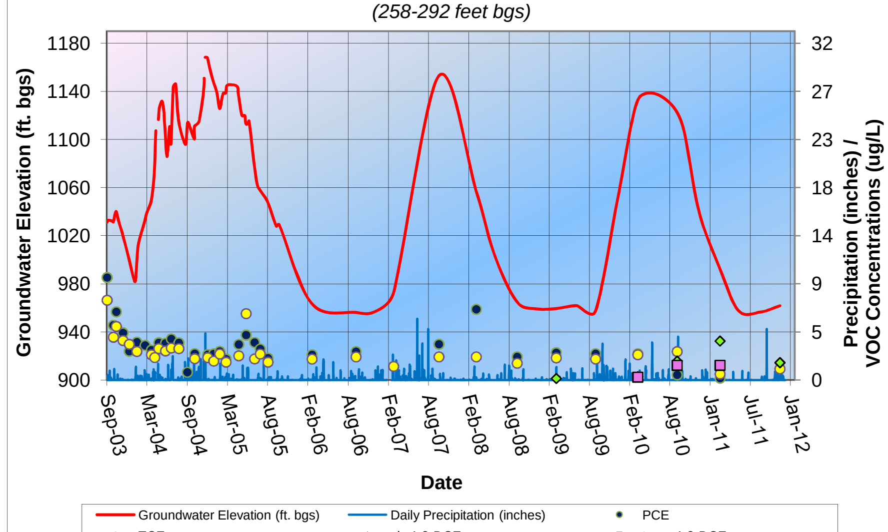
WB02-LGR07
(223-253 feet bgs)



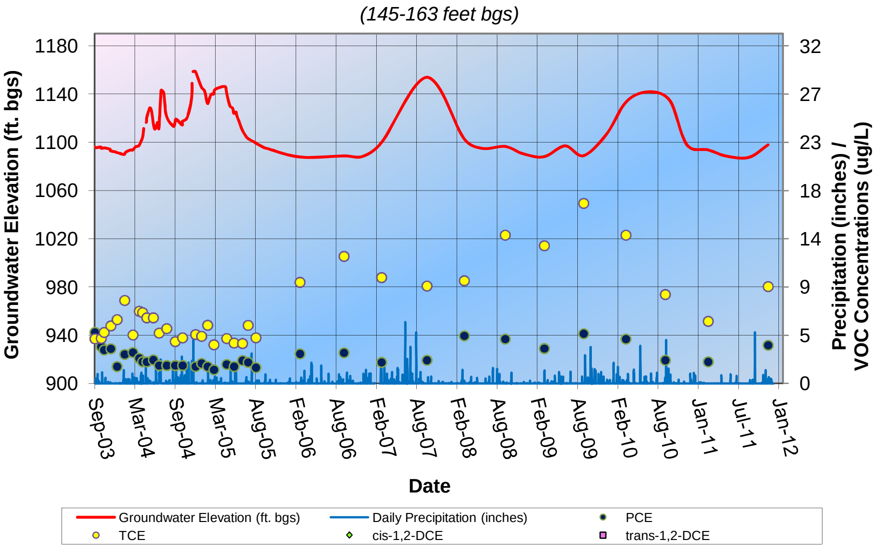
WB02-LGR03
(110-140 feet bgs)



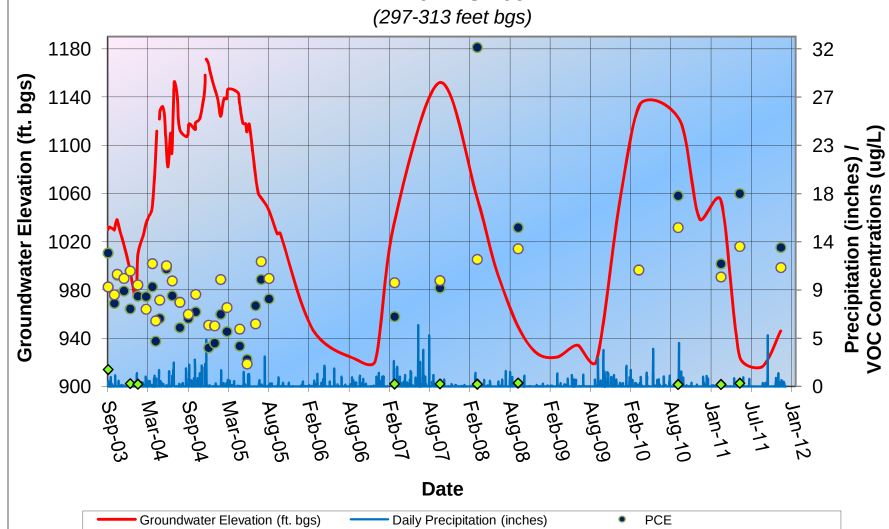
WB02-LGR08
(258-292 feet bgs)



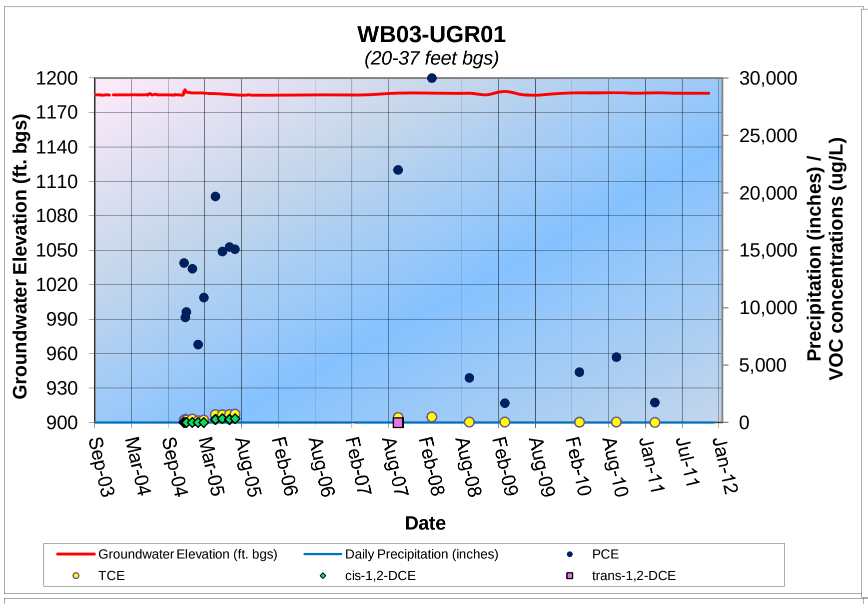
WB02-LGR04
(145-163 feet bgs)

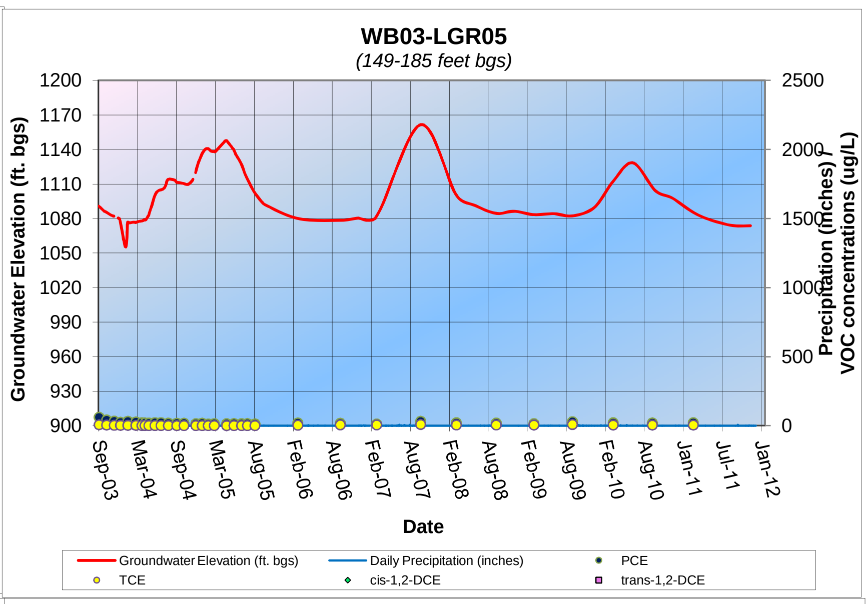


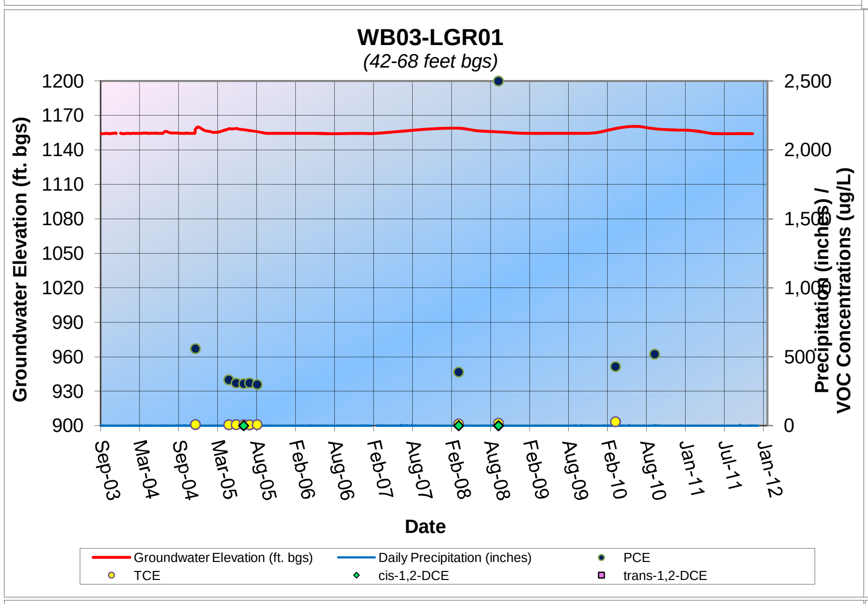
WB02-LGR09
(297-313 feet bgs)

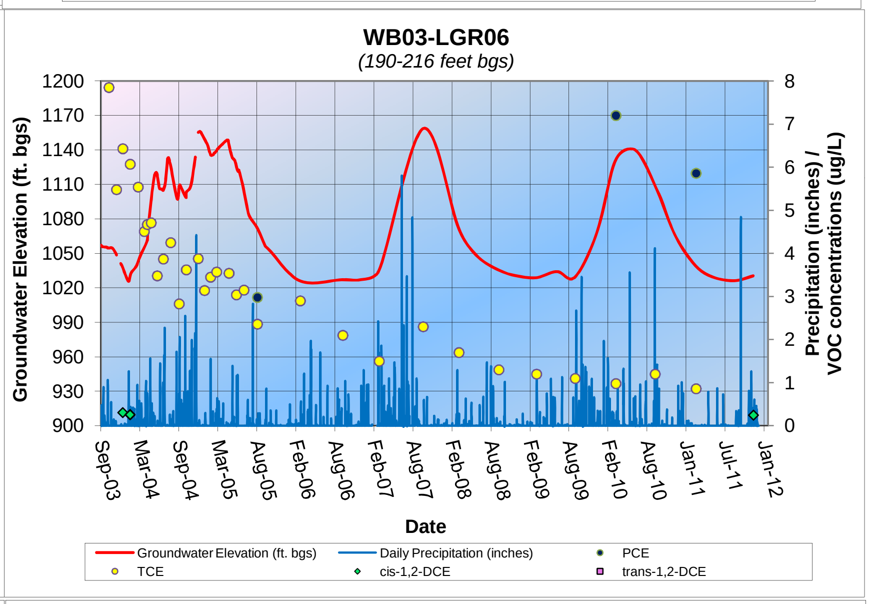


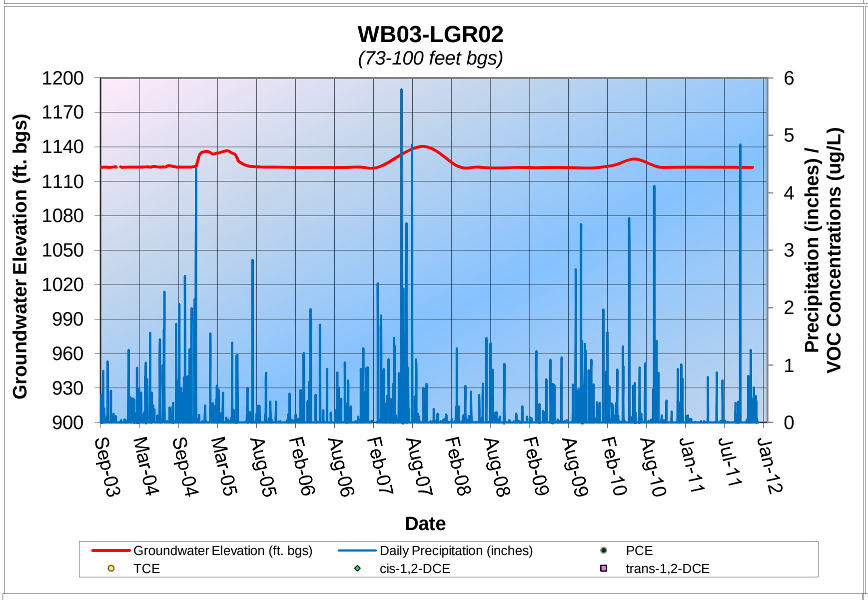
Appendix D.3
CS-WB03
VOC Concentrations / Precipitaiton / Groundwater Elevation
(VOC concentrations in micrograms / liter)

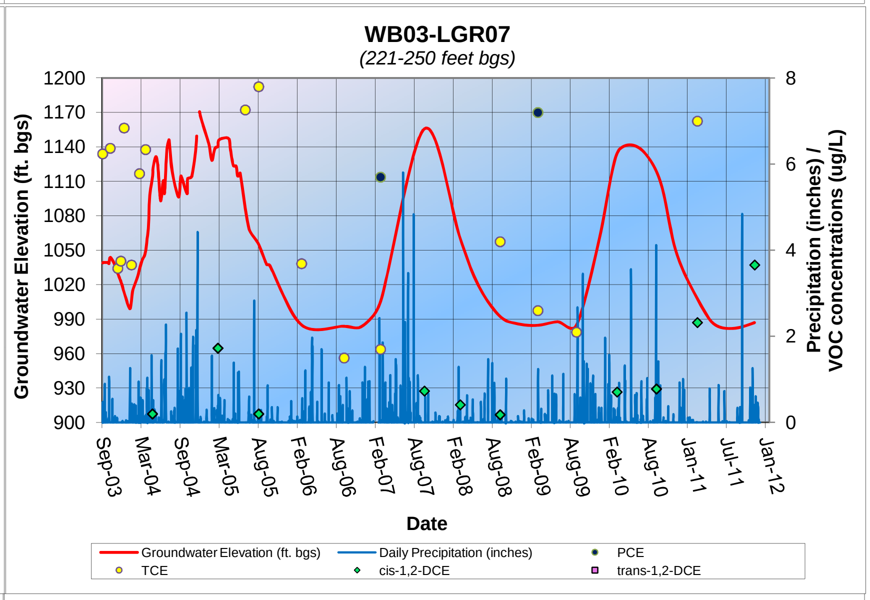


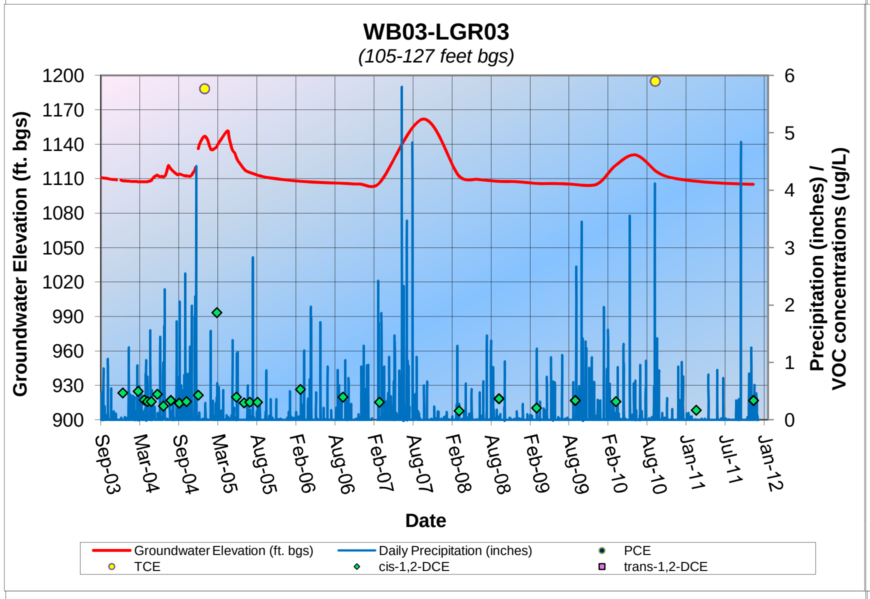


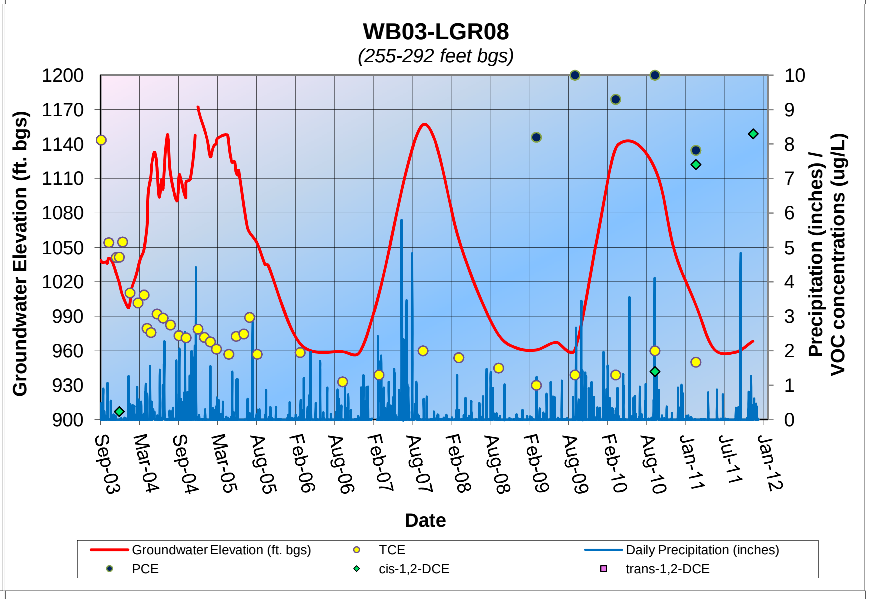


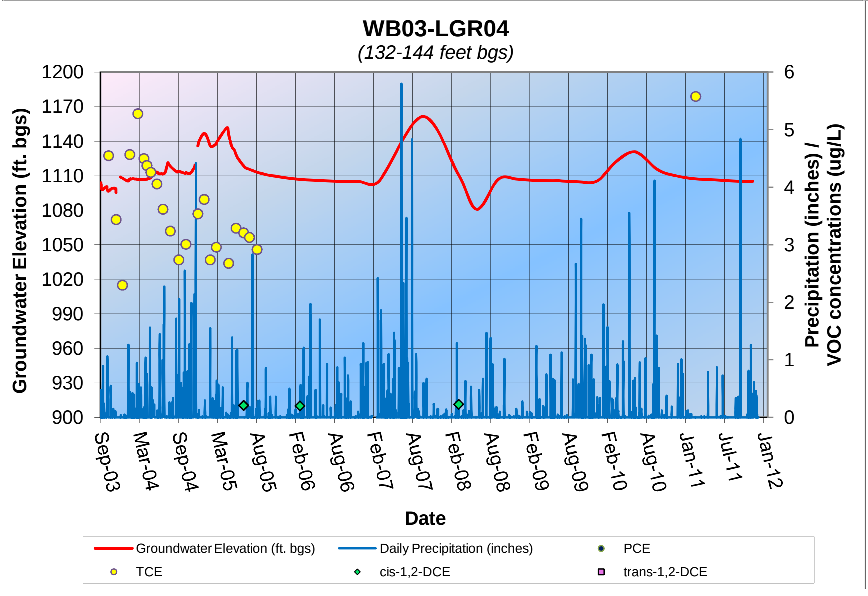


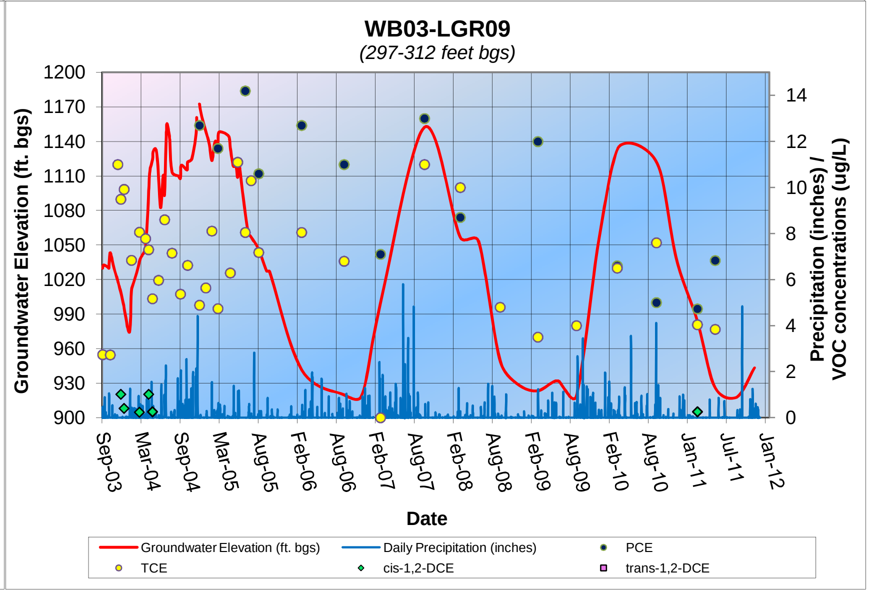






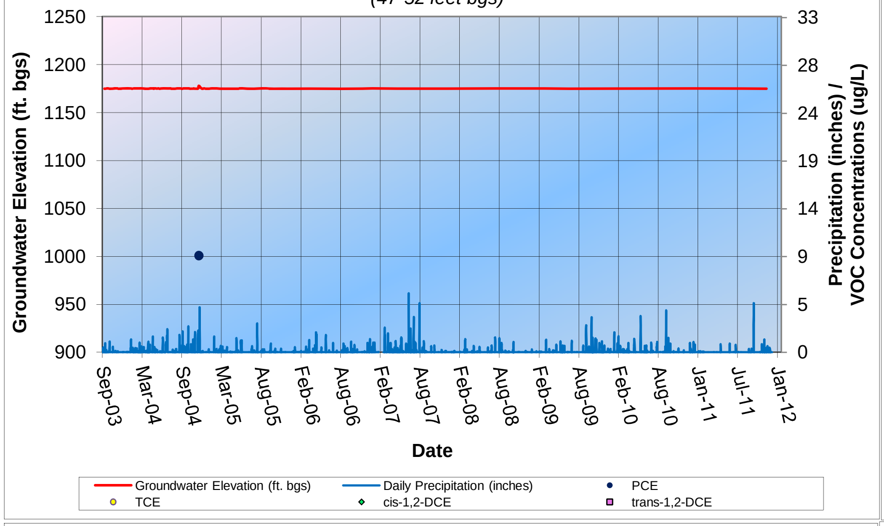




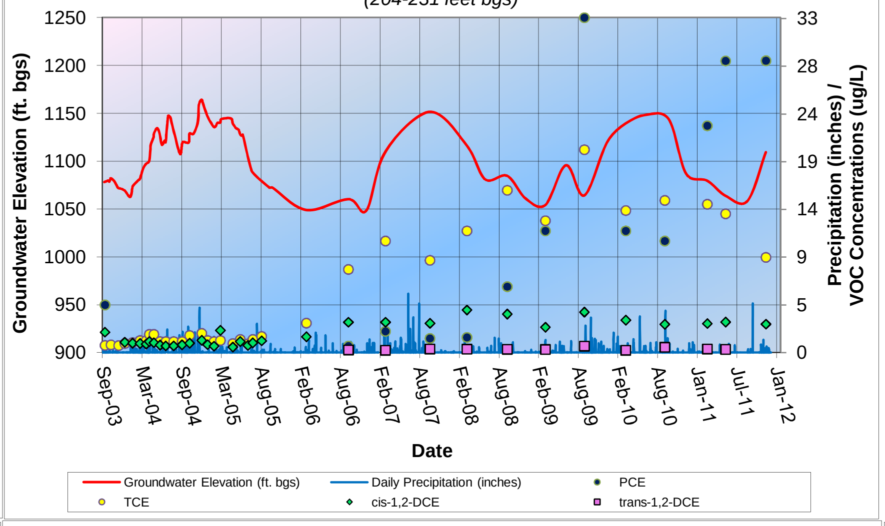


Appendix D.4
CS-WB04
VOC Concentrations / Precipitaiton / Groundwater Elevation
(VOC concentrations in micrograms / liter)

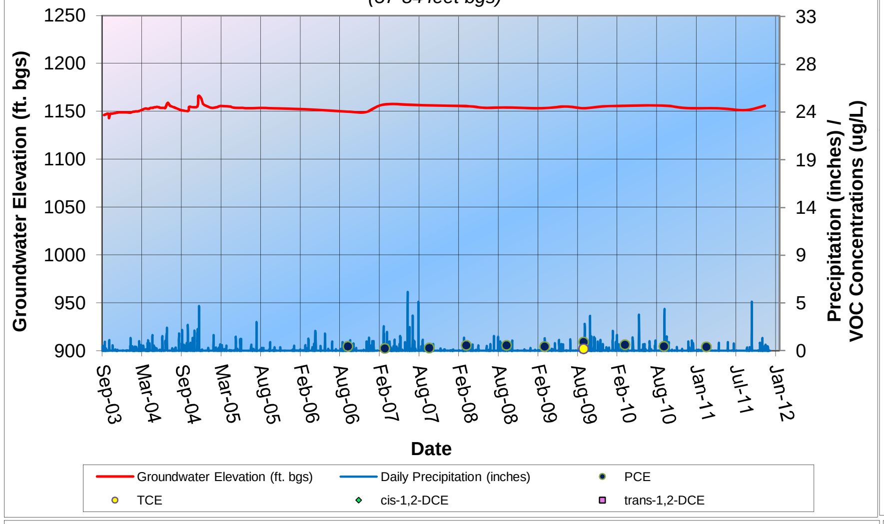
WB04-UGR01
(47-52 feet bgs)



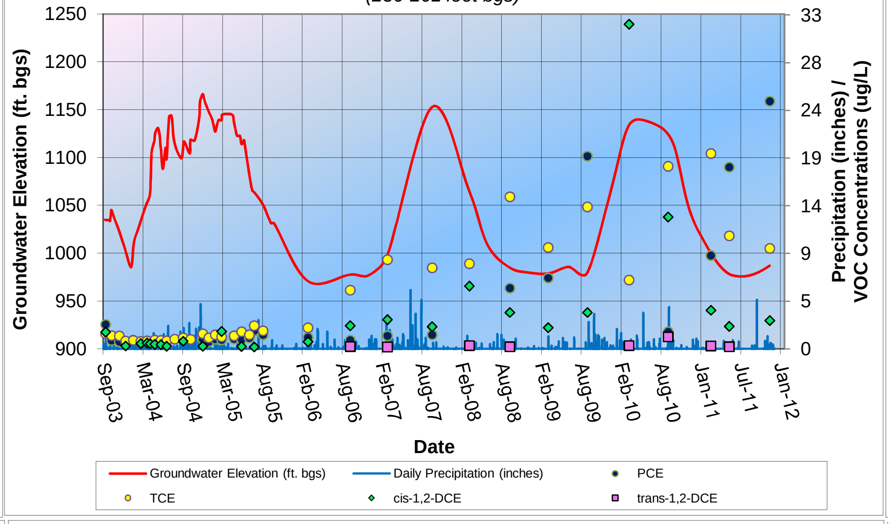
WB04-LGR06
(204-231 feet bgs)



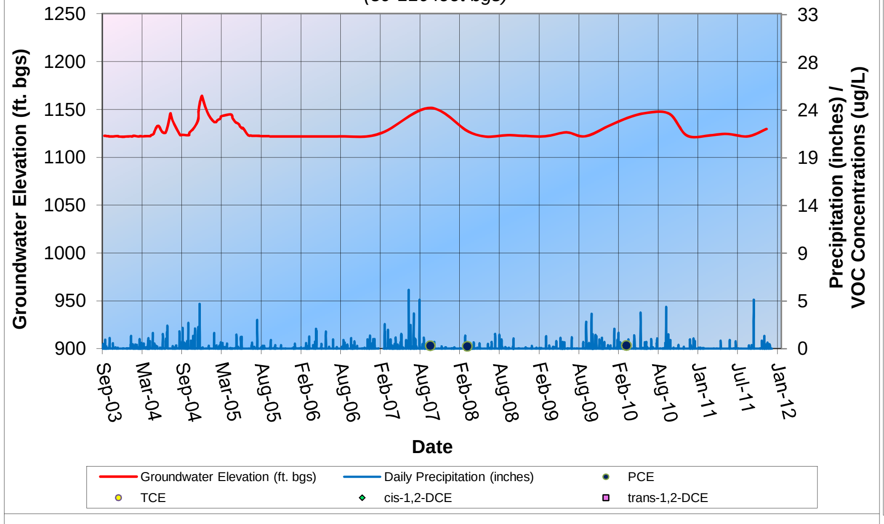
WB04-LGR01
(57-84 feet bgs)



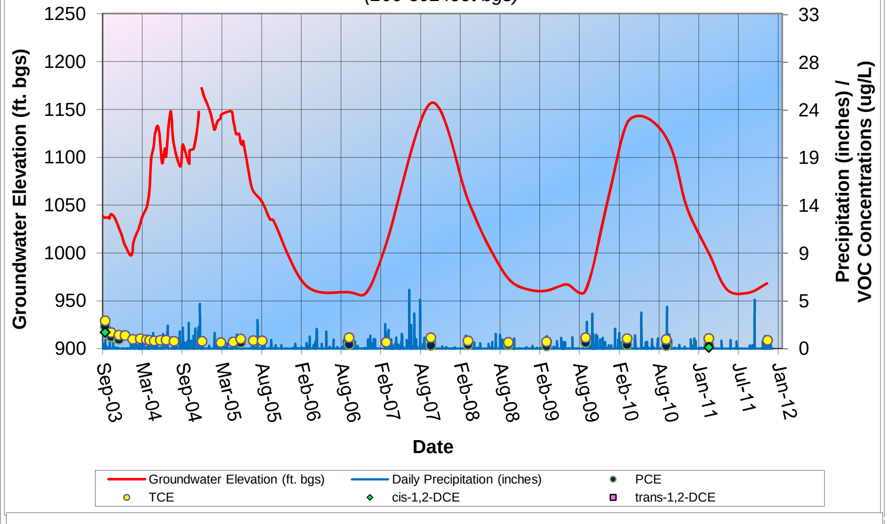
WB04-LGR07
(236-261 feet bgs)



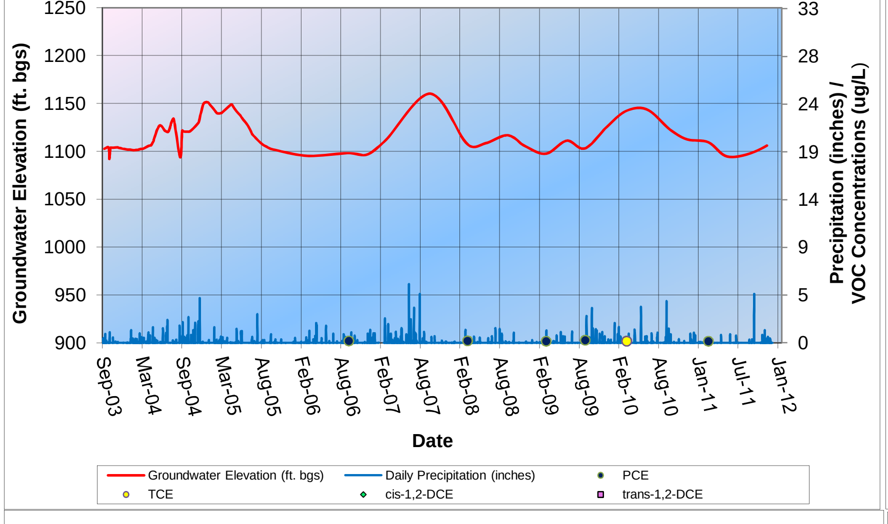
WB04-LGR02
(89-110 feet bgs)



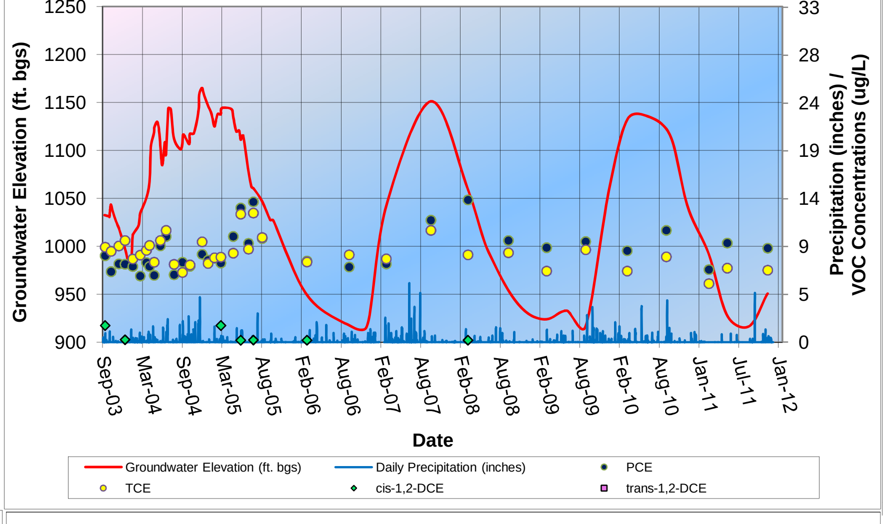
WB04-LGR08
(266-302 feet bgs)



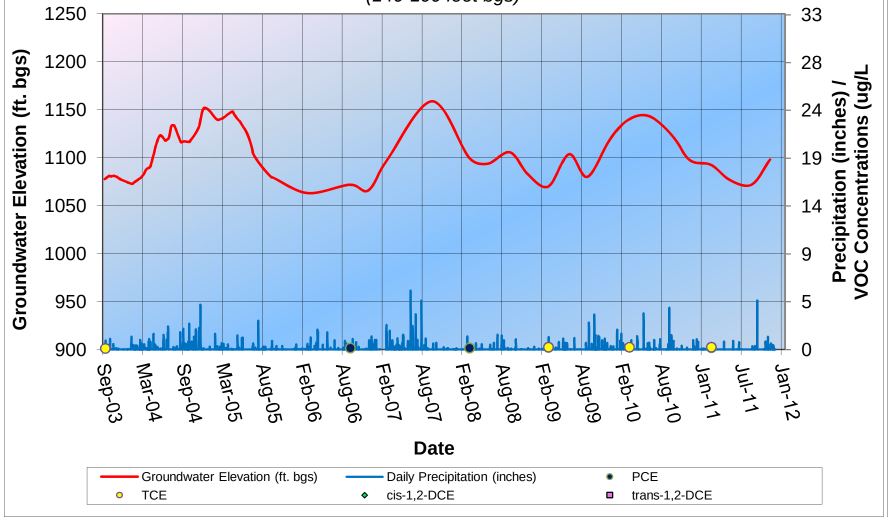
WB04-LGR03
(115-135 feet bgs)



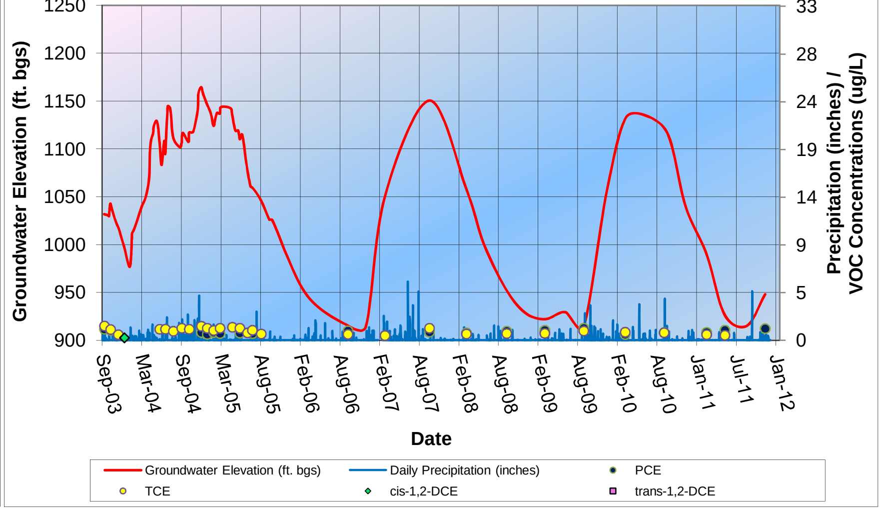
WB04-LGR09
(307-320 feet bgs)



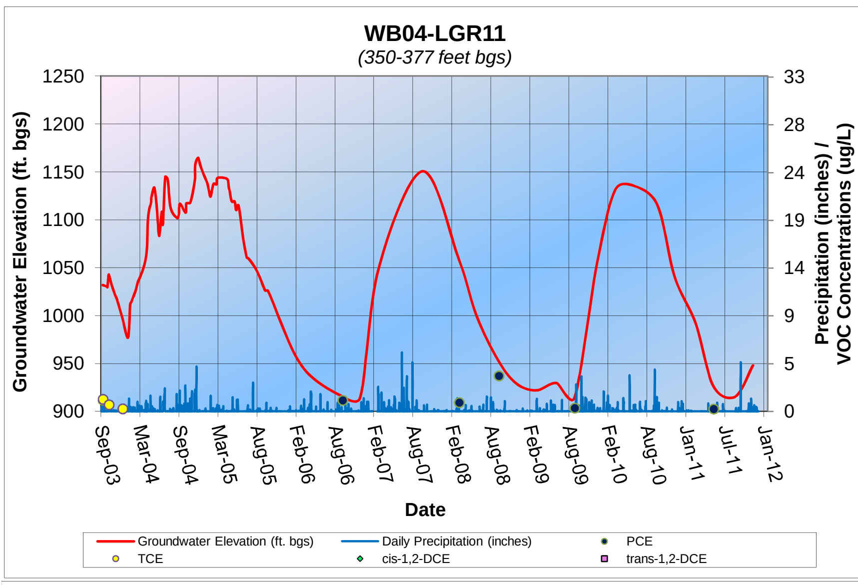
WB04-LGR04
(140-199 feet bgs)

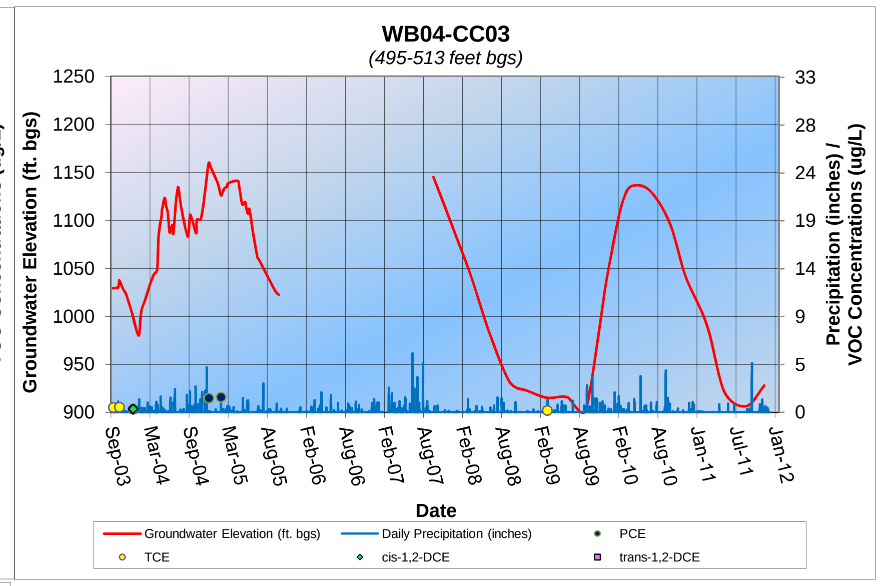


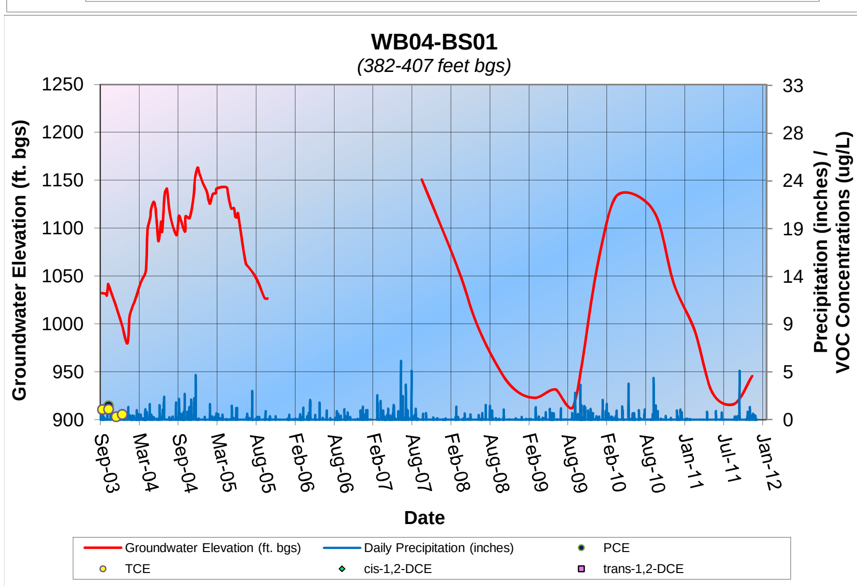
WB04-LGR10
(325-345 feet bgs)

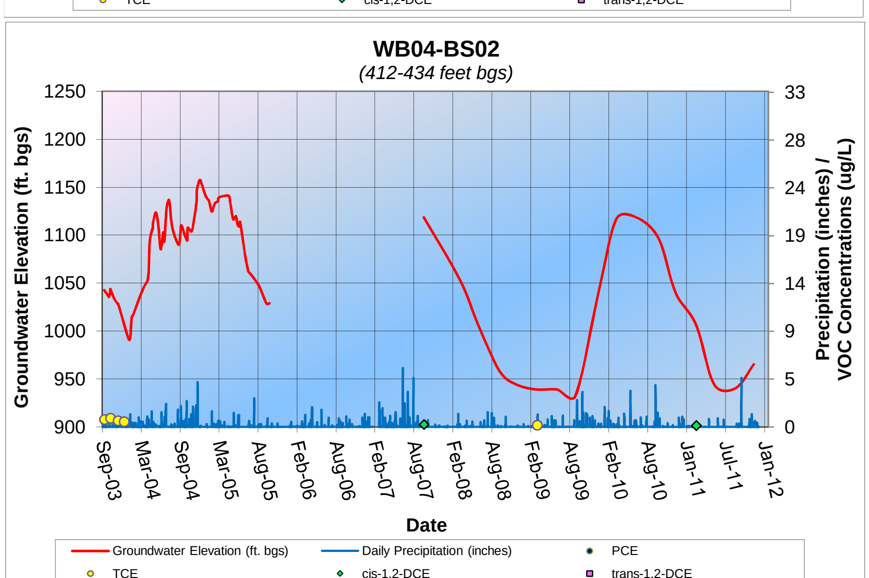


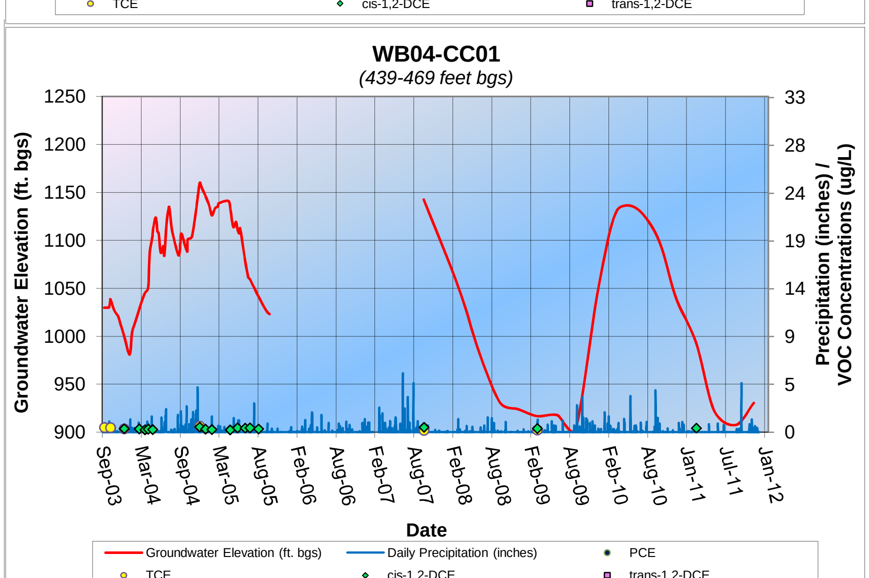
Appendix D.4
CS-WB04
VOC Concentrations / Precipitaiton / Groundwater Elevation
(VOC concentrations in micrograms / liter)

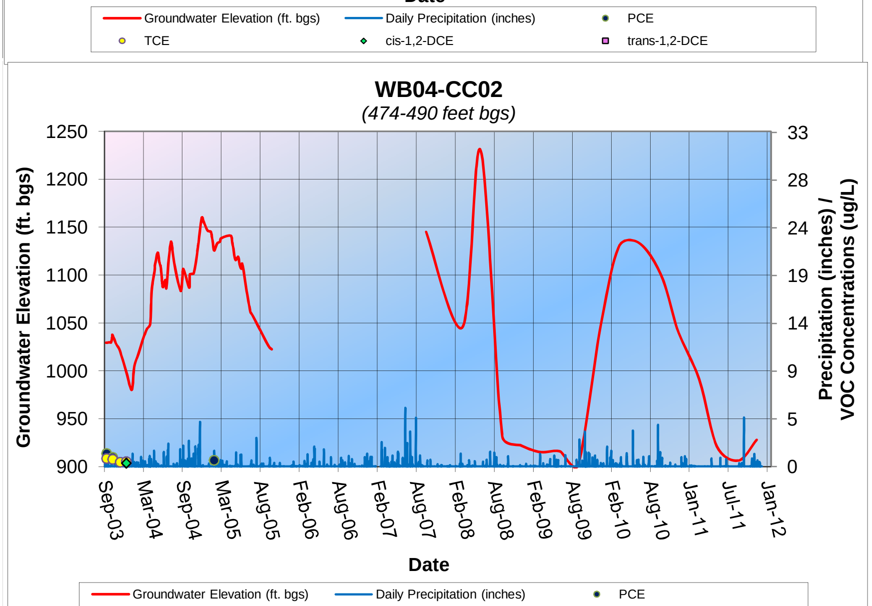












APPENDIX E

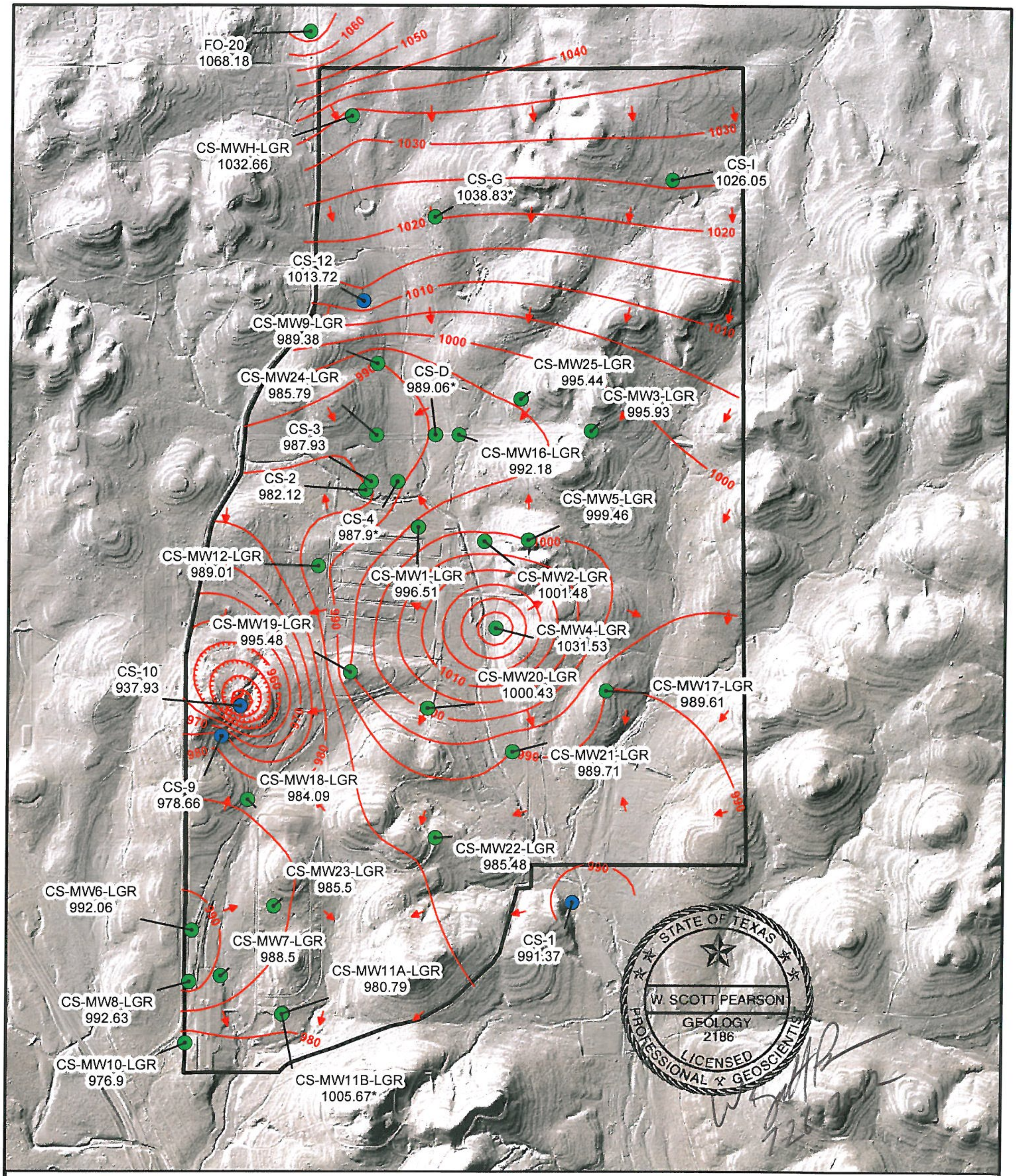
DROUGHT CONTINGENCY PLAN TRIGGERS

CSSA Drought Contingency Plan

Triggering Conditions	***Stage***	***Restrictions***
CS-10 water level > 180 ft bgl.	1) ***Mild*** Water Shortage	Voluntary Restrictions • Discontinue flushing water mains as practical/prudent. • No landscape watering between 1000 to 2000 hours • No car washing at homes (except during watering times), use CSSA car wash that recycles water. • CSSA Car Wash to be operated in water recycling mode. • Water customers encouraged to practice water conservation and minimize or discontinue non-essential water use. • Construction contractors required to quantify water use.
CS-10 Ambient water level > 211 ft bgl.	2) ***Moderate*** Water Shortage	Mandatory Restrictions • All of Stage 1 restrictions apply and • Sprinkler watering reduced to 15 minutes per segment, 2 days/week. • Hand water allowed before 1000 and after 2000. • No water use for ornamental outdoor fountains. • Water for construction work allowed under special permit. • Construction contractors limited to 90% of documented water use.
CS-10 Ambient water level > 238 ft bgl.	3) ***Severe*** Water Shortage	Mandatory Restrictions • All of Stage 1 & 2 restrictions apply and • Sprinkler watering reduced to 15 minutes per segment, 1 day/week. • Hand water allowed before 0700 and after 2100. • Construction contractors limited to 80% of documented water use.
CS-10 Ambient water level > 263 ft bgl.	4) ***Critical*** Water Shortage	Mandatory Restrictions • All of Stage 1, 2 & 3 restrictions apply and • Sprinkler watering reduced to 7 minutes per segment, 1 day/week. • Hand water of ornamental plants, shrubs, & trees allowed between 0700 and 1100. No hand held watering of turf or grass. • • Construction contractors limited to 50% of documented water use
CS-10 Drawdown water level > 396 ft bgl. or major water line break, pump malfunction, etc.	5) ***Emergency*** Water Shortage	Mandatory Restrictions • All of Stage 1, 2, 3, & 4 restrictions apply and • No sprinkler use. No hand watering. • Use of water for construction projects considered on case by case basis. • • CSSA Installation Manager, Branch Managers, and post residents to meet within 48 hours to consider and adopt rules restricting non-discretionary and discretionary water use.

APPENDIX F

POTENTIOMETRIC MAPS FOR MARCH, JUNE, SEPTEMBER, DECEMBER 2011



N
W E
S

0 1,200 2,400 3,600 4,800 Feet

- Flow direction
- LGR Groundwater Contours
- Outer fence
- LGR Wells and groundwater elevation (ft above msl)
- Drinking water wells (may be completed in LGR, BS, and/or CC)

* Not a fully penetrating well into LGR. Groundwater elevation not used in contouring

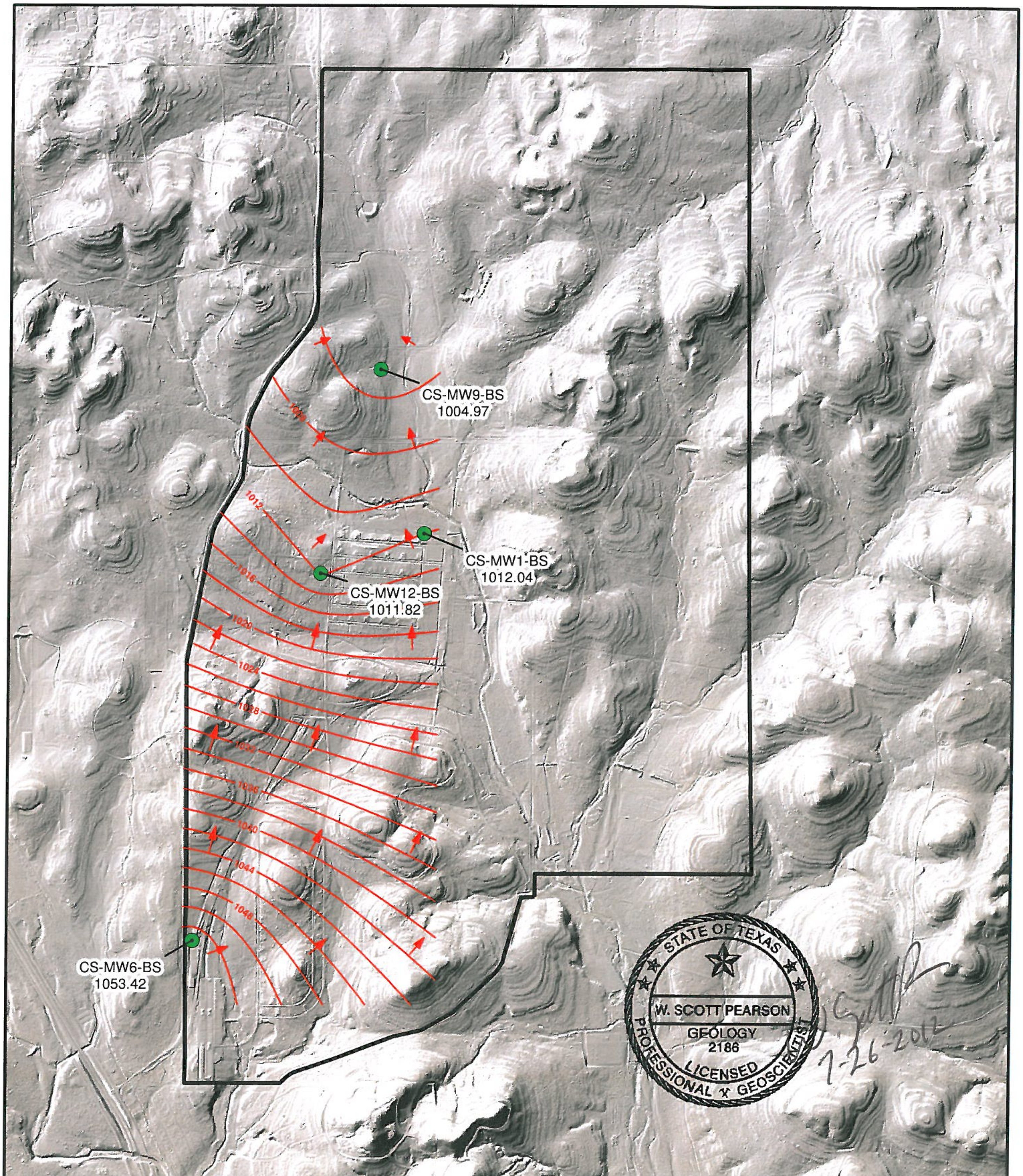
Figure F.1

March 2011 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

J:\CSSA\GIS\Groundwater\Maps\csm_figs\Mar11_potentiometric_lgr.mxd - 7/28/2011 @ 12:46:33 PM



Flow direction

BS Groundwater Contours

Outer fence

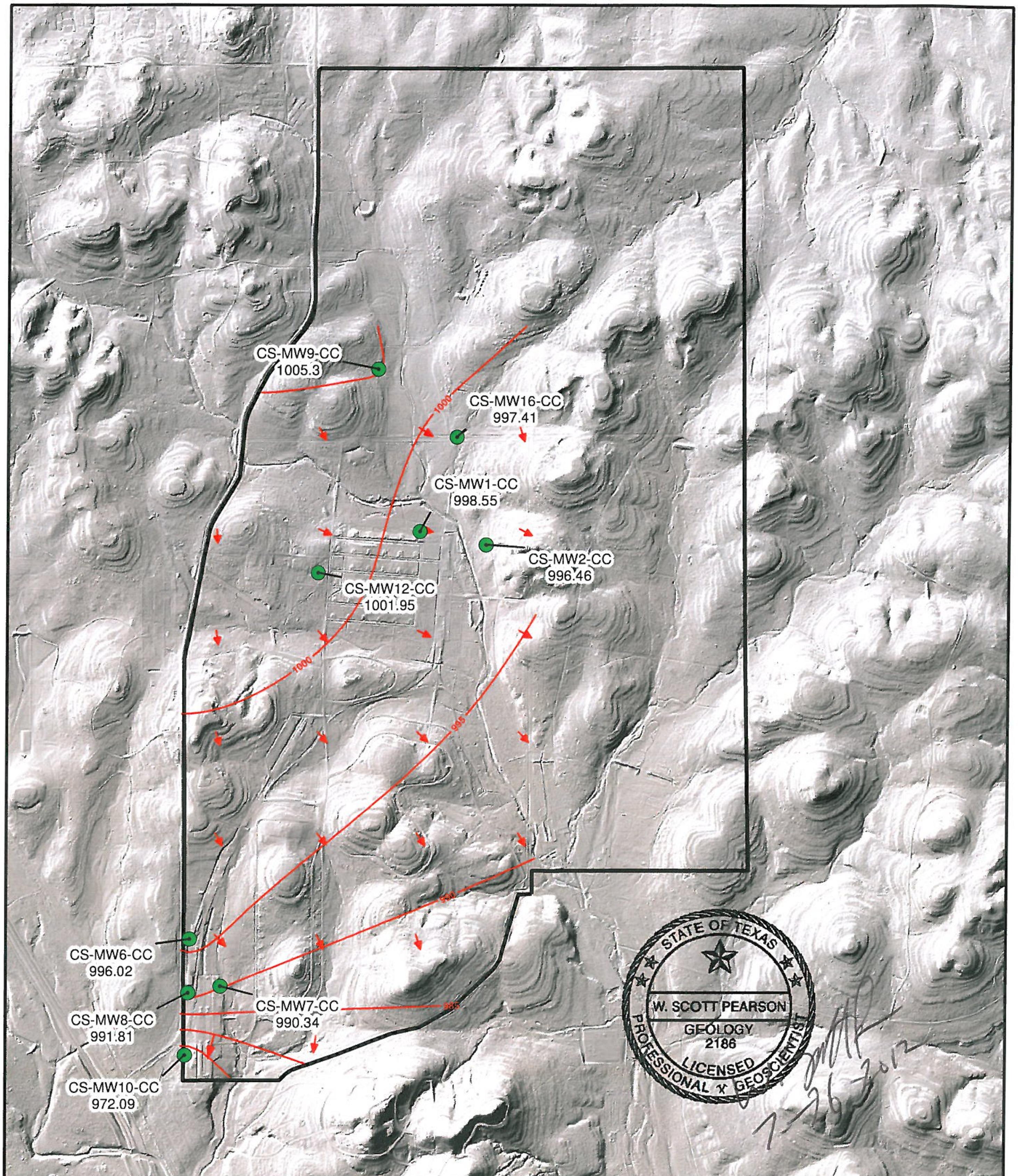
BS Wells and groundwater elevation (ft above msl)

Figure F.2

March 2011 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

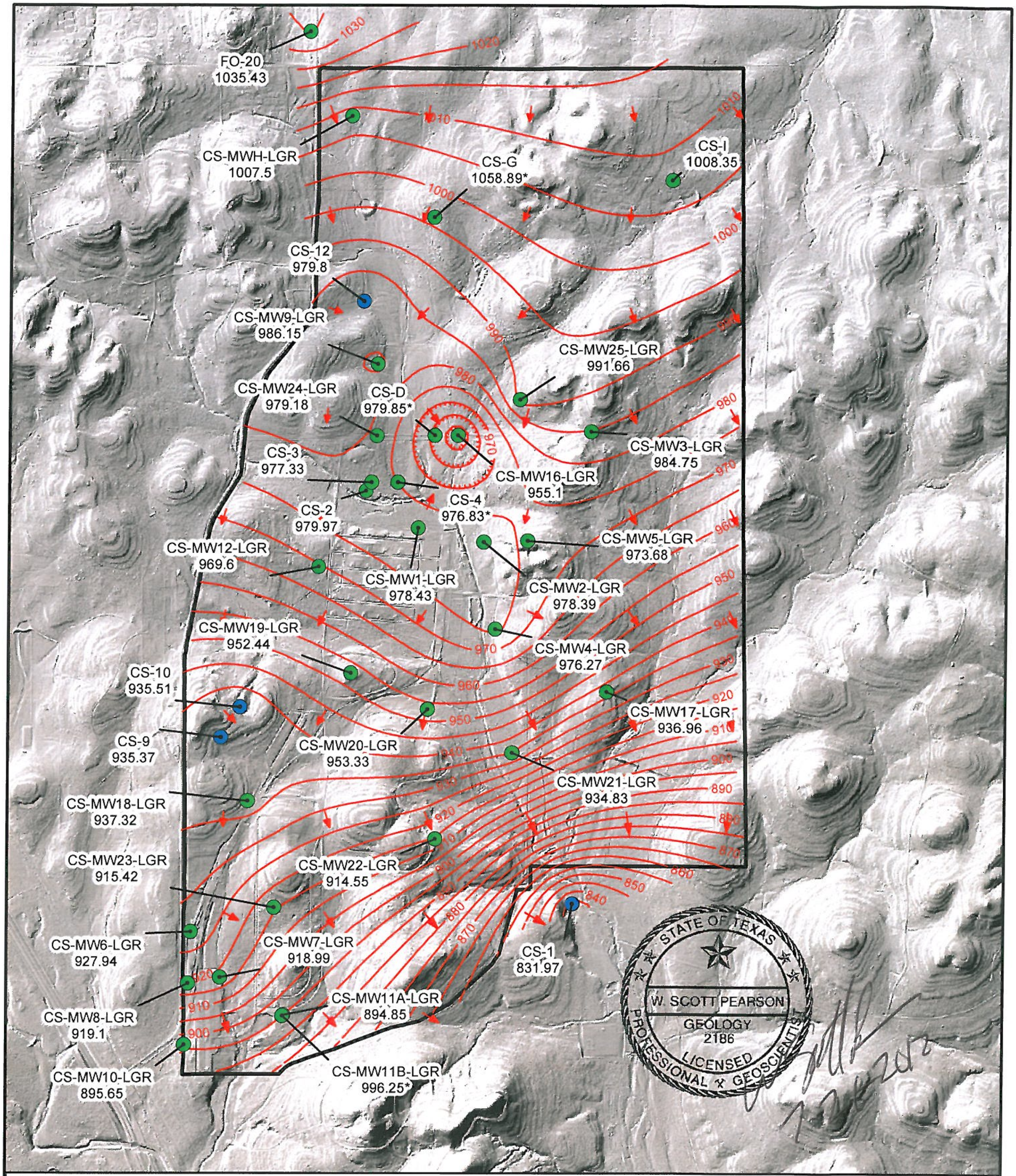


N
W E
S

0 1,200 2,400 3,600 4,800
Feet

- Flow direction
- CC Groundwater Contours
- Outer fence
- CC Wells and groundwater elevation (ft above msl)

Figure F.3
March 2011 Potentiometric Surface Map, CC Wells
Camp Stanley Storage Activity
PARSONS



N W E S

0 1,200 2,400 3,600 4,800 Feet

- Flow direction
- LGR Groundwater Contours
- Outer fence
- LGR Wells and groundwater elevation (ft above msl)
- Drinking water wells (may be completed in LGR, BS, and/or CC)

* Not a fully penetrating well into LGR. Groundwater elevation not used in contouring

Figure F.4

June 2011 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

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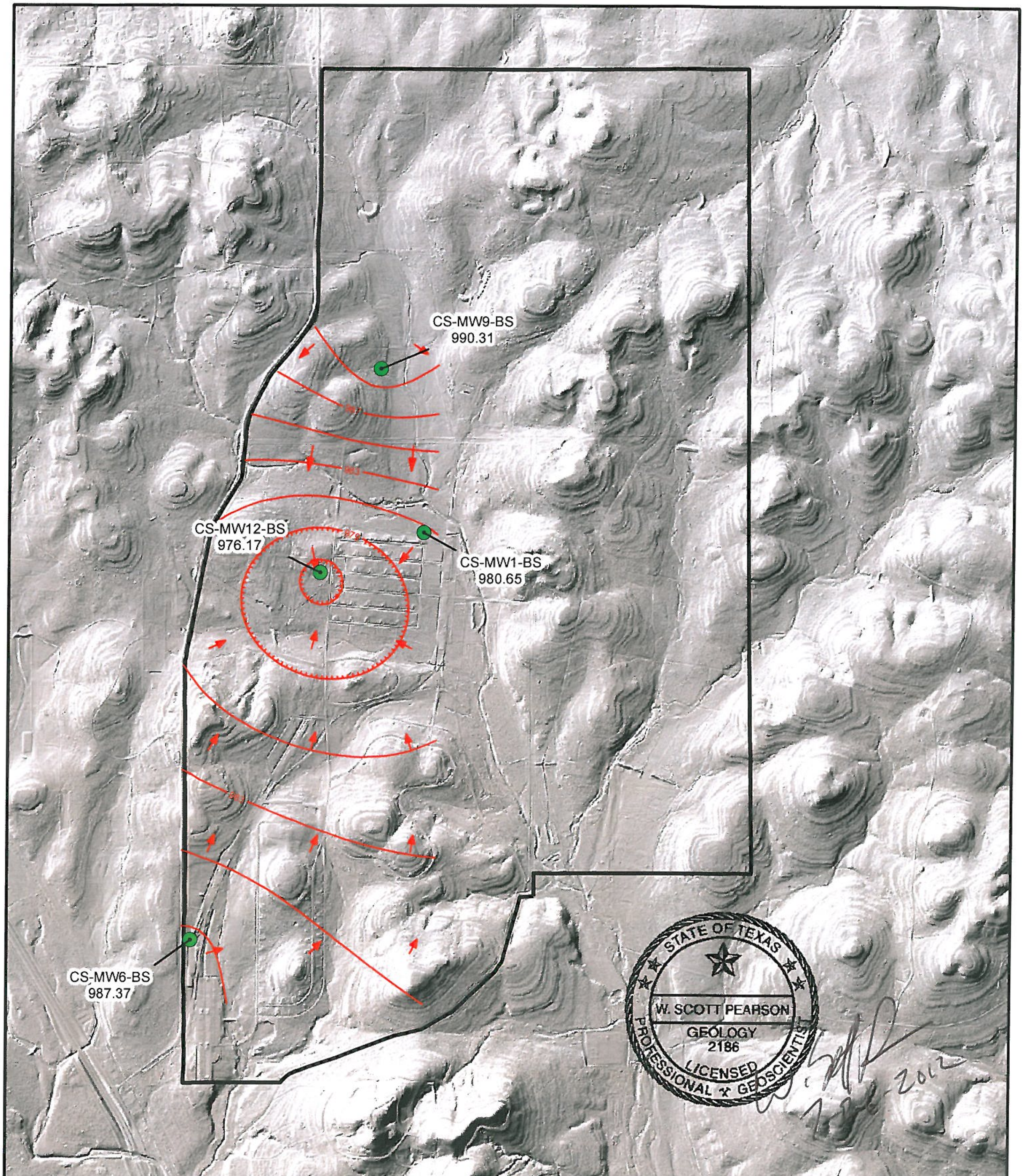


N
W E
S

0 1,200 2,400 3,600 4,800
Feet

Flow direction
BS Groundwater Contours
Outer fence
BS Wells and groundwater elevation (ft above msl)

Figure F.5

June 2011 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

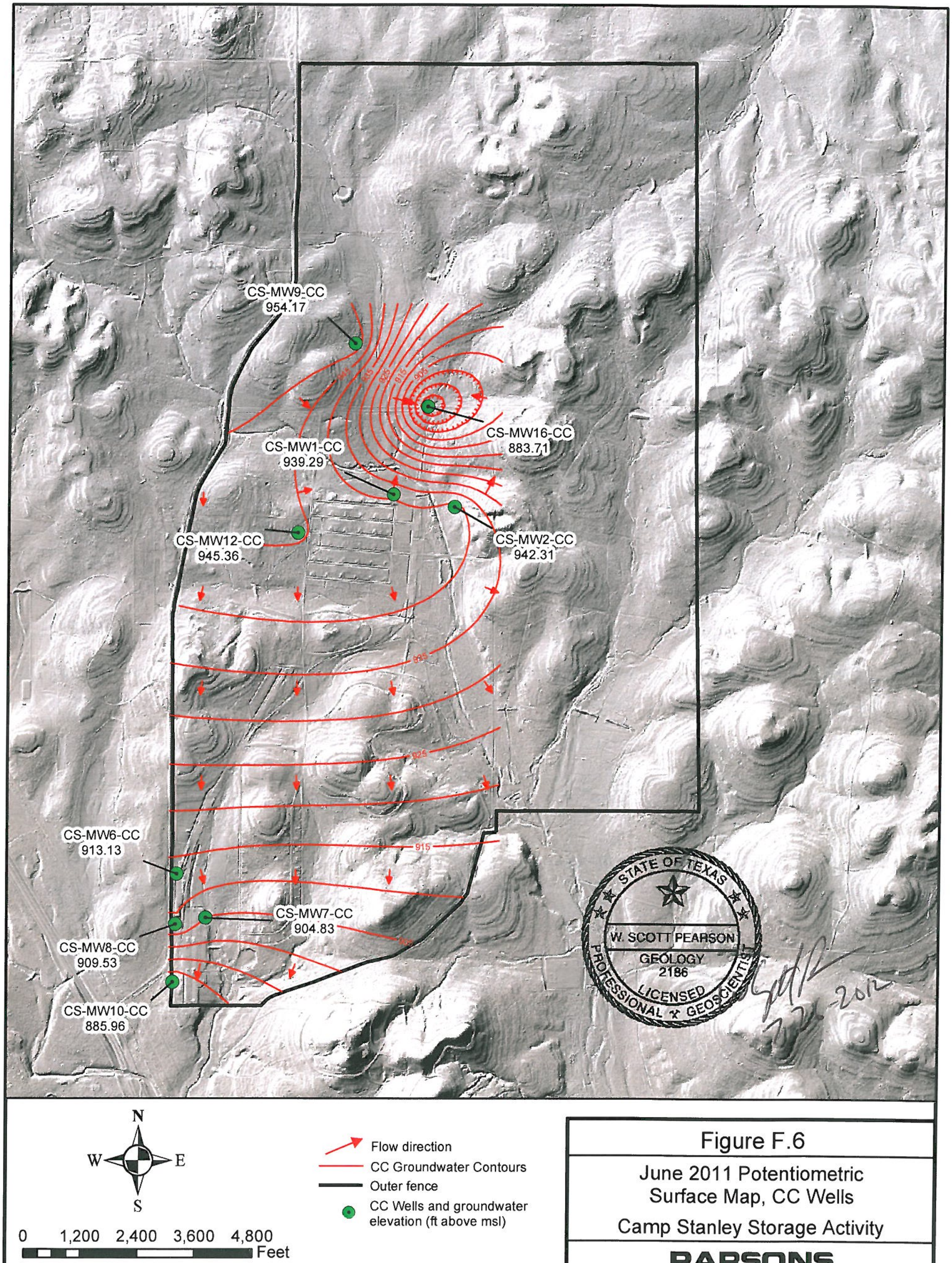
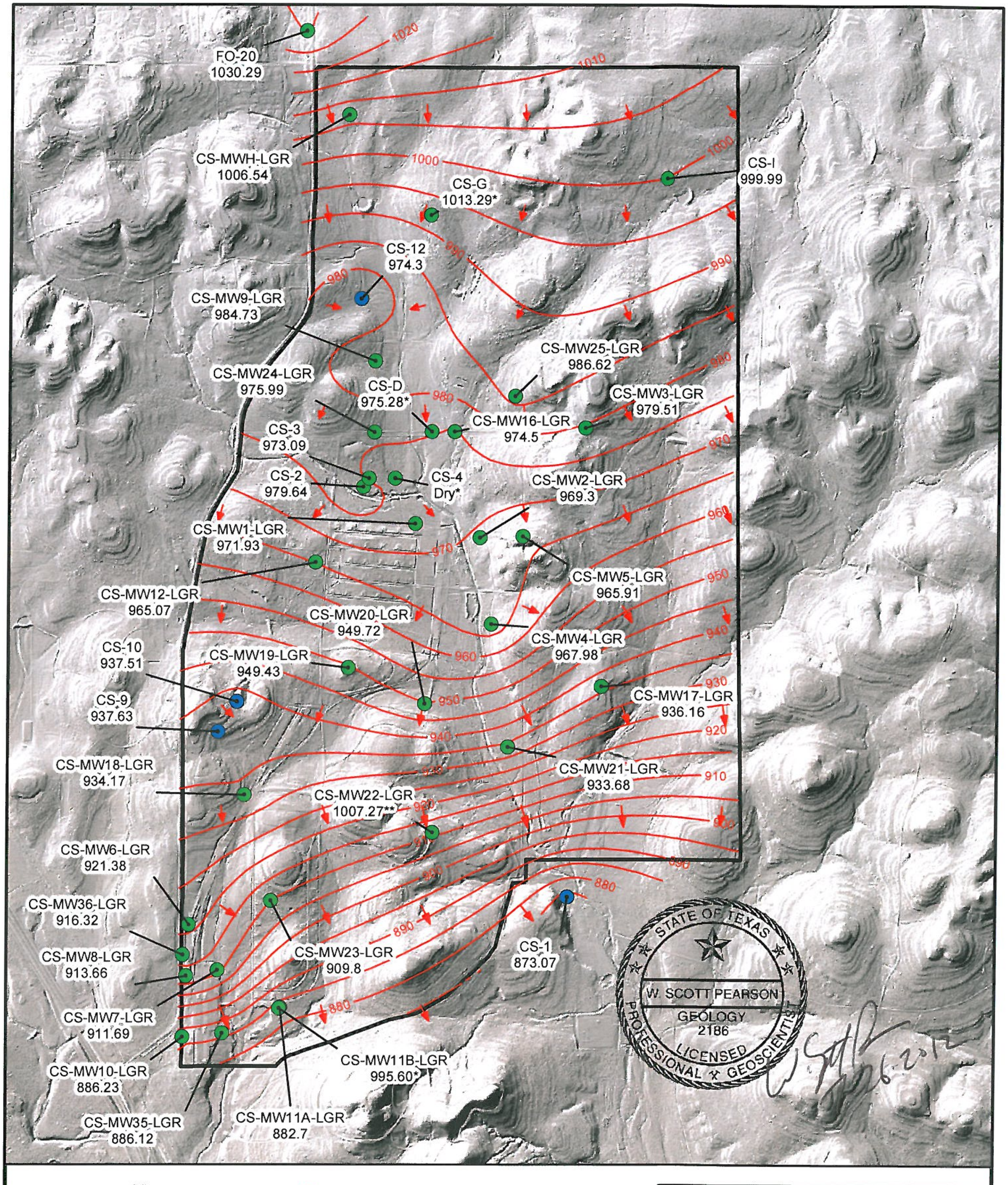


Figure F.6

June 2011 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS



N
W E
S

Flow direction
Outer fence
LGR Groundwater Contours
LGR Wells and groundwater elevation (ft above msl)
Drinking water wells (may be completed in LGR, BS, and/or CC)

0 1,200 2,400 3,600 4,800 Feet

* Not a fully penetrating well into LGR. Groundwater elevation not used in contouring
**Measured groundwater elevation is suspected to be incorrect and therefore not used in contouring

Figure F.7

September 2011 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

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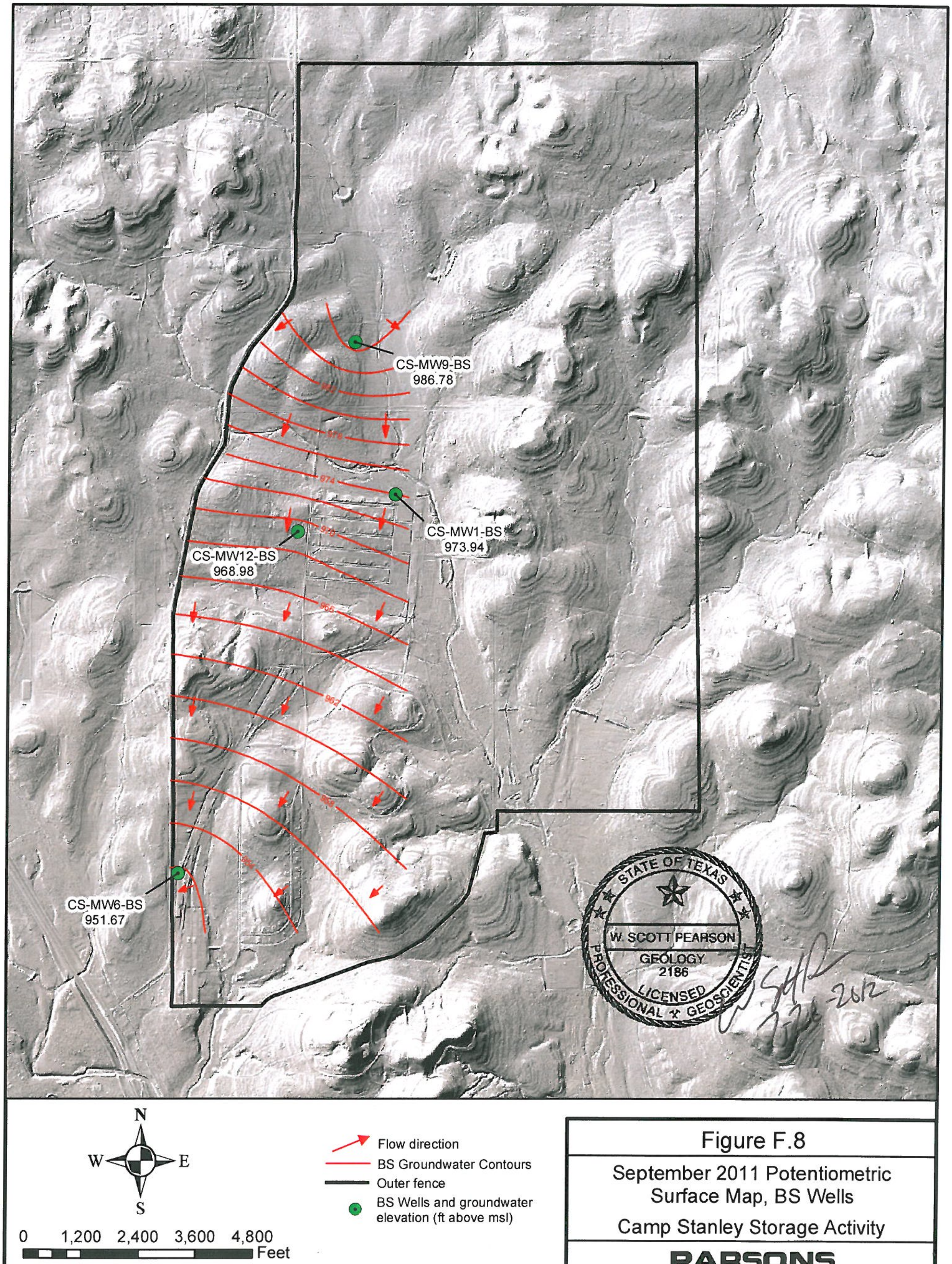

Figure F.8

September 2011 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

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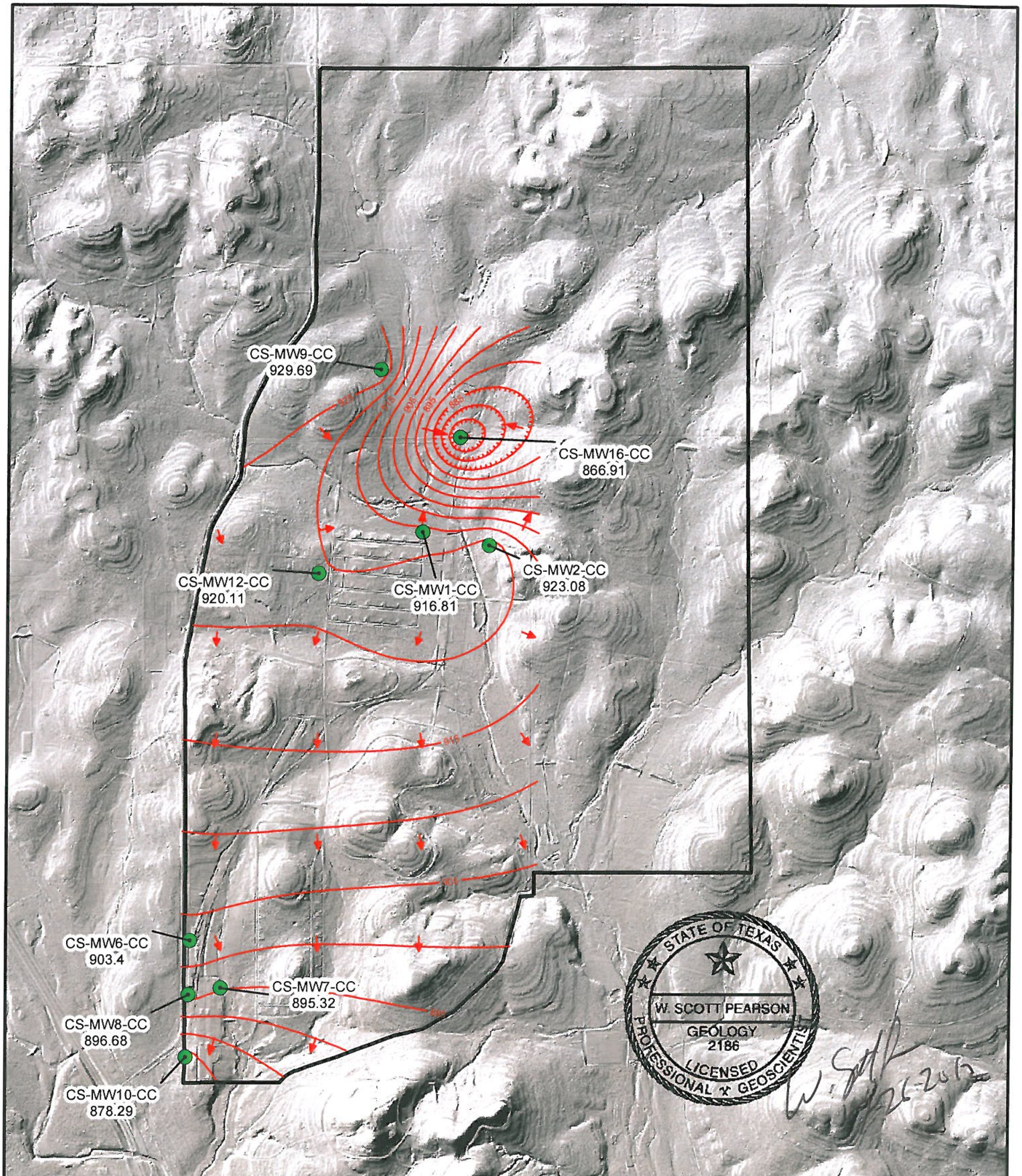

N
W E
S

0 1,200 2,400 3,600 4,800 Feet

Flow direction
CC Groundwater Contours
Outer fence
CC Wells and groundwater elevation (ft above msl)

Figure F.9

September 2011 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

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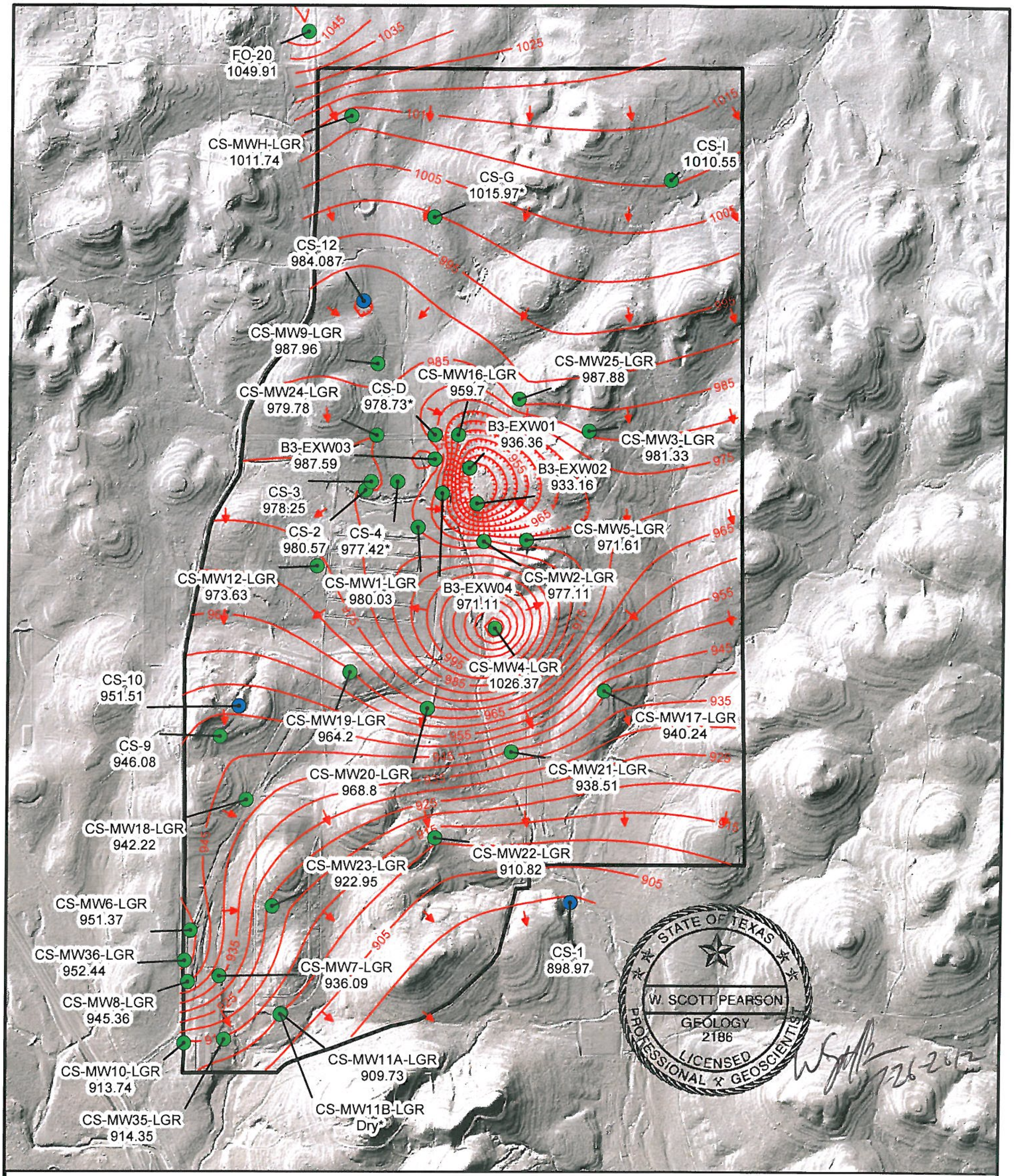

N / W / E / S

0 1,200 2,400 3,600 4,800 Feet

Flow direction

Outer fence

LGR Groundwater Contours

LGR Wells and groundwater elevation (ft above msl)

Drinking water wells (may be completed in LGR, BS, and/or CC)

* Not a fully penetrating well into LGR. Groundwater elevation not used in contouring

Figure F.10

December 2011 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

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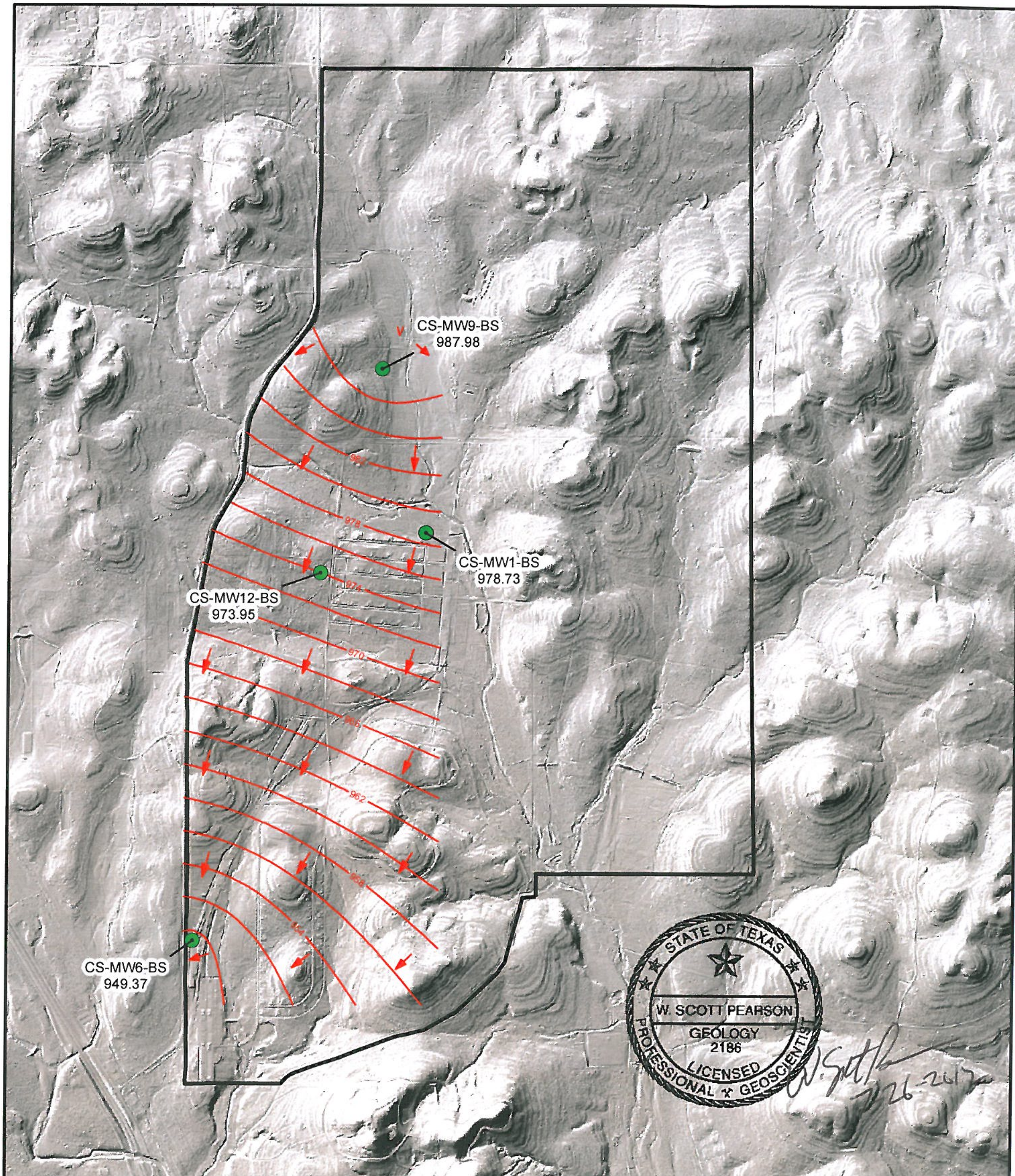

N
W E
S

0 1,200 2,400 3,600 4,800 Feet

Flow direction
BS Groundwater Contours
Outer fence
BS Wells and groundwater elevation (ft above msl)

Figure F.11

December 2011 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

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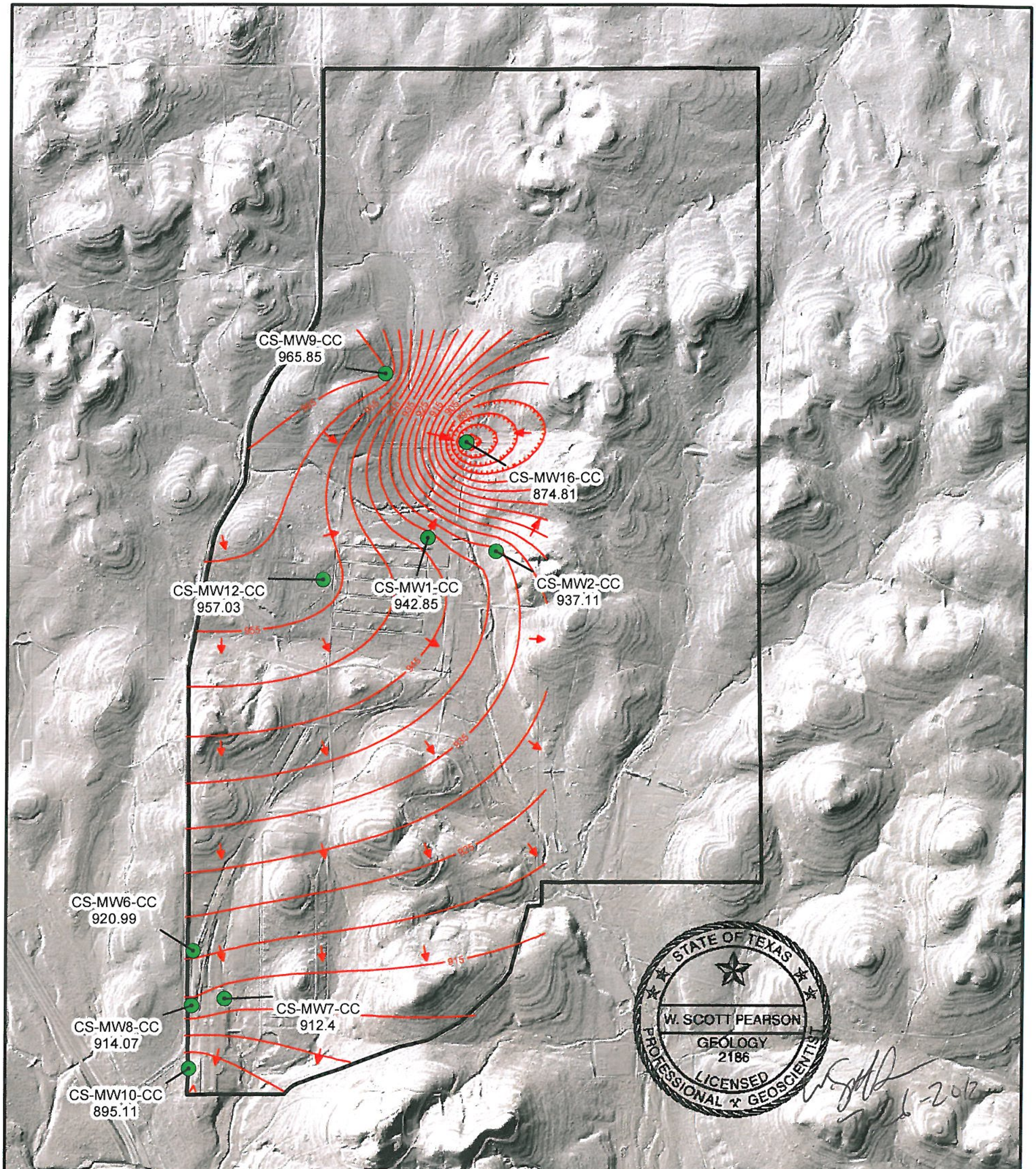

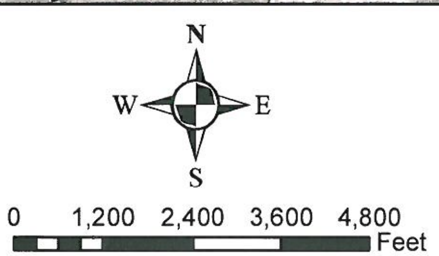

- Flow direction
- CC Groundwater Contours
- Outer fence
- CC Wells and groundwater elevation (ft above msl)

Figure F.12

December 2011 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

J:\CSSA\GIS\Groundwater\Maps\csm_figs\Dec11_potentiometric_cc.mxd - 2/3/2012 @ 1:35:57 PM

APPENDIX G

2011 QUARTERLY OFF-POST GROUNDWATER ANALYTICAL RESULTS

Appendix G
2011 Quarterly Off-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Tetra-chloroethene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)	pH	Temperature (°C)	Specific Conductivity (mS)
FO-8	3/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.09	21.90	0.499
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.21	22.00	0.567
FO-17	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.41	21.80	0.607
Duplicate	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.41	21.80	0.607
FO-22	3/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.26	21.20	0.472
Duplicate	3/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.26	21.20	0.472
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.98	22.20	0.592
FO-J1	3/3/2011	0.12U	0.07U	0.08U	**0.22F**	0.05U	0.08U	6.90	21.80	0.521
	6/2/2011	0.12U	0.07U	0.08U	**0.41F**	0.05U	0.08U	7.48	21.60	0.565
HS-1	3/3/2011	0.12U	0.07U	0.08U	**0.15F**	0.05U	0.08U	6.85	23.60	0.510
Duplicate	3/3/2011	0.12U	0.07U	0.08U	**0.15F**	0.05U	0.08U	6.85	23.60	0.510
	6/3/2011	0.12U	0.07U	0.08U	**0.16F**	0.05U	0.08U	7.08	23.70	0.591
HS-2	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.27	22.10	0.768
HS-3	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.20	24.40	0.581
I10-2	6/13/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.49	22.10	0.531
I10-4	3/1/2011	0.12U	0.07U	0.08U	**6**	**2.26**	0.08U	7.07	20.50	0.647
	5/31/2011	0.12U	0.07U	0.08U	**5.56J**	**1.97J**	0.08U	6.68	27.40	0.774
	9/7/2011	0.12U	0.07U	0.08U	**4.12**	**1.84**	0.08U	7.44	22.70	0.720
	12/6/2011	0.12U	0.07U	0.08U	**6.87**	**2.85**	0.08U	6.91	16.80	0.715
I10-5	3/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.97	22.40	0.502
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.22	22.70	0.635
Duplicate	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.22	22.70	0.635
I10-7	6/15/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.39	25.30	0.534
I10-8	3/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.83	22.10	0.526
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.24	22.20	0.599
I10-9	9/6/2011	0.12U	0.07U	0.08U	0.06U	**0.57F**	0.08U	6.55	21.70	0.527
Duplicate	9/6/2011	0.12U	0.07U	0.08U	0.06U	**0.32F**	0.08U	6.55	21.70	0.527
	12/19/2011	0.12U	0.07U	0.08U	0.06U	**1.29**	0.08U	7.04	20.50	0.537
JW-5	3/1/2011	0.12U	0.07U	0.08U	**0.12F**	0.05U	0.08U	7.43	19.20	0.502
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.23	24.20	0.600
JW-6	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.43	22.60	0.600
JW-7	3/3/2011	0.12U	0.07U	0.08U	**0.37F**	0.05U	0.08U	6.84	21.20	0.497
	6/7/2011	0.12U	0.07U	0.08U	**0.43F**	0.05U	0.08U	6.96	21.20	0.519
JW-8	3/1/2011	0.12U	0.07U	0.08U	**0.31F**	0.05U	0.08U	7.26	20.90	0.514
	6/1/2011	0.12U	0.07U	0.08U	**0.16F**	0.05U	0.08U	7.62	21.90	0.567
JW-9	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.63	21.10	0.534
JW-13	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.45	22.40	0.550
JW-14	3/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.95	21.80	0.538
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.49	22.10	0.576
JW-15	3/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.38	21.50	0.520
	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.94	21.30	0.532
Duplicate	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.94	21.30	0.532
JW-26	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.48	23.90	0.570
JW-27	3/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.74	20.90	0.577
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.32	21.00	0.653
JW-28	3/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.19	21.60	0.591
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.31	21.70	0.652
JW-29	3/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.23	21.10	0.577
	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.05	21.20	0.655
JW-30	3/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.31	19.80	0.523
	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.99	20.70	0.586
Duplicate	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.99	20.70	0.586
JW-31	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.21	27.10	0.609
LS-1	3/2/2011	0.12U	0.07U	0.08U	**0.28F**	0.05U	0.08U	6.77	21.30	0.538
	5/31/2011	0.12U	0.07U	0.08U	**0.49F**	0.05U	0.08U	7.00	26.50	0.657
LS-4	3/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.88	23.70	0.611
	5/31/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.90	25.70	0.686
LS-5	3/2/2011	0.12U	0.07U	0.08U	**1.10F**	**2.59**	0.08U	6.78	22.20	0.601
	5/31/2011	0.12U	0.07U	0.08U	**0.66F**	**2.36**	0.08U	6.33	22.40	0.672
	9/6/2011	0.12U	0.07U	0.08U	**1.38F**	**4.8**	0.08U	8.04	21.50	0.622
	9/28/2011	0.12U	0.07U	0.08U	**1.11F**	**2.54**	0.08U	8.10	21.60	0.623
	12/5/2011	0.12U	0.07U	0.08U	**1.05F**	**3.87**	0.08U	6.98	21.60	0.625
LS-6	2/28/2011	0.12U	0.07U	0.08U	**0.76F**	**0.85F**	0.08U	7.01	22.10	0.602
	5/31/2011	0.12U	0.07U	0.08U	**0.68F**	**0.90F**	0.08U	6.39	22.30	0.677

Appendix G
2011 Quarterly Off-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Tetra-chloroethene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)	pH	Temperature (°C)	Specific Conductivity (mS)
	9/6/2011	0.12U	0.07U	0.08U	**1.43**	**1.87**	0.08U	7.55	21.20	0.628
	12/5/2011	0.12U	0.07U	0.08U	**1.16F**	**2.41**	0.08U	6.92	21.60	0.602
LS-6-A2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
	9/6/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
LS-7	2/28/2011	0.12U	0.07U	0.08U	**2.88**	**0.43F**	0.08U	6.98	22.30	0.613
	5/31/2011	0.12U	0.07U	0.08U	**2.05**	0.05U	0.08U	6.46	22.40	0.683
	9/6/2011	0.12U	0.07U	0.08U	**4.35**	**1.02**	0.08U	7.47	22.20	0.632
	12/5/2011	0.12U	0.07U	0.08U	**2.48**	**1.03**	0.08U	6.61	21.90	0.633
LS-7-A2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
	9/6/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
OFR-1	3/3/2011	0.12U	0.07U	0.08U	**0.24F**	0.05U	0.08U	6.99	21.50	0.515
	6/1/2011	0.12U	0.07U	0.08U	**0.17F**	0.05U	0.08U	7.50	21.90	0.588
OFR-3	5/31/2011	0.12U	0.07U	0.08U	**3.33**	**1.91**	0.08U	6.57	22.50	0.606
	9/6/2011	0.12U	0.07U	0.08U	**7.72**	**5.14**	0.08U	7.85	21.40	0.557
	12/5/2011	0.12U	0.07U	0.08U	**3.67**	**3.14**	0.08U	6.85	19.70	0.550
OFR-3-A2	9/6/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
OFR-4	3/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.90	21.50	0.494
	6/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.01	22.00	0.512
OW-BARNOWL	2/28/2011	0.12U	0.07U	0.08U	**0.15F**	0.05U	0.08U	7.14	21.70	0.547
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.20	21.80	0.600
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.26	21.70	0.570
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.44	21.00	0.590
Duplicate	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.44	21.00	0.590
OW-CE1	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.08	21.40	0.722
Duplicate	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.08	21.40	0.722
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.18	21.60	0.700
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.16	21.40	0.667
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.99	20.90	0.674
OW-CE2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	22.40	0.561
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.05	22.50	0.600
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.53	22.10	0.594
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.49	21.60	0.594
OW-DAIRYWELL	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.11	22.50	0.562
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.23	22.40	0.600
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.48	22.30	0.541
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.57	21.40	0.550
OW-HH1	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.03	21.50	0.732
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.25	21.70	0.822
Duplicate	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.25	21.70	0.822
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.15	21.30	0.780
Duplicate	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.15	21.30	0.780
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.48	20.90	0.764
OW-HH2	2/28/2011	0.12U	0.07U	0.08U	**0.20F**	0.05U	0.08U	7.14	22.10	0.544
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.41	22.30	0.626
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.41	22.00	0.559
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.57	21.00	0.571
OW-HH3	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	21.70	0.532
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.03	22.10	0.600
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.51	21.80	0.542
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.18	21.40	0.620
OW-MT2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.11	22.50	0.562
	6/1/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.29	22.00	0.600
	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.39	22.10	0.575
	12/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.34	21.30	0.695
RFR-3	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.47	21.60	0.556
RFR-4	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.39	20.30	0.654
RFR-5	6/2/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.52	21.90	0.565
RFR-8	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.04	22.40	0.554
RFR-9	6/13/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.29	21.50	0.516
RFR-10	2/28/2011	0.12U	**0.39F**	0.08U	**30.98**	**13.03**	0.08U	7.07	22.50	0.575
	5/31/2011	0.12U	0.07U	0.08U	**4.4**	0.05U	0.08U	6.76	22.50	0.652
	9/6/2011	0.12U	0.07U	0.08U	**6.75**	**1.79**	0.08U	8.05	21.60	0.614
	12/5/2011	0.12U	0.07U	0.08U	**11.41**	**3.9**	0.08U	7.12	21.10	0.606
RFR-10-A2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA

Appendix G
2011 Quarterly Off-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	1,1-Dichloroethene (ug/L)	*cis*-1,2-Dichloroethene (ug/L)	*trans*-1,2-Dichloroethene (ug/L)	Tetrachloroethene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)	pH	Temperature (°C)	Specific Conductivity (mS)
	9/6/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
RFR-10-B2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
Duplicate	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
	9/6/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
RFR-11	2/28/2011	0.12U	0.07U	0.08U	**0.68F**	**1.37**	0.08U	7.13	23.10	0.567
	5/31/2011	0.12U	0.07U	0.08U	0.06U	**1.92**	0.08U	6.86	26.10	0.608
	9/6/2011	0.12U	0.07U	0.08U	**0.64F**	**4.81**	0.08U	7.82	25.00	0.566
	12/5/2011	0.12U	0.07U	0.08U	**0.62F**	**2.69**	0.08U	7.12	22.80	0.586
Duplicate	12/5/2011	0.12U	0.07U	0.08U	**0.84F**	**3.11**	0.08U	7.12	22.80	0.586
RFR-11-A2	2/28/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
	9/6/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	NA	NA	NA
RFR-12	6/15/2011	0.12U	0.07U	0.08U	**0.20F**	**0.63F**	0.08U	7.44	22.70	0.542
	9/7/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.91	22.70	0.545
RFR-13	6/3/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.07	23.80	0.596
RFR-14	3/3/2011	0.12U	0.07U	0.08U	**0.11F**	0.05U	0.08U	7.11	16.90	0.537
	6/3/2011	0.12U	0.07U	0.08U	**0.20F**	0.05U	0.08U	7.14	24.30	0.570
SLD-01	9/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.50	21.40	0.611

BOLD (shaded)	≥ MCL
BOLD (boxed)	≥ RL
BOLD	≥ MDL

Notes:
- µg/L = micrograms per liter
-mS = millisiemans
- RL = reporting limit
- MCL = maximum contaminant level
- MDL = method detection limit
- VOCs analyzed using laboratory method SW8260B.
- *Duplicate* = field duplicate
- F = The analyte was positively identified but the associated numerical value is below the RL.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA

APPENDIX H

PRE- AND POST-GAC SAMPLE COMPARISONS FOR WELLS LS-6, LS-7, RFR-10, RFR-11 AND OFR-3

APPENDIX H

PRE- AND POST-GAC SAMPLE COMPARISONS FOR WELLS LS-5, LS-6, LS-7, RFR-10, RFR-11 AND OFR-3

LS-5				
	PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post
3/2/2011	1.1F	NA	2.59	NA
5/31/2011	0.66F	NA	2.36	NA
9/6/2011	1.38F	NA	4.80	NA
9/28/2011	1.11F	NA	2.54	NA
GAC unit installed 10/6/2011				
12/5/2011	1.05F	NA	3.87	NA

LS-6				
	PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post
2/28/2011	0.76F	ND	0.85F	ND
5/31/2011	0.68F	NA	0.90F	NA
9/6/2011	1.43	ND	1.87	ND
12/5/2011	1.16F	NA	2.41	NA

LS-7				
	PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post
2/28/2011	2.88	ND	0.43F	ND
5/31/2011	2.05	NA	ND	NA
9/6/2011	4.35	ND	1.02	ND
12/5/2011	2.48	NA	1.03	NA

RFR-10				
	PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post
2/28/2011	30.98	ND/ND	13.03	ND/ND
5/31/2011	4.4	NA	ND	NA
9/6/2011	6.75	ND/ND	1.79	ND/ND
12/5/2011	11.41	NA	3.9	NA

RFR-11				
	PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post
2/28/2011	0.68F	ND	1.37	ND
5/31/2011	ND	NA	1.92	NA
9/6/2011	0.64F	ND	4.81	ND
12/5/2011	0.62F	NA	2.69	NA

OFR-3				
	PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post
2/28/2011	No sample due to expired access agreement.			
5/31/2011	3.33	NA	1.91	NA
9/6/2011	7.72	ND	5.14	ND
12/5/2011	3.67	NA	3.14	NA

NA – not applicable (post-GAC not sampled during this event) ND – indicates analyte was not detected at or above the MDL.

APPENDIX I

WELL CS-12 ANALYTICAL RESULTS

Appendix I
Well CS-12 Analytical Results

SAMPLE ID:		CS-12	CS-12-DUP	CS-12	CS-12	CS-12-DUP	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12-DUP
DATE SAMPLED:		3/25/2009	3/25/2009	9/14/2009	12/14/2009	12/14/2009	3/9/2010	6/14/2010	9/17/2010	12/8/2010	6/7/2011	7/27/2011	9/14/2011	10/12/2011	11/15/2011	12/15/2011	12/15/2011
LAB SAMPLE ID:		AX93654	AX93655	AY03397	AY09118	AY09119	AY12571	AY16809	AY22093	AY28752	AY39436	AY43242	AY46384	AY48404	AY50763	AY52119	AY52120
	Units																
Volatile Organics - SW8260B																	
1,1,1,2-Tetrachloroethane	µg/L	0.090 U	0.090 U														
1,1,1-Trichloroethane	µg/L	0.030 U	0.030 U														
1,1,2,2-Tetrachloroethane	µg/L	0.070 U	0.070 U														
1,1,2-Trichloroethane	µg/L	0.060 U	0.060 U														
1,1-Dichloroethane	µg/L	0.070 U	0.070 U														
1,1-Dichloroethene	µg/L	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.30 U	0.12 U	0.12 U	0.12 U	0.12 U		0.12 U			0.12 U	0.12 U
1,1-Dichloropropene	µg/L	0.10 U	0.10 U														
1,2,3-Trichlorobenzene	µg/L	0.24 U	0.24 U														
1,2,3-Trichloropropane	µg/L	0.17 U	0.17 U														
1,2,4-Trichlorobenzene	µg/L	0.16 U	0.16 U														
1,2,4-Trimethylbenzene	µg/L	0.040 U	0.040 U														
1,2-Dibromo-3-chloropropane	µg/L	0.76 U	0.76 U														
1,2-Dibromoethane (EDB)	µg/L	0.060 U	0.060 U														
1,2-Dichlorobenzene	µg/L	0.020 U	0.020 U														
1,2-Dichloroethane	µg/L	0.050 U	0.050 U														
1,2-Dichloropropane	µg/L	0.060 U	0.060 U														
1,3,5-Trimethylbenzene (Mesitylene)	µg/L	0.040 M	0.040 U														
1,3-Dichlorobenzene	µg/L	0.030 U	0.030 U														
1,3-Dichloropropane	µg/L	0.050 U	0.050 U														
1,4-Dichlorobenzene	µg/L	0.070 U	0.070 U														
1-Chlorohexane	µg/L	0.040 U	0.040 U														
2,2-Dichloropropane	µg/L	0.10 M	0.10 U														
2-Chlorotoluene	µg/L	0.040 U	0.040 U														
4-Chlorotoluene	µg/L	0.040 U	0.040 U														
Benzene	µg/L	0.070 U	0.070 U														
Bromobenzene	µg/L	0.060 U	0.060 U														
Bromochloromethane	µg/L	0.11 U	0.11 U														
Bromodichloromethane	µg/L	0.060 U	0.060 U														
Bromoform	µg/L	0.13 U	0.13 U														
Bromomethane	µg/L	0.080 U	0.080 U														
Carbon tetrachloride	µg/L	0.060 U	0.060 U														
Chlorobenzene	µg/L	0.040 U	0.040 U														
Chloroethane	µg/L	0.070 U	0.070 U														
Chloroform	µg/L	**1.5**	**1.4**														
Chloromethane	µg/L	0.16 U	0.16 U														
cis-1,2-Dichloroethene	µg/L	0.070 U	0.070 U	0.070 U	0.070 U	0.070 U	0.16 U	0.070 U	0.070 U	0.070 U	0.070 U		0.070 U			0.070 U	0.070 U
cis-1,3-Dichloropropene	µg/L	0.030 U	0.030 U														
Dibromochloromethane	µg/L	0.060 U	0.060 U														
Dibromomethane	µg/L	0.060 U	0.060 U														
Dichlorodifluoromethane	µg/L	0.11 U	0.11 U														
Ethylbenzene	µg/L	0.050 U	0.050 U														
Hexachlorobutadiene	µg/L	0.17 U	0.17 U														
Isopropylbenzene	µg/L	0.040 U	0.040 U														
m,p-Xylene	µg/L	0.070 U	0.070 U														
Methylene chloride	µg/L	0.51 U	0.51 U														
Naphthalene	µg/L	0.070 U	0.070 U														
n-Butylbenzene	µg/L	0.17 U	0.17 U														
n-Propylbenzene	µg/L	0.030 U	0.030 U														
o-Xylene	µg/L	0.060 U	0.060 U														

Appendix I
Well CS-12 Analytical Results

SAMPLE ID: DATE SAMPLED: LAB SAMPLE ID:	Units	CS-12 3/25/2009 AX93654	CS-12-DUP 3/25/2009 AX93655	CS-12 9/14/2009 AY03397	CS-12 12/14/2009 AY09118	CS-12-DUP 12/14/2009 AY09119	CS-12 3/9/2010 AY12571	CS-12 6/14/2010 AY16809	CS-12 9/17/2010 AY22093	CS-12 12/8/2010 AY28752	CS-12 6/7/2011 AY39436	CS-12 7/27/2011 AY43242	CS-12 9/14/2011 AY46384	CS-12 10/12/2011 AY48404	CS-12 11/15/2011 AY50763	CS-12 12/15/2011 AY52119	CS-12-DUP 12/15/2011 AY52120
p-Cymene (p-Isopropyltoluene)	µg/L	0.050 U	0.050 U														
sec-Butylbenzene	µg/L	0.050 U	0.050 U														
Styrene	µg/L	0.080 M	0.080 U														
tert-Butylbenzene	µg/L	0.040 U	0.040 U														
Tetrachloroethene (PCE)	µg/L	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U	0.15 U	0.060 U	0.060 U	0.060 U	0.060 U		0.060 U			0.060 U	0.060 U
Toluene	µg/L	**0.54** F	**0.55** F														
trans-1,2-Dichloroethene	µg/L	0.080 U	0.080 U	0.080 U	0.080 U	0.080 U	0.19 U	0.080 U	0.080 U	0.080 U	0.080 U		0.080 U			0.080 U	0.080 U
trans-1,3-Dichloropropene	µg/L	0.040 U	0.040 U														
Trichloroethene (TCE)	µg/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.16 U	0.050 U	0.050 U	0.050 U	0.050 U		0.050 U			0.050 U	0.050 U
Trichlorofluoromethane	µg/L	0.070 U	0.070 U														
Vinyl chloride	µg/L	0.080 U	0.080 U	0.080 U	0.080 U	0.080 U	0.23 U	0.080 U	0.080 U	0.080 U	0.080 U		0.080 U			0.080 U	0.080 U
Semi-Volatile Organics - SW8270C																	
1,2,4-Trichlorobenzene	µg/L	1.5 U	1.5 U														
1,2-Dichlorobenzene	µg/L	1.6 U	1.6 U														
1,3-Dichlorobenzene	µg/L	1.2 U	1.2 U														
1,4-Dichlorobenzene	µg/L	1.6 U	1.6 U														
2,4,5-Trichlorophenol	µg/L	1.9 U	1.9 U														
2,4,6-Trichlorophenol	µg/L	1.8 U	1.8 U														
2,4-Dichlorophenol	µg/L	1.6 U	1.6 U														
2,4-Dimethylphenol	µg/L	1.2 U	1.2 U														
2,4-Dinitrophenol	µg/L	1.6 U	1.6 U														
2,4-Dinitrotoluene	µg/L	1.7 U	1.7 U														
2,6-Dinitrotoluene	µg/L	2.1 U	2.1 U														
2-Chloronaphthalene	µg/L	2.0 U	2.0 U														
2-Chlorophenol	µg/L	1.1 U	1.1 U														
2-Methyl-4,6-dinitrophenol	µg/L	2.0 U	2.0 U														
2-Methylnaphthalene	µg/L	1.1 U	1.1 U														
2-Methylphenol	µg/L	1.4 U	1.4 U														
2-Nitroaniline	µg/L	2.0 U	2.0 U														
2-Nitrophenol	µg/L	1.9 U	1.9 U														
3,3'-Dichlorobenzidine	µg/L	2.6 U	2.6 U														
3-Nitroaniline	µg/L	2.4 U	2.4 U														
4-Bromophenyl phenyl ether	µg/L	2.0 U	2.0 U														
4-Chloro-3-methyl phenol	µg/L	1.4 U	1.4 U														
4-Chloroaniline	µg/L	3.0 U	3.0 U														
4-Chlorophenyl phenyl ether	µg/L	1.9 U	1.9 U														
4-Methylphenol (p-cresol)	µg/L	1.1 U	1.1 U														
4-Nitroaniline	µg/L	2.4 U	2.4 U														
4-Nitrophenol	µg/L	1.1 U	1.1 U														
Acenaphthene	µg/L	1.8 U	1.8 U														
Acenaphthylene	µg/L	1.4 U	1.4 U														
Anthracene	µg/L	2.2 U	2.2 U														
Benzo(a)anthracene	µg/L	1.7 U	1.7 U														
Benzo(a)pyrene	µg/L	1.9 U	1.9 U														
Benzo(b)fluoranthene	µg/L	3.1 U	3.1 U														
Benzo(g,h,i)perylene	µg/L	2.5 U	2.5 U														
Benzoic acid	µg/L	2.4 U	2.4 U														
Benzyl alcohol	µg/L	1.2 U	1.2 U														
Benzyl butyl phthalate	µg/L	1.7 U	1.7 U														
bis(2-Chloroethoxy)methane	µg/L	1.3 U	1.3 U														

Appendix I
Well CS-12 Analytical Results

SAMPLE ID:		CS-12	CS-12-DUP	CS-12	CS-12	CS-12-DUP	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12-DUP
DATE SAMPLED:		3/25/2009	3/25/2009	9/14/2009	12/14/2009	12/14/2009	3/9/2010	6/14/2010	9/17/2010	12/8/2010	6/7/2011	7/27/2011	9/14/2011	10/12/2011	11/15/2011	12/15/2011	12/15/2011
LAB SAMPLE ID:		AX93654	AX93655	AY03397	AY09118	AY09119	AY12571	AY16809	AY22093	AY28752	AY39436	AY43242	AY46384	AY48404	AY50763	AY52119	AY52120
	Units																
bis(2-Chloroethyl)ether	µg/L	1.4 U	1.4 U														
bis(2-Chloroisopropyl)ether	µg/L	1.1 U	1.1 U														
bis(2-Ethylhexyl) phthalate	µg/L	1.7 U	1.7 U														
Chrysene	µg/L	1.6 U	1.6 U														
Dibenzo(a,h)anthracene	µg/L	2.5 U	2.5 U														
Dibenzofuran	µg/L	1.6 U	1.6 U														
Diethyl phthalate	µg/L	1.8 U	1.8 U														
Dimethyl phthalate	µg/L	1.9 U	1.9 U														
Di-n-butyl phthalate	µg/L	2.2 U	2.2 U														
Di-n-octyl phthalate	µg/L	1.8 U	1.8 U														
Fluoranthene	µg/L	2.3 U	2.3 U														
Fluorene	µg/L	1.8 U	1.8 U														
Hexachlorobenzene	µg/L	1.8 U	1.8 U														
Hexachlorobutadiene	µg/L	1.7 U	1.7 U														
Hexachlorocyclopentadiene	µg/L	1.1 U	1.1 U														
Hexachloroethane	µg/L	1.5 U	1.5 U														
Indeno(1,2,3-cd)pyrene	µg/L	2.4 U	2.4 U														
Isophorone	µg/L	1.3 U	1.3 U														
Naphthalene	µg/L	1.9 U	1.9 U														
Nitrobenzene	µg/L	1.6 U	1.6 U														
n-Nitrosodi-n-propylamine	µg/L	1.9 U	1.9 U														
n-Nitrosodiphenylamine	µg/L	5.2 U	5.2 U														
Pentachlorophenol	µg/L	2.7 U	2.7 U														
Phenanthrene	µg/L	2.0 U	2.0 U														
Phenol	µg/L	0.79 U	0.79 U														
Pyrene	µg/L	1.5 U	1.5 U														
Metals - SW6010B/SW7470A																	
Aluminum	mg/L	**0.65**	**0.61**								0.020 U	**0.19** F	0.020 U	0.020 U		0.020 U	0.020 U
Arsenic	mg/L	0.00020 U	0.00020 U	0.00020 U	**0.0012** F	**0.0013** F	**0.0025** F	**0.0034** F	**0.0082** F	**0.0013** F	0.00020 U		**0.0021** F		**0.0020** F	**0.0020** F	**0.0015** F
Barium	mg/L	**0.034**	**0.034**	**0.029**	**0.032**	**0.033**	**0.030**	**0.038**	**0.034**	**0.031**	**0.030**		**0.033**		**0.035**	**0.029**	**0.030**
Cadmium	mg/L	0.00050 U	0.00050 U	0.00050 U	0.00050 U	0.00050 U	**0.00060** F	**0.00060** F	0.00050 U	0.00050 U	0.00050 U		0.00050 U		0.00050 U	0.00050 U	0.00050 U
Calcium	mg/L	**83**	**85**														
Chromium	mg/L	**0.0020** F	**0.0020** F	0.0010 U	0.0010 U	0.0010 U	**0.0023** F	**0.0020** F	0.0010 U	0.0010 U	0.0010 U		0.0010 U		0.0010 U	0.0010 U	0.0010 U
Copper	mg/L	0.0030 U	0.0030 U	**0.012**	**0.014** J	**0.011** J	**0.047**	**0.010**	**0.0080** F	**0.043**	**0.011** J		**0.015** J		**0.019**	**0.0050** F	**0.0080** F
Iron	mg/L	**0.44**	**0.40**								**2.0** M	**2.0**	**0.080** F	**0.22**		0.030 U	0.030 U
Lead	mg/L	0.0019 U	0.0019 U	**0.0045** F	0.0019 U	0.0019 U	**0.025**	**0.0039** F	0.0019 U	**0.019** F	0.0019 U		**0.0053** F		0.0019 U	0.0019 U	0.0019 U
Magnesium	mg/L	**23**	**24**														
Manganese	mg/L	**0.015**	**0.016**														
Mercury	mg/L	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U	0.00010 U		0.00010 U		**0.00020** F	0.00010 U	0.00010 U
Nickel	mg/L	**0.0030** F	**0.0030** F														
Potassium	mg/L	**2.3**	**2.3**														
Sodium	mg/L	**13**	**13**														
Zinc	mg/L	**0.30**	**0.31**	**0.27**	**0.22**	**0.23**	**1.4**	**0.43**	**0.24**	**0.40**	**0.48**		**0.20**		**0.40**	**0.18**	**0.18**
Anions - SW9056																	
Bromide	mg/L	0.070 U	0.070 U														
Chloride	mg/L	**20**	**20**														
Fluoride	mg/L	**0.43** F	**0.42** F														
Phosphorus	mg/L	0.13 U	0.13 U														
Sulfate	mg/L	**14**	**14**														
Nitrogen - SW9056																	

Appendix I
Well CS-12 Analytical Results

SAMPLE ID:		CS-12		CS-12-DUP		CS-12	CS-12	CS-12-DUP	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12	CS-12-DUP
DATE SAMPLED:		3/25/2009		3/25/2009		9/14/2009	12/14/2009	12/14/2009	3/9/2010	6/14/2010	9/17/2010	12/8/2010	6/7/2011	7/27/2011	9/14/2011	10/12/2011	11/15/2011	12/15/2011	12/15/2011
LAB SAMPLE ID:		AX93654		AX93655		AY03397	AY09118	AY09119	AY12571	AY16809	AY22093	AY28752	AY39436	AY43242	AY46384	AY48404	AY50763	AY52119	AY52120
	Units																		
Nitrate	mg/L	**4.7**	J	**4.8**	J														
Nitrite	mg/L	0.040	UJ	0.040	UJ														
Total Dissolved Solids -E160.1																			
Total Dissolved Solids	mg/L	**360**		**360**															
pH - E150.1																			
pH	pH units	**7.3**		**7.6**															

QA NOTES AND DATA QUALIFIERS:

(NO CODE) - Confirmed identification.
U - Analyte was not detected above the indicated Method Detection Limit (MDL).
F - Analyte was positively identified, but the quantitation is an estimation above the MDL and below the Reporting Limit (RL).
J - Analyte was positively identified, but the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
UJ - Analyte was not detected above the indicated RL; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
M = Concentration is estimated due to a matrix effect.
Detections are bolded.

APPENDIX J

DECEMBER 2011
DATA VALIDATION REPORTS

(LABORATORY DATA PACKAGES ARE SUBMITTED TO CSSA ELECTRONICALLY.)

SDG 66455
SDG 66493
SDG 66538
SDG 66558
SDG 66581
SDG 66582

DATA VERIFICATION SUMMARY REPORT

for off-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang and Katherine LaPierre
Parsons - Austin

INTRODUCTION

The following data verification summary report covers groundwater samples and the associated field quality control (QC) samples collected from off-post Camp Stanley Storage Activity (CSSA) on December 5 and 6, 2011. The samples were assigned to the following Sample Delivery Group (SDG) and were analyzed for volatile organic compounds (VOCs):

66455

The field QC samples associated with this SDG included one field duplicate (FD) sample and one trip blank (TB). 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. The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0ºC, 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 nine (9) samples, seven (7) off-post groundwater samples, one FD sample, and one TB. The samples were collected on December 5 and 6, 2011 and were analyzed for a reduced list of VOCs which included: 1,1-dichloroethene, *cis*-1,2-dichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in two (2) batches (#162218 and #162219) under one set of 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 two laboratory control spike (LCS) samples and the surrogate spikes.

All LCS recoveries were within acceptance criteria.

All surrogates recovers were within acceptance criteria except 4-Bromofluorobenzene recovered at 127%, 2% higher than the upper control limit of 125%. No flags were applied.

Precision

Precision was evaluated using the relative percent difference (RPD) obtained from the parent and FD analyte results. An extra set of vials was collected from well RFR-11 and submitted as a FD.

Only TCE was detected above the reporting limit (RL) in both RFR-11 and its FD. All other target analytes were non-detect at RLs in both the parent and field duplicate samples.

Analyte	Parent, µg/L	FD, µg/L	%RPD	Criteria, %RPD
TCE	2.69	3.11	14	≤20

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 and laboratory blanks for cross contamination of samples during transit or 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.
- The two LCS samples were prepared using a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.
- All internal standard criteria were met.

There were two method blanks and one TB associated with the VOC analyses in this SDG. All blanks 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%.

DATA VERIFICATION SUMMARY REPORT

for off-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang and Katherine LaPierre
Parsons - Austin

INTRODUCTION

The following data verification summary report covers groundwater samples and the associated field quality control (QC) samples collected from off-post Camp Stanley Storage Activity (CSSA) on December 7, 2011. The samples were assigned to the following Sample Delivery Group (SDG) and were analyzed for volatile organic compounds (VOCs):

66493

The field QC samples associated with this SDG included one field duplicate (FD) sample, one set of matrix spike/matrix spike duplicate (MS/MSD), and one trip blank (TB). 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. The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0ºC, 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 twelve (12) samples, eight (8) off-post groundwater samples, one FD sample, one set of MS/MSD, and one TB. The samples were collected on December 7, 2011 and were analyzed for a reduced list of VOCs which included: 1,1-dichloroethene, *cis*-1,2-dichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in two (2) batches (#162442 and #162632) under three sets of initial calibration (ICAL) involving two different instruments. 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 two laboratory control spike (LCS) samples, MS/MSD, and the surrogate spikes. Sample OW-CE1 was designated for the MS/MSD analyses on the chain-of-custody.

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

Precision

Precision was evaluated using the relative percent difference (RPD) obtained from the MS/MSD and parent and FD analyte results. An extra set of vials was collected from well OW-BARNOWL and submitted as a FD.

All target analytes were non-detect at RLs in both the parent and field duplicate samples.

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 and laboratory blanks for cross contamination of samples during transit or 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.
- The two LCS samples were prepared using a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.
- All internal standard criteria were met.

There were two method blanks and one TB associated with the VOC analyses in this SDG. All blanks 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%.

DATA VERIFICATION SUMMARY REPORT

for on-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang and Katherine LaPierre
Parsons - Austin

INTRODUCTION

The following data verification summary report covers quarterly groundwater samples and the associated field quality control (QC) sample collected from on-post Camp Stanley Storage Activity (CSSA) on December 13 and 14, 2011. The samples in the following Sample Delivery Group (SDG) were analyzed for a reduced list of volatile organic compounds (VOCs) and metals:

66538

The field QC sample associated with this SDG was one trip blank (TB). 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. The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0ºC, 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 packages 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 nine (9) samples, including eight (8) on-post groundwater samples and one (1) TB. The samples were collected on September 14, 2011 and were analyzed for a reduced list of VOCs which included: 1,1-dichloroethene, *cis*-1,2-dichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in two batches (#162437 and #162632) under two different initial calibrations (ICALs). 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 two laboratory control spike (LCS) samples and the surrogate spikes. No sample was designated for MS/MSD analyses on the COC for this SDG.

All LCS and surrogate spike recoveries were within acceptance criteria.

Precision

Precision could not be evaluated due to the lack of duplicate analyses involved in this SDG.

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 and laboratory blanks for cross contamination of samples during transit or 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.
- The LCS samples were prepared using a secondary source. All second source verification criteria were met.

- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.
- All internal standard criteria were met.

There were two method blanks and one TB associated with the VOC analyses in this SDG. All blanks 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 eight (8) on-post groundwater samples. Samples were collected on December 13 and 14, 2011 and were analyzed for cadmium, chromium, and lead.

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 one batch (#162555). The samples were analyzed in one batch under a single ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS. No sample was designated for MS/MSD analysis on the COC for this SDG.

All LCS recoveries were within acceptance criteria.

Precision

Precision could not be evaluated due to the lack of duplicate analysis.

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 in this SDG 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 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 eight (8) on-post groundwater samples. Samples were collected on December 13 and 14, 2011. All samples were analyzed for mercury.

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

The mercury samples were digested in one batch (#162534). The samples were analyzed in a one batch under a single ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS. No sample was designated for MS/MSD analysis on the COC for this SDG.

The LCS recovery was within acceptance criteria.

Precision

Precision could not be evaluated due to the lack of duplicate analysis in this SDG.

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.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were 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.

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

DATA VERIFICATION SUMMARY REPORT

for on-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang and Katherine LaPierre
Parsons - Austin

INTRODUCTION

The following data verification summary report covers four quarterly groundwater samples and the associated field quality control (QC) samples collected from on-post Camp Stanley Storage Activity (CSSA) on December 15, 2011. The samples in the following Sample Delivery Group (SDG) were analyzed for a reduced list of volatile organic compounds (VOCs) and metals:

66558

The field QC samples associated with this SDG were one set of parent/field duplicate (FD), one pair of matrix spike/matrix spike duplicate (MS/MSD), and one trip blank (TB). 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. The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0ºC, 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 packages 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 eight (8) samples, including four (4) on-post groundwater samples, one FD, one pair of MS/MSD, and one (1) TB. The samples were collected on September 15, 2011 and were analyzed for a reduced list of VOCs which included: 1,1-dichloroethene, *cis*-1,2-dichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in one batch (#162610) under one set of initial calibration (ICALs). 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 laboratory control sample (LCS) and the surrogate spikes. Sample CS-1 was designated for MS/MSD analyses on the COC for this SDG.

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

Precision

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

All %RPDs of the MS/MSD results were compliant.

None of the target VOCs were detected above the reporting limits in the parent and FD samples, therefore, the %RPD calculation was not applicable.

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 and laboratory blanks for cross contamination of samples during transit or 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.
- The LCS was prepared using a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.
- All internal standard criteria were met.

There were one method blank and one TB associated with the VOC analyses in this SDG. All blanks 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 seven (7) on-post groundwater samples including four (4) on-post well samples, one (1) FD, and one (1) pair of MS and MSD. Samples were collected on December 15, 2011 and were analyzed for cadmium, chromium, and lead. In addition, samples CS-10, CS-12, CS-12FD, and CS-1 were analyzed for arsenic, barium, copper, and zinc, and CS-12 and CS-12FD were also analyzed for aluminum and iron.

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 one batch (#162797). The samples were analyzed in one batch under a single ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS. Sample CS-12 was designated for MS/MSD analysis on the COC for this SDG.

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

Precision

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

All %RPDs of the MS and MSD analyses were compliant.

Only barium and zinc were detected above the reporting limits in the CS-12 and CS-12FD.

Metals	CS-12, ug/L	CS-12FD, ug/L	%RPD	Criteria, %RPD
Barium	0.0294	0.0297	1.0	≤20
Zinc	0.176	0.180	2.2	

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 in this SDG 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 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 seven (7) on-post groundwater samples including four (4) on-post well samples, one (1) FD, and one (1) pair of MS and MSD. Samples were collected on December 15, 2011 and were analyzed for mercury.

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

The mercury samples were prepared in one batch (#162533). The samples were analyzed in a one batch under a single ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS, MS, and MSD. Sample CS-1 was designated for MS/MSD analysis on the COC for this SDG.

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

Precision

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

The %RPD of the MS and MSD was compliant.

Mercury was not detected in the CS-12 and CS-12FD samples.

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.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were 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.

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

DATA VERIFICATION SUMMARY REPORT

for sample collected from MW35

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang
Parsons - Austin

INTRODUCTION

The following data verification summary report covers one groundwater sample collected from Camp Stanley Storage Activity (CSSA) on December 19, 2011. The sample in the following Sample Delivery Group (SDG) was collected from MW35:

66581

This sample was analyzed for nitrate and nitrite.

This sample was collected by Parsons and analyzed by Agriculture & Priority Pollutants Laboratories, Inc. (APPL) in Clovis, California, following the procedures outlined in the Statement of Work and EPA Methods 353.2 for nitrate and nitrite.

The cooler was received by the laboratory at a temperature of 2.0°C which was within the 2 – 6 degree recommended.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the EPA Methods 300.0 and 353.2. Information reviewed in the data packages included sample results; laboratory quality control results; calibrations; case narratives; raw data; COC forms and the cooler receipt checklist. The analyses and findings presented in this report are based on the reviewed information, and whether lab followed the EPA method or not.

Nitrate and Nitrite

General

MW35-LGR was collected on December 19, 2011 for nitrate and nitrite analyses.

The nitrate and nitrite analyses were performed using USEPA Method 353.2. This sample was analyzed by following the procedures outlined in the method, prepared and analyzed within the holding time (28 days) required by the method.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the laboratory control sample (LCS).

Both nitrate and nitrite recoveries were within acceptance criteria.

Precision

Precision could not be evaluated due to the lack of duplicate analysis.

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 EPA method;
- Evaluating holding time; and
- Examining laboratory blanks for cross contamination of samples during sample analysis.

The sample in this SDG was analyzed following the COC and the analytical procedures described in the EPA Method 353.2. This sample was prepared and analyzed within the holding times required by the method.

- All initial calibration criteria were met.
- All calibration verification criteria were met.
- All ICVs were prepared using a secondary source.
- All second source verification criteria were met.

There was one method blank for nitrate, one method blank for nitrite, and several continuing calibration blanks involved in this SDG. All blanks were free of nitrate or nitrite at the reporting limits.

Completeness

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

The nitrate and nitrite results for the sample in this SDG were considered usable. The completeness of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

Completeness

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

The nitrate and nitrite results for the sample in this SDG were considered usable. The completeness for the nitrate and nitrite portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.

DATA VERIFICATION SUMMARY REPORT

for off-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

Data Verification by: Tammy Chang and Katherine LaPierre
Parsons - Austin

INTRODUCTION

The following data verification summary report covers one groundwater sample and the associated field quality control (QC) sample collected from off-post Camp Stanley Storage Activity (CSSA) on December 19, 2011. The samples were assigned to the following Sample Delivery Group (SDG) and were analyzed for volatile organic compounds (VOCs):

66582

The field QC sample associated with this SDG included one trip blank (TB). 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.

Both 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. The samples in this SDG were shipped to the laboratory in one cooler. The cooler was received by the laboratory at a temperature of 2.0ºC, 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 two (2) samples including one (1) off-post groundwater samples and one TB. The samples were collected on December 19, 2011 and were analyzed for a reduced list of VOCs which included: 1,1-dichloroethene, *cis*-1,2-dichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in one (1) batch (#162611) under one set of initial calibration (ICAL). Both 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 laboratory control sample (LCS) and the surrogate spikes.

All LCS and surrogates recoveries were within acceptance criteria.

Precision

Precision could not be evaluated due to the lack of duplicate analyses.

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 and laboratory blanks for cross contamination of samples during transit or analysis.

Both samples in this data package were analyzed following the COC and the analytical procedures described in the CSSA QAPP, Version 1.0. Both 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.
- The LCS was prepared using a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.

- All internal standard criteria were met.

There were one method blank and one TB associated with the VOC analyses in this SDG. All blanks 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%.

APPENDIX K

USEPA LTMO APPROVAL LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
PERMITTING DIVISION
1445 Ross Avenue
Dallas, Texas 75202

Transmitted via e-mail

February 16, 2011

Camp Stanley Storage Activity
ATTN: Mr. Gabriel Moreno-Fergusson
25800 Ralph Fair Road
Boerne, Texas 78015-4800

Re: *Three-Tiered Long Term Monitoring Network Optimization Evaluation*
Data Quality Objectives for the Groundwater Monitoring Program
Camp Stanley Storage Activity

Dear Gabe:

The U.S. Environmental Protection Agency (EPA) has reviewed the *Three-Tiered Long Term Monitoring Network Optimization (LTMO) Evaluation* and the *Data Quality Objectives (DQOs) for the Groundwater Monitoring Program* for the Camp Stanley Storage Activity (CSSA). Pursuant to, and in accordance with, the final Resource Conservation and Recovery Act (RCRA) Section 3008(h) Administrative Order on Consent (Order) for CSSA, Docket No. RCRA-VI 002(h)99-H FY99, dated May 5, 1999, the EPA approves the LTMO evaluation recommendations and the DQOs. Upon TCEQ approval, the recommendations of the LTMO and DQOs may be implemented in the groundwater monitoring program.

If you have any questions, please feel free to contact me at (214) 665-8317 or via e-mail at *lyssy.gregory@epa.gov*.

Sincerely,

/s/ Greg J. Lyssy 2-16-2011

Greg J. Lyssy
Senior Project Manager
Federal Facilities Section

cc: Kirk Coulter, TCEQ, Austin
Jorge Salazar, TCEQ, San Antonio
Scott Pearson, Parsons
Julie Burdey, Parsons
Ken Rice, Parsons

Pearson, William Scott

From: Burdey, Julie
Sent: Monday, March 21, 2011 12:34 PM
To: Gabriel Moreno-Fergusson
Cc: Schoepflin, Shannon; Pearson, William Scott
Subject: FW: FW: LTMO and DQO approval letter

Please see email correspondence with Kirk below. He approves the LTMO recommendations, but I have asked him to send a formal letter.

-----Original Message-----
From: Burdey, Julie
Sent: Monday, March 21, 2011 8:19 AM
To: 'Kirk Coulter'
Subject: RE: FW: LTMO and DQO approval letter

Hi Kirk-

I guess we would feel better with a letter primarily because the last time we did the optimization which recommended reductions (over 5 years ago), Sonny wrote a letter saying it was ok to implement the reductions on-post, but not off-post.

Thanks much!!
Julie

-----Original Message-----
From: Kirk Coulter [mailto:Kirk.Coulter@tceq.texas.gov]
Sent: Monday, March 21, 2011 7:54 AM
To: Burdey, Julie
Subject: Re: FW: LTMO and DQO approval letter

Julie

I did look at it and did not have any questions with the report or Greg's letter. I did not send a letter because I know Greg is the primary authority; however, if you need s letter from me, I will send one. Let me know if this E-Mail will work as an approval or not

APPENDIX L

USEPA CONSTITUENT CONCENTRATION MAPS LETTER

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Transmitted via e-mail

February 13, 2012

MEMORANDUM

FROM: *Greg J. Lyssy*
Senior Project Manager
Federal Facilities Section (6PD-F)

TO: Gabriel Moreno-Ferguson
CSSA

CC: Kirk Coulter
TCEQ

RE: **CSSA Constituent Concentration Maps**

This Memo is written pursuant to our meeting on January 24, 2012, and as a follow-up to the discussions on the graphical depiction of analytical data in groundwater plume maps, and in accordance with the final Resource Conservation and Recovery Act (RCRA), Section 3008(h) Administrative Order on Consent (Order) for Camp Stanley Storage Activity (CSSA), Docket No. RCRA-VI 002(h)99-H FY99, dated May 5, 1999.

Historically, CSSA has created groundwater plume delineation maps utilizing all analytical data, including historical data points as well as data points that are near or at the method detection limit of the constituents. Preparing plume maps utilizing data points that are in the part per trillion range (and several orders of magnitude below the Maximum Contaminant Levels (MCLs)) may create a misleading graphical representation of the actual plume size.

In order to have consistency on plume maps across different facilities, it is my recommendation that CSSA create a groundwater plume map at the MCL (or appropriate regulatory level if there is not an MCL) for the constituents of concern (COCs). In addition, CSSA should also create a groundwater plume map that depicts isoconcentrations at 20% of the MCL.

If desired, CSSA may create a ***base*** groundwater plume map using data near the method detection limit, but that map ***must*** contain qualifying information on the data that was used to create the map.

Groundwater monitoring of the plume at CSSA is required, and will continue to be required, as long as the Order is in place and there are COCs in the groundwater.

If CSSA, or your technical consultants, have any questions regarding this Memo, please do not hesitate to call me at 214.665.8317, or I may be contacted via e-mail at *lyssy.gregory@epa.gov*.