FINAL

2010 ANNUAL GROUNDWATER REPORT

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

September 2011

GEOSCIENTIST CERTIFICATION

2010 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 2010 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 2010, and is true and accurate to the best of my knowledge and belief.

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ACRONYMS AND ABBREVIATIONS

µg/L	Microgram per liter
1,1-DCE	1,1-dichloroethene
§3008(h) Order	RCRA 3008(h) Administrative Order on Consent
AACOG	Alamo Area Council of Governments
AFCEE	Air Force Center for Engineering and the Environment
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
STL	Severn Trent Laboratories
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
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 2010 at Camp Stanley Storage Activity (CSSA). Groundwater monitoring was performed on-post and off-post during the months of March, June, September, and December 2010. 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 2010.

- 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. The 2010 annual rainfall at CSSA was 35.75 inches which was slightly above the normal annual rainfall for the region.

- During 2009, aquifer levels declined to the primary Lower Glen Rose (LGR) production interval and remained fairly static until the recharge events of the last quarter of the year. Correspondingly, by December 2009, water levels rose approximately 100 feet on average. Water levels continued to increase through May 2010 and then declined through the summer months. The aquifer rebounded yet again in response to tropical weather systems in September 2010. A new drought cycle ensued in October 2010 with a corresponding decline in water levels. By the end of the year, water levels in December 2010 were very close to the elevations recorded in December 2009.

- A total of 92 samples were collected from 45 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-4, CS-D, and CS-MW1-LGR) exceeded drinking water standards for volatile organic compounds (VOCs) and four wells (CS-9, CS-12, CS-MW25-LGR, and CS-MW9-BS) exceeded drinking water standards for metals.

- A total of 72 samples were collected from 37 Westbay zones. VOC concentrations above drinking water standards were detected in a total of 20 zones at all four Westbay locations.

- A total of 122 samples were collected from 44 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 2010 at CSSA. Groundwater monitoring was performed on-post and off-post during the months of March, June, September, and December 2010. All wells considered for sampling in 2010 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 2010.

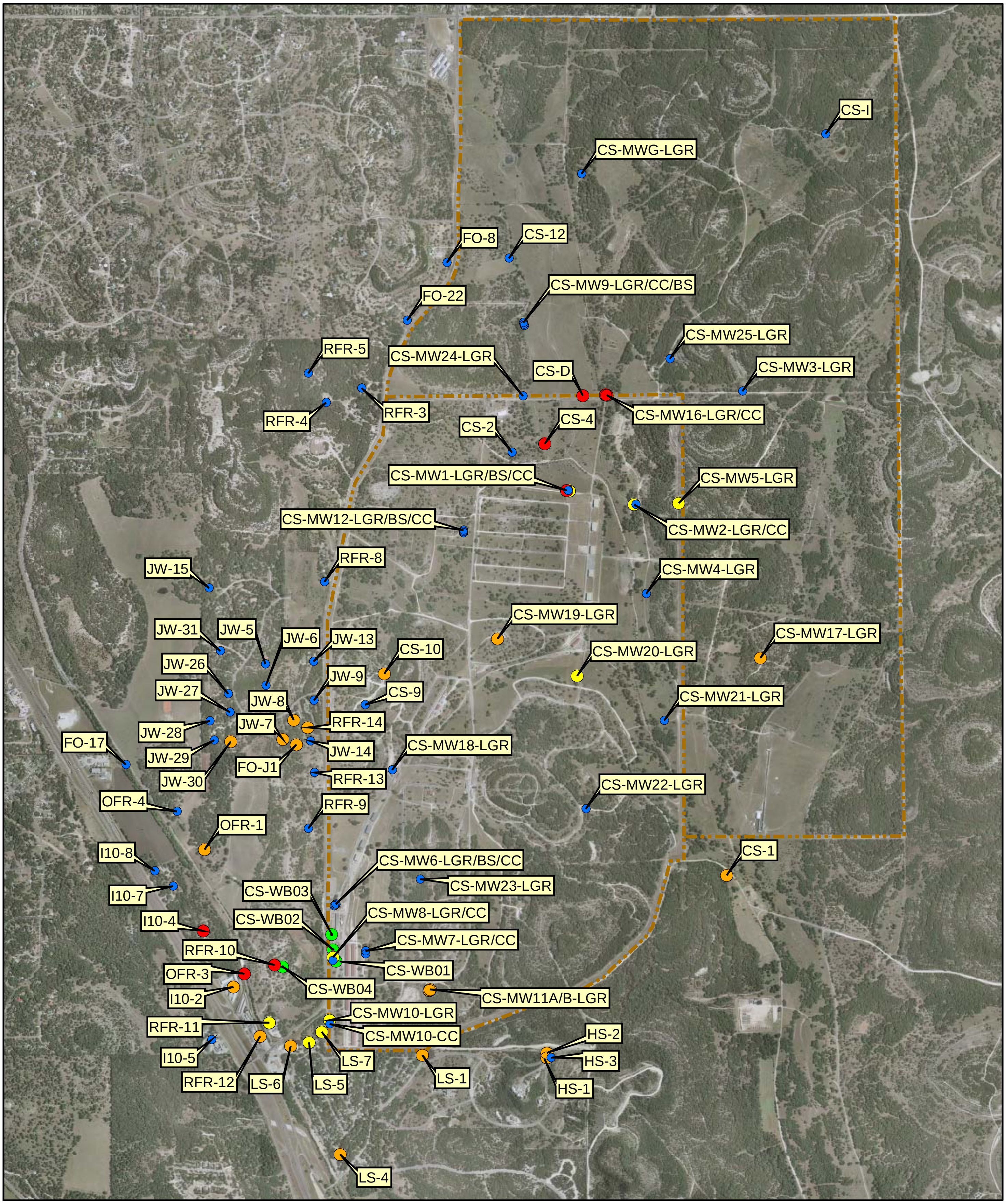
Groundwater monitoring conducted in 2010 was scoped under the U.S. Army Corps of Engineers (USACE) Fort Worth District (CESWF), Contract W9126G-07-D-0028, Task Order DO50. This contract was funded through December 2010.

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 *Final Data Quality Objectives (DQO) for the Groundwater Monitoring Program* (Parsons 2006) in **Appendix A**, as well as the recommendations of the *Three-Tiered Long Term Monitoring Network Optimization Evaluation* (Parsons 2005). The latter document provides recommendations for sampling based on the Long Term Monitoring Optimization (LTMO) study performed for the CSSA groundwater monitoring program. The LTMO sampling frequencies were implemented on-post in December 2005, as approved by the Texas Commission on Environmental Quality (TCEQ) and USEPA. The ongoing groundwater monitoring program complies with the CSSA Quality Assurance Program Plan (QAPP) (CSSA 2002) and the Sampling and Analysis Plans and Work Plans prepared for each groundwater monitoring task order. The sampling conducted in 2010 was conducted in compliance with the applicable CSSA QAPP, DQOs, and Work Plans. Both the CSSA DQOs and LTMO processes were updated at the end of 2010, and will be implemented in future monitoring events beginning in 2011.



N
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Feet

2010 Sampled Wells

- Wells with VOC concentrations > MCL
- Wells with VOC concentrations between RL and MCL
- Wells with VOC concentrations below the RL
- Other Non-detect Wells
- Multi-port Westbay Wells
- CSSA Fenceline

Figure 1.1

2010 Sampled On-Post and Off-Post Groundwater Wells
Camp Stanley Storage Activity

PARSONS

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A comprehensive summary of the results from the 2010 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.

The laboratory data packages and associated data validation reports for 2010 were submitted to CSSA separately from this report.

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. In summary, since 2001 the following changes to the off-post well locations have occurred:

- Six former domestic wells have been plugged and abandoned (RFR-6, RFR-7, I10-1, I10-3, OFR-2, and DOM-1);
- Two environmental wells have been drilled then subsequently plugged/abandoned as part of the Lost Creek development (CTX-1 and CTX-2);
- One environmental monitoring well has been installed and is in use by CSSA (WB04);
- Four new domestic wells have been drilled within ½-mile of CSSA (RFR-13, RFR-14, JW-3, and JW-34); and
- Four new public supply test wells have been drilled within ½-mile of CSSA (COR-1 through COR-4).

- Eleven additional wells have also been 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. These wells include 8 active supply wells operated by The Oaks Water Supply Corporation (TOWSC), one plugged well owned by TOWSC, and two private wells (I10-9 and I10-10) utilized for domestic/stock purposes.

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 2010 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 2010 events. Water level measurements made at all monitoring wells and drinking water wells listed in **Table 2.1**, a total of 46 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 6 wells completed with open boreholes over multiple formations were not used. Beginning in January 2010, the average water levels surged by 150 feet in response to more than 10 inches rainfall during the first 5 months. The most significant (greater than 1 inch) rainfalls occurred in January, February, April, and May.

The aquifer levels declined by 150 feet during the summer months until the tropical weather season in September when CSSA received another 9.62 inches of rainfall. In response to that precipitation activity the aquifer levels increased by 110 feet again. However, a new drought cycle began in October 2010, and the aquifer declined by 116 feet through December 2010. Through all the hydrological cycles in 2010, the overall groundwater levels in the Middle Trinity Aquifer decreased only 6.22 feet from January through December 2010, as shown in **Table 2.1**. The total amount of precipitation that fell in 2010 was 35.25 inches, which is an increase from 29.61 inches that fell in 2009, as measured by the CSSA weather stations.

Based on 2010 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 2010, 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. The decreases seen in ground water elevations in MW-1 CC and MW-2 CC may also may be in part attributable to periodic pumping from CS-16CC.

Table 2.1
Summary of Groundwater Elevations and Changes, 2010

Well ID	TOC elevation (ft MSL)	March 2010 Elevations	June 2010 Elevations	September 2010 Elevations	December 2010 Elevations	Groundwater Elevation Change: December 09 minus March 2010	June minus March	September minus June	December minus September	Formations Screened: LGR	BS	CC
CS-1+ #	**1169.27**	**1036.97**	**1061.77**	**1034.79**	**1015.37**	**35.80**	**24.80**	**-26.98**	**-19.42**	**ALL**		
CS-2	**1237.59**	**1153.71**	**1159.00**	**1153.28**	**1032.44**	**108.42**	**5.29**	**-5.72**	**-120.84**	**?**	**?**	
CS-3	1240.17	1142.53	1157.58	1142.02	1036.96	93.81	15.05	-15.56	-105.06	**X**		
CS-4	**1229.28**	**1153.61**	**1156.86**	**1141.52**	**1037.70**	**103.38**	**3.25**	-15.34	-103.82	**?**	**?**	
CS-9	**1325.31**	**1150.19**	**1152.71**	**1128.36**	**1032.34**	**105.28**	**2.52**	**-24.35**	**-96.02**	**ALL**		
CS-10+ #	**1331.51**	**1150.41**	**1150.97**	**1052.81**	**1032.93**	**104.90**	**0.56**	**-98.16**	**-19.88**	**ALL**		
CS-D	1236.03	1150.37	1151.75	1134.14	1033.60	101.24	1.38	-17.61	-100.54	**X**		
CS-MWG-LGR	1328.14	1137.99	1143.18	1119.87	1064.44	75.80	5.19	-23.31	-55.43	**X**		
CS-MWH-LGR	1319.19	1151.15	1157.24	1111.92	1044.79	99.92	6.09	-45.32	-67.13	**X**		
CS-I	1315.20	1139.16	NA	1164.20	1148.25	83.11	NA	NA	-15.95		**X**	
CS-MW1-LGR+	1220.73	1154.06	1157.22	1138.71	1047.88	93.13	3.16	-18.51	-90.83			**X**
CS-MW1-BS+	1221.09	1084.66	1130.96	1063.96	1058.81	60.90	46.30	-67.00	-5.15	**X**		
CS-MW1-CC+	1221.39	1124.60	1109.96	1025.46	1009.07	100.01	-14.64	-84.50	-16.39			
CS-MW2-LGR	1237.08	1149.92	1154.39	1126.28	1051.08	86.44	4.47	-28.11	-75.20	**X**		
CS-MW2-CC	1240.11	1101.59	1101.28	1013.63	1012.84	89.58	-0.31	-87.65	-0.79	**X**		
CS-MW3-LGR	1334.14	1138.28	1144.40	1120.94	1045.69	89.94	6.12	-23.46	-75.25	**X**		
CS-MW4-LGR*	1209.71	1173.04	1172.97	1151.76	1079.90	41.13	-0.07	-21.21	-71.86	**X**		
CS-MW5-LGR	1340.24	1144.51	1149.64	1116.89	1048.53	88.07	5.13	-32.75	-68.36		**X**	
CS-MW6-LGR+	1232.25	1140.47	1138.59	1124.91	1042.04	84.87	-1.88	-13.68	-82.87			**X**
CS-MW6-BS+	1232.67	1133.25	1137.63	1091.17	1083.67	88.58	4.38	-46.46	-7.50	**X**		
CS-MW6-CC+	1233.21	1141.43	1136.72	1072.49	1039.12	99.87	-4.71	-64.23	-33.37			**X**
CS-MW7-LGR	1202.27	1137.03	1138.44	1121.52	1036.49	88.15	1.41	-16.92	-85.03	**X**		
CS-MW7-CC	1201.84	1131.92	1135.12	1083.24	1035.90	90.88	3.20	-51.88	-47.34			**X**
CS-MW8-LGR	1208.35	1137.61	1137.89	1119.89	1040.38	82.26	0.28	-18.00	-79.51	**X**		
CS-MW8-CC**	1206.13	1132.13	1135.30	1081.29	1036.78	90.60	3.17	-54.01	-44.51		**X**	
CS-MW9-LGR+	1257.27	1149.23	1154.93	1146.32	1036.46	104.56	5.70	-8.61	-109.86			**X**
CS-MW9-BS+	1256.73	1152.73	1158.33	1067.59	1047.82	106.70	5.60	-90.74	-19.77	**X**		
CS-MW9-CC+	1255.95	1136.26	1132.81	1060.78	1022.15	112.62	-3.45	-72.03	-38.63			**X**
CS-MW10-LGR+	1189.53	1129.98	1132.27	1112.60	1031.69	82.05	2.29	-19.67	-80.91	**X**		
CS-MW10-CC+	1190.04	1128.59	1131.09	1113.34	1026.57	88.95	2.50	-17.75	-86.77	**X**		
CS-MW11A-LGR	1204.03	1124.97	1128.69	1110.21	1022.73	94.69	3.72	-18.48	-87.48	**X**		
CS-MW11B-LGR	1203.52	1116.83	1122.00	1025.19	1015.27	NA	5.17	-96.81	-9.92		**X**	
CS-MW12-LGR+	1259.07	1154.99	1158.59	1137.00	1039.41	103.87	3.60	-21.59	-97.59			**X**
CS-MW12-BS+	1258.37	1144.73	1154.27	1057.79	1052.87	97.27	9.54	-96.48	-4.92	**X**		
CS-MW12-CC+	1257.31	1136.91	1129.94	1051.96	1027.15	103.79	-6.97	-77.98	-24.81			**X**
CS-MW16-LGR+ #	1244.60	1149.10	1126.90	1122.22	1008.76	122.70	-22.20	-4.68	-113.46	**X**		
CS-MW16-CC+ #	1244.51	1122.37	1004.13	989.97	897.36	154.36	-118.24	-14.16	-92.61	**X**		
CS-MW17-LGR	1257.01	1140.27	1142.69	1119.60	1040.53	90.31	2.42	-23.09	-79.07	**X**		
CS-MW18-LGR*	1283.61	1147.36	1150.76	1134.81	1036.82	100.05	3.40	-15.95	-97.99	**X**		
CS-MW19-LGR	1255.53	1156.60	1160.61	1137.90	1047.98	90.87	4.01	-22.71	-89.92	**X**		
CS-MW20-LGR	1209.42	1157.14	1160.91	1134.50	1051.86	84.12	3.77	-26.41	-82.64	**X**		
CS-MW21-LGR*	1184.53	1144.03	1146.59	1123.53	1040.81	93.05	2.56	-23.06	-82.72	**X**		
CS-MW22-LGR	1280.49	1145.47	1152.24	1128.68	1035.50	103.28	6.77	-23.56	-93.18	**X**		
CS-MW23-LGR	1258.20	1136.98	1139.44	1124.90	1031.20	97.38	2.46	-14.54	-93.70	**X**		
CS-MW24-LGR*	1253.90	1152.94	1156.85	1146.20	1033.65	107.39	3.91	-10.65	-112.55	**X**		
CS-MW25-LGR	1293.01	1140.17	1146.23	1154.46	1044.54	93.01	6.06	8.23	-109.92	**X**		
FO-20	NA	1165.05	1173.00	1102.00	1075.24	86.72	7.95	-71.00	-26.76	**ALL**		
					Average groundwater elevation change:	**91.51**	**3.97**	**-37.77**	**-63.93**			
					Average groundwater elevation change since December 2009:	**-6.22**						

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
** Well equipped with a USGS monitored transducer
+ Wells equipped with a SCADA transducer
# well is pumping
NA = Data not available
?=Exact screening information unknown for this well.
All measurements given in feet.

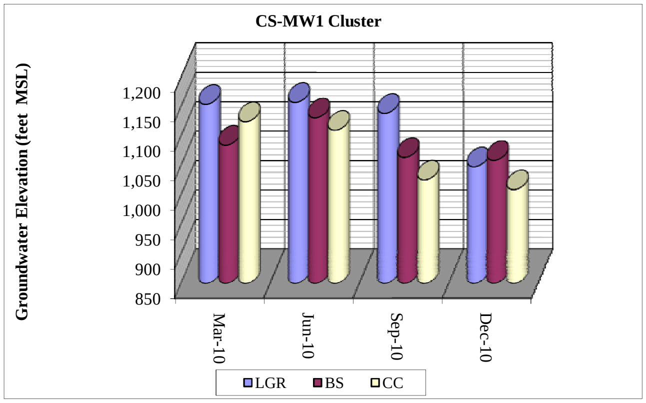
Table 2.2
Summary of Groundwater Elevation by Formation, 2010

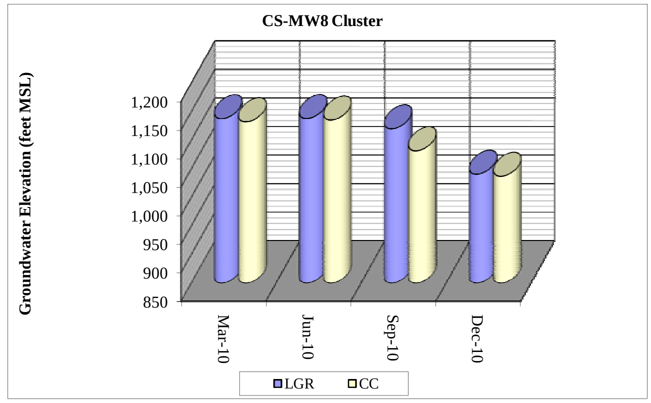
Well ID	TOC elevation (ft MSL)	2010 Groundwater Elevations March	June	September	December	Formations Screened LGR	BS	CC
CS-1+ #	**1169.27**	**1036.97**	**1061.77**	**1034.79**	**1015.37**	**ALL**		
CS-2	**1237.59**	**1153.71**	**1159.00**	**1153.28**	**1032.44**	**?**	**?**	
CS-3	1240.17	1142.53	1157.58	1142.02	1036.96	**X**		
CS-4	**1229.28**	**1153.61**	**1156.86**	**1141.52**	**1037.70**	**?**	**?**	
CS-9	**1325.31**	**1150.19**	**1152.71**	**1128.36**	**1032.34**	**ALL**		
CS-10+ #	**1331.51**	**1150.41**	**1150.97**	**1052.81**	**1032.93**	**ALL**		
CS-D	1236.03	1150.37	1151.75	1134.14	1033.60	**X**		
CS-MWG-LGR	1328.14	1137.99	1143.18	1119.87	1064.44	**X**		
CS-MWH-LGR	1319.19	1151.15	1157.24	1111.92	1044.79	**X**		
CS-I	1315.20	1139.16	NA	1164.20	1148.25	**X**		
CS-MW1-LGR+	1220.73	1154.06	1157.22	1138.71	1047.88	**X**		
CS-MW1-BS+	1221.09	1084.66	1130.96	1063.96	1058.81		**X**	
CS-MW1-CC+	1221.39	1124.60	1109.96	1025.46	1009.07			**X**
CS-MW2-LGR	1237.08	1149.92	1154.39	1126.28	1051.08	**X**		
CS-MW2-CC	1240.11	1101.59	1101.28	1013.63	1012.84			
CS-MW3-LGR	1334.14	1138.28	1144.40	1120.94	1045.69	**X**		
CS-MW4-LGR*	1209.71	1173.04	1172.97	1151.76	1079.90	**X**		
CS-MW5-LGR	1340.24	1144.51	1149.64	1116.89	1048.53	**X**		
CS-MW6-LGR+	1232.25	1140.47	1138.59	1124.91	1042.04	**X**		
CS-MW6-BS+	1232.67	1133.25	1137.63	1091.17	1083.67		**X**	
CS-MW6-CC+	1233.21	1141.43	1136.72	1072.49	1039.12			**X**
CS-MW7-LGR	1202.27	1137.03	1138.44	1121.52	1036.49	**X**		
CS-MW7-CC	1201.84	1131.92	1135.12	1083.24	1035.90			**X**
CS-MW8-LGR	1208.35	1137.61	1137.89	1119.89	1040.38	**X**		
CS-MW8-CC**	1206.13	1132.13	1135.30	1081.29	1036.78			**X**
CS-MW9-LGR+	1257.27	1149.23	1154.93	1146.32	1036.46	**X**		
CS-MW9-BS+	1256.73	1152.73	1158.33	1067.59	1047.82		**X**	
CS-MW9-CC+	1255.95	1136.26	1132.81	1060.78	1022.15			**X**
CS-MW10-LGR+	1189.53	1129.98	1132.27	1112.60	1031.69	**X**		
CS-MW10-CC+	1190.04	1128.59	1131.09	1113.34	1026.57			**X**
CS-MW11A-LGR	1204.03	1124.97	1128.69	1110.21	1022.73	**X**		
CS-MW11B-LGR	1203.52	1116.83	1122.00	1025.19	1015.27	**X**		
CS-MW12-LGR+	1259.07	1154.99	1158.59	1137.00	1039.41	**X**		
CS-MW12-BS+	1258.37	1144.73	1154.27	1057.79	1052.87		**X**	
CS-MW12-CC+	1257.31	1136.91	1129.94	1051.96	1027.15			**X**
CS-MW16-LGR+ #	1244.60	1149.10	1126.90	1122.22	1008.76	**X**		
CS-MW16-CC+ #	1244.51	1122.37	1004.13	989.97	897.36			**X**
CS-MW17-LGR	1257.01	1140.27	1142.69	1119.60	1040.53	**X**		
CS-MW18-LGR*	1283.61	1147.36	1150.76	1134.81	1036.82	**X**		
CS-MW19-LGR	1255.53	1156.60	1160.61	1137.90	1047.98	**X**		
CS-MW20-LGR	1209.42	1157.14	1160.91	1134.50	1051.86	**X**		
CS-MW21-LGR*	1184.53	1144.03	1146.59	1123.53	1040.81	**X**		
CS-MW22-LGR	1280.49	1145.47	1152.24	1128.68	1035.50	**X**		
CS-MW23-LGR	1258.20	1136.98	1139.44	1124.90	1031.20	**X**		
CS-MW24-LGR*	1253.90	1152.94	1156.85	1146.20	1033.65	**X**		
CS-MW25-LGR	1293.01	1140.17	1146.23	1154.46	1044.54	**X**		
FO-20	NA	1165.05	1173.00	1102.00	1075.24	**ALL**		
Average groundwater elevation by formation, each event:	**LGR:**	**1144.36**	**1147.52**	**1126.83**	**1044.19**	**Average groundwater elevation by formation all of 2010:**		**1115.72**
	BS:	**1128.84**	**1145.30**	**1070.13**	**1060.79**			**1101.27**
	CC:	**1131.78**	**1114.38**	**1059.82**	**1011.76**			**1079.43**

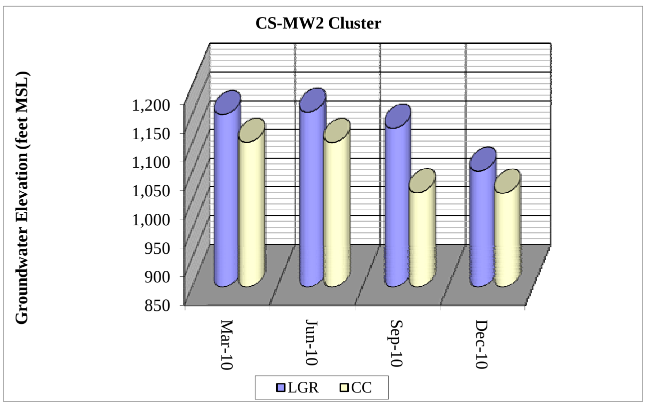
Notes:
Average groundwater elevation change is calculated from wells screened in only one formation.

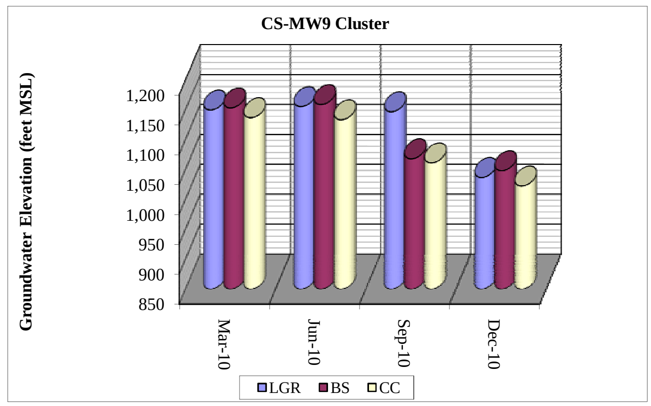
Bold wells: CS-1, CS-2, CS-4, CS-9, CS-10, and CS-11 are open boreholes across more than one of the formations and are not included in average groundwater elevation calculations. CS-1, CS-9, CS-10 and CS-11 are current and former drinking water wells
*Wells equipped with a transducer
** Well equipped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

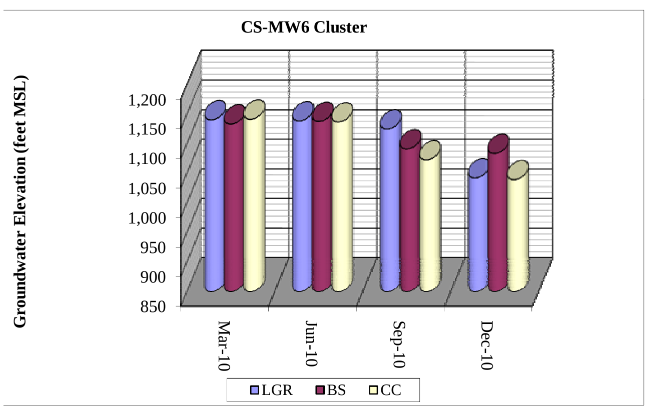
Figure 2.1
Comparison of Groundwater Elevations within Well Clusters

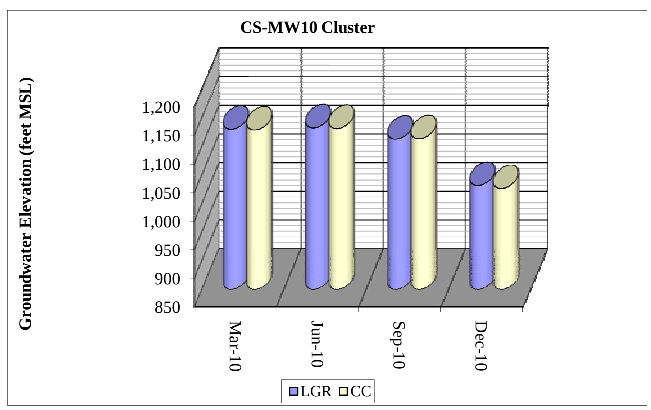


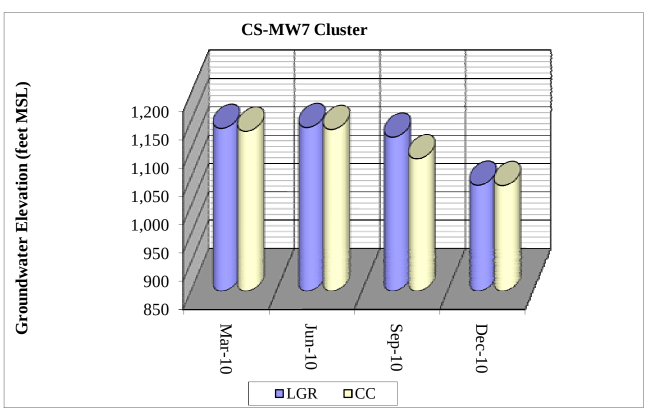


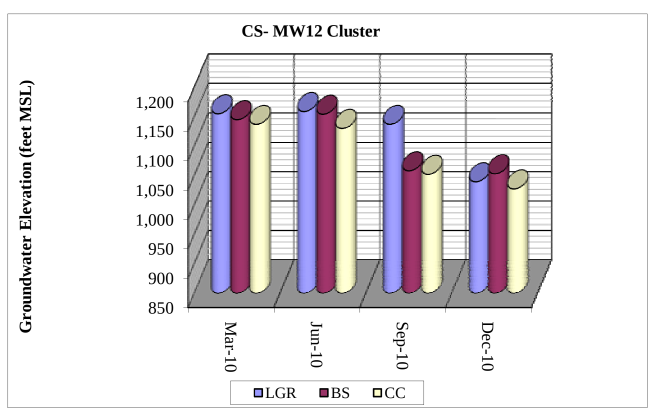












J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2010\Annual Report\Figure 2-1 Cluster Wells Comparisons.xlsx

Under more favorable hydrologic conditions, the groundwater elevation in the BS typically falls between the LGR and CC elevations, as seen in September 2010. However, when water levels decline as they did during the last quarter of 2010, 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 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

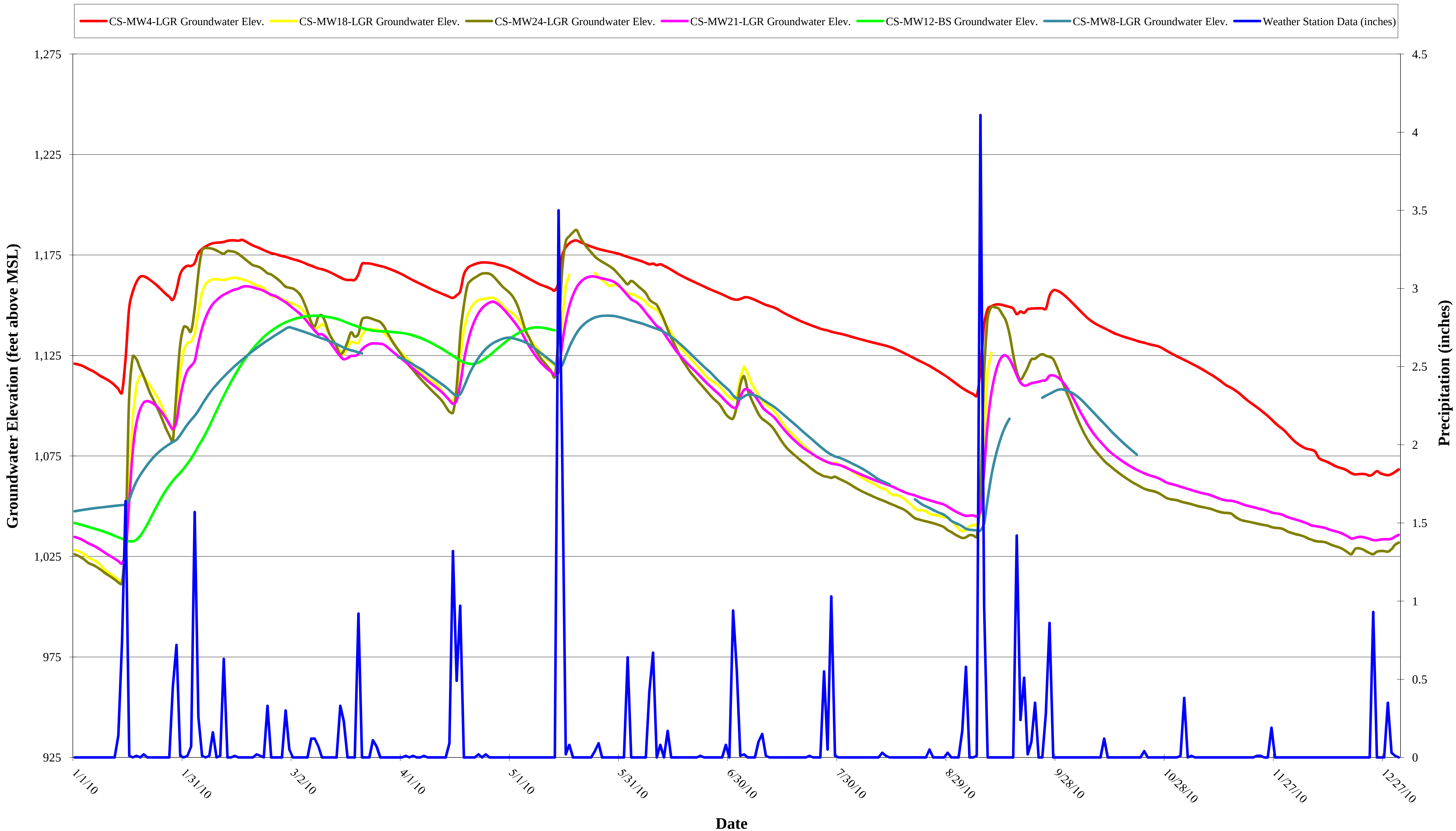
Of the 47 wells listed on **Table 2.1**, 22 are equipped with transducers to continuously log groundwater levels, 18 are providing telemetry directly to the Supervisory Control and Data Acquisition (SCADA) system. The wells with SCADA transducers are still being programmed for SCADA compatibility. One well is also equipped with a transducer provided by the USGS. Two weather stations are in place at CSSA, WS-N adjacent to well CS-MW16-LGR 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 2010 through December 31, 2010) collected from 6 wells specifically screened within the LGR and BS 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. Additional LGR, BS, and CC wells are also equipped with transducers, however minimal data was collected in 2010 due to SCADA outages or equipment failure. The failed and obsolete equipment was recently replaced and will be up and running when SCADA programming is complete. 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.

Both CSSA weather stations were down at some point in 2010 for calibration and/or equipment malfunction but never at the same period of time. CSSA weather stations reported 95 rainfall events with a total precipitation of 35.75 inches in 2010. Rainfall events during 2010 were sporadic, with 8 rain events of one inch or more per day compared to 2009 which had 12 rain events of one inch or more. Slightly more rain fell in the first half of the year with approximately 20 inches recorded by June while the last half of the year reported 15 inches. Overall this represents a fairly even distribution compared to most years.

Based upon historical data, 2010 rainfall totals ended about 3 inches above average for the year. For comparison, the 2000 to 2009 annual precipitation for the San Antonio, Texas area averaged 32.22 inches, as recorded by the weather station operated by the National

Figure 2.2, Selected Wells Groundwater Elevations vs Precipitation Data



J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2010\Annual Report\Figure 2-2 Transducer-WS Data.xlsx

Weather Service (NWS). The month with the highest rainfall total was September, with 9.62 inches of rain at CSSA. The record all time high precipitation in San Antonio for September was set in 1946 with 15.78 inches of rain as reported by the NWS.

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. The last major precipitation event, which was the largest of the year, occurred in September and brought aquifer levels up more than 100 feet in some areas. Rainfall amounts have declined since September and the aquifer has declined as well putting water levels at nearly the same elevations that they were at the beginning of 2010.

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 September 2007 quickly rebounded at the end of 2009 and somewhat normal precipitation continued through 2010. 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.

2.1.4 Post-wide Flow Direction and Gradient

An overall average 2010 calculated LGR groundwater gradient is to the south-southeast at 0.00019 ft/ft. Depending which quadrant of the post the measurement is taken, the groundwater gradient varied seasonally from 0.00029 ft/ft (December 2010) to 0.00085 ft/ft (June 2010). General groundwater flow directions and average gradients calculated during past monitoring events are provided in **Table 2.3** for comparison.

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	
December-10	NA	4.45	-63.93	*-113.46	1045.26	1060.79	1011.76	0.00029	

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

Lower Glen Rose

The 2010 potentiometric surface maps for LGR-screened wells (**Appendix F.1, F.4, F.7** & **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 the mounding effect 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 not considered within this map.

Groundwater elevations in 2010 showed the normal recharge and drawdown that occur during a year with nearly average precipitation. Water levels were higher overall than the levels that persisted through the drought of 2008 which ended in September 2009. The most notable feature of these maps (**F.1, F.4, F.7** and **F.10**) is the return of the groundwater mound that typically occurs in the central portion of post at CS-MW4-LGR.

Well CS-MW4-LGR in the central portion of CSSA consistently has the highest groundwater elevation of LGR screened wells. This elevation was approximately 15 to 25 feet higher than the nearest comparable wells (CS-MW2-LGR and CS-MW20-LGR). Unlike the general trend at CSSA, groundwater flow appears to radiate outward from CS-MW4-LGR. Historical data have shown that this mounding effect can either be muted or completely removed under distressed aquifer conditions. Presumably this region has a strong hydraulic connection to significant perched water either associated with Salado Creek or the hillsides to the east.

The groundwater drawdown due to the continuous pumping of CS-16-LGR, CS-EXW01-LGR, and CS-EXW02-LGR (Bioreactor System) is a reoccurring feature in the central portion of the post. 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 35 feet (December 2010). Groundwater in the inner cantonment also shows a drawdown effect from the pumping of water supply well CS-10, and is most notable in September 2010 (**Appendix F.1**). Finally, a cone-of-depression is evident in the North Pasture on the March and June 2010 potentiometric maps (**F.1** and **F.4**). This drawdown is the result of the pumping of future supply well CS-12 in support of SWMU B-3 Bioreactor activities.

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. 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 2010 are presented in **Appendix F.2, F.5, F.8** & **F.11**.

In typical fashion, the 2010 potentiometric surface maps for BS-screened wells exhibited groundwater flow in multiple directions throughout 2010. The March and June 2010 measurements (**F.2** and **F.5**) indicate a predominately easterly-southeasterly flow with some minor directional shifts in the close approximation of each well. Conversely, the maps for September and December (**F.8** and **F.11**) show a gradient flow predominately toward the north. A depression can be seen around well CS-MW12-BS in the September 2010 map (**F.8**). This depression may reflect the slow formation recharge in the area around CS-MW12-BS compared to the formation recharge near the other wells as the water levels were all measured three days after a major precipitation event.

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 2010 potentiometric surface maps for CC-screened wells (**Appendix F.3 F.6, F.9** & **F.12**) exhibited an easterly flow in all quarters. Throughout 2010, 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 (**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 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**. Sixty-four on-post samples were scheduled to be collected in 2010 (11 in March, 26 in June, 17 in September, and 10 in December). One of the 64 samples could not be collected due to a pump outage in well CS-MWH-LGR. Twenty-eight additional samples were collected in September 2010 to provide a complete set of data for the annual snapshot event. 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.

Table 2.4
Overview of the On-Post Monitoring Program

Count	Well ID	*Analytes*	*Last Sample Date*	*Mar-10*	*Jun-10*	*Sep-10 (snapshot)*	*Dec-10*	*Sampling Frequency*
1	CS-MW1-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
2	CS-MW1-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
3	CS-MW1-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
4	CS-MW2-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
5	CS-MW2-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
6	CS-MW3-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
7	CS-MW4-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
8	CS-MW5-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
9	CS-MW6-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
10	CS-MW6-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
11	CS-MW6-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
12	CS-MW7-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
13	CS-MW7-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
14	CS-MW8-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Every 9 months*
15	CS-MW8-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
16	CS-MW9-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
17	CS-MW9-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
18	CS-MW9-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
19	CS-MW10-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Every 9 months*
20	CS-MW10-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
21	CS-MW11A-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
22	CS-MW11B-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	NS	S	NS	Semi-annual
23	CS-MW12-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Every 9 months*
24	CS-MW12-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
25	CS-MW12-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Biennial
26	CS-MW16-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
27	CS-MW16-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
28	CW-MW17-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Every 9 months*
29	CS-MW18-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
30	CS-MW19-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
31	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
32	CS-2	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Every 9 months*
	CS-3	sampled as needed, no pump	Dec-99	NS	NS	NS	NS	as needed
33	CS-4	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
34	CS-9	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
35	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
	CS-11	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-09	NS	NS	NS	NS	pump removed
36	CS-12	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
37	CS-D	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	S	NS	Semi-annual
38	CS-MWG-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NS	S	NS	Every 9 months*
39	CS-MWH-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	NS pump out	NS	Biennial
40	CS-I	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	**pump not working**	S	S	NS	Every 9 months*
41	CS-MW20-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
42	CS-MW21-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
43	CS-MW22-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
44	CS-MW23-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
45	CS-MW24-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
46	CS-MW25-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**

*Wells recommended for annual sampling frequency in the LTMO are scheduled every nine months (every third quarter) to gather seasonal data.
**Quarterly until LTMO Update Study can recommend a frequency.
S = Sample
NS = No Sample

Under the provisions of the groundwater monitoring LTMO study and DQOs, the analytical metals list was modified in the July 2008 meeting with the regulators to include chromium, cadmium, mercury and lead. This change was a result of previous analytical results and past investigations of CSSA metal COC sources. All on-post monitoring wells are sampled for the 4 previously mentioned metals. 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).

One well, CS-MWH-LGR, was not sampled in 2010 due to electrical malfunction at the well pump box, possibly due to a lightening striking the power pole. See Table 2.4 for the Overview of On-Post Sampling in 2010.

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-4, CS-MW16-LGR, CS-MW16-CC, CS-D, CS-MW1-LGR, CS-9, CS-12, CS-MW9-BS, and CS-MW25-LGR in 2010. 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-4** – This well was sampled twice in 2010. TCE was above the MCL in June 2010 and both PCE and TCE concentrations were above their MCLs in September 2010. *Cis*-1,2-DCE and *trans*-1,2-DCE were also detected below their respective MCLs. No metals of concern were detected in this well in 2010. The MCL was first exceeded in this well in June 2004, then again in December 2009, June 2010, and September 2010. The all time high VOC concentrations in CS-4 of 43, 87, and 66 ppb for PCE, TCE DCE, respectively, were recorded in 2009.
- **CS-MW16-LGR** – This well was sampled two times in 2010. Concentrations of PCE, TCE, and *cis*-1,2-DCE exceeded their MCLs during the June and September sampling events. *Trans*-1,2-DCE was detected below the MCL in both events. Cadmium was detected in below the MCL in September 2010. 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.

Table 2.5
2010 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)	Dichloro-ethene, *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	3/8/2010	--	--	--	--	--	--
	6/14/2010	--	--	--	--	--	--
	9/8/2010	--	--	--	--	**0.17F**	--
	12/8/2010	--	--	--	--	**0.23F**	--
CS-2	9/16/2010	--	--	--	--	--	--
CS-4	6/10/2010	--	**2.03**	--	**4.34**	**5.55**	--
	9/16/2010	--	**5.99**	**0.6**	**6.39**	**10.03**	--
CS-9	3/8/2010	--	--	--	--	--	--
	6/14/2010	--	--	--	--	--	--
	9/8/2010	--	--	--	--	--	--
Duplicate	9/8/2010	--	--	--	--	--	--
	12/8/2010	--	--	--	--	--	--
CS-10	3/8/2010	--	--	--	--	**0.24F**	--
	6/14/2010	--	--	--	--	--	--
Duplicate	6/14/2010	--	--	--	--	--	--
	9/8/2010	--	--	--	--	--	--
	12/8/2010	--	--	--	--	--	--
CS-12	3/9/2010	--	--	--	--	--	--
	6/14/2010	--	--	--	--	--	--
	9/17/2010	--	--	--	--	--	--
	12/8/2010	--	--	--	--	--	--
CS-MW16-LGR	6/14/2010	--	**136.56**	**0.22F**	**142.56**	**162.6**	--
	9/8/2010	--	**239.84**	**0.6**	**236.28**	**293.04**	--
CS-MW16-CC	6/14/2010	**0.33F**	**33.86**	**3.92**	**4.9**	**42.6**	--
	9/8/2010	--	**30.27**	**4.03**	**2.99**	**38.4**	--
CS-D	6/10/2010	--	**98.94**	**0.88**	**100.03**	**137.52**	--
	9/16/2010	--	**122.82**	**3.98**	**110.02**	**153.76**	--
CS-MWG-LGR	9/14/2010	--	--	--	--	--	--
CS-I	6/14/2010	--	--	--	--	--	--
	9/13/2010	--	--	--	--	--	--
CS-MW1-LGR	6/9/2010	--	**54.85**	**0.68**	**37.85**	**51.15**	--
	9/7/2010	--	**20.77**	**0.31F**	**16.73**	**34.92**	--
CS-MW1-BS	9/7/2010	--	**1.38**	--	--	--	--
CS-MW1-CC	9/7/2010	--	--	--	--	--	--
CS-MW2-LGR	6/9/2010	--	**1.13F**	--	**0.16F**	--	--
	9/16/2010	--	**1.41**	--	--	--	--
CS-MW2-CC	9/16/2010	--	--	--	--	--	--
CS-MW3-LGR	6/10/2010	--	--	--	--	--	--
	9/14/2010	--	--	--	--	--	--
CS-MW4-LGR	6/10/2010	--	--	--	--	--	--
	9/17/2010	--	--	--	--	--	--
CS-MW5-LGR	6/9/2010	--	**0.96F**	--	**0.88F**	**0.94F**	--
	9/9/2010	--	**1.69**	--	**0.84F**	**1.71**	--

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Table 2.5
2010 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)	Dichloro-ethene, *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-MW6-LGR	6/8/2010	--	--	--	--	--	--
	9/10/2010	--	--	--	--	--	--
CS-MW6-BS	9/10/2010	--	--	--	--	--	--
CS-MW6-CC	9/10/2010	--	--	--	--	--	--
CS-MW7-LGR	6/8/2010	--	--	--	--	--	--
	9/15/2010	--	--	--	--	--	--
CS-MW7-CC	9/15/2010	--	--	--	--	--	--
Duplicate	9/15/2010	--	--	--	--	--	--
CS-MW8-LGR	9/15/2010	--	--	--	1.88	--	--
CS-MW8-CC	9/15/2010	--	--	--	--	--	--
CS-MW9-LGR	6/10/2010	--	--	--	--	--	--
	9/14/2010	--	--	--	--	--	--
CS-MW9-BS	9/14/2010	--	--	--	--	--	--
CS-MW9-CC	9/14/2010	--	--	--	--	--	--
CS-MW10-LGR	9/15/2010	--	--	--	1.96	0.38F	--
CS-MW10-CC	9/15/2010	--	--	--	--	--	--
CS-MW11A-LGR	6/8/2010	--	--	--	0.86F	--	--
	9/9/2010	--	--	--	0.73F	--	--
CS-MW11B-LGR	3/8/2010	--	--	--	0.94F	--	--
Duplicate	3/8/2010	--	--	--	0.92F	--	--
	9/9/2010	--	--	--	0.92F	--	--
CS-MW12-LGR	9/10/2010	--	--	--	--	--	--
CS-MW12-BS	9/10/2010	--	--	--	--	--	--
CS-MW12-CC	9/10/2010	--	--	--	--	--	--
CS-MW17-LGR	9/14/2010	--	--	--	0.29F	--	--
CS-MW18-LGR	6/8/2010	--	--	--	--	--	--
	9/10/2010	--	--	--	--	--	--
CS-MW19-LGR	6/8/2010	--	--	--	0.43F	--	--
	9/17/2010	--	--	--	0.41F	--	--
Duplicate	9/17/2010	--	--	--	0.49F	--	--
CS-MW20-LGR	3/8/2010	--	--	--	1.8	--	--
	6/9/2010	--	--	--	1.95	--	--
	9/17/2010	--	--	--	1.79	--	--
	12/7/2010	--	--	--	1.71	--	--
CS-MW21-LGR	3/9/2010	--	--	--	--	--	--
	6/10/2010	--	--	--	--	--	--
	9/17/2010	--	--	--	--	--	--
	12/7/2010	--	--	--	--	--	--
CS-MW22-LGR	3/8/2010	--	--	--	--	--	--
	6/9/2010	--	--	--	--	--	--
	9/17/2010	--	--	--	--	--	--
	12/7/2010	--	--	--	--	--	--

Table 2.5
2010 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)	Dichloro-ethene, *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-MW23-LGR	3/9/2010	--	--	--	--	--	--
	6/8/2010	--	--	--	--	--	--
	9/15/2010	--	--	--	--	--	--
Duplicate	9/15/2010	--	--	--	--	--	--
	12/7/2010	--	--	--	--	--	--
CS-MW24-LGR	3/8/2010	--	--	--	--	--	--
	6/9/2010	--	--	--	--	--	--
Duplicate	6/9/2010	--	--	--	--	--	--
	9/17/2010	--	--	--	--	--	--
Duplicate	9/17/2010	--	--	--	--	--	--
	12/7/2010	--	--	--	--	--	--
CS-MW25-LGR	3/9/2010	--	--	--	--	--	--
	6/10/2010	--	--	--	--	--	--
	9/14/2010	--	--	--	--	--	--
	12/8/2010	--	--	--	--	--	--
Duplicate	12/8/2010	--	--	--	--	--	--

Bold	Value > or = MCL
Bold	MCL > Value > or = RL
Bold	RL > Value > MDL

Notes:
- µg/L = miligrams per liter
- AL = action level
- SS = secondary standard
- 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.
- NA = Not analyzed for this parameter.
- All samples analyzed by Agriculture & Priority Pollutants Laboratories (APPL), Inc. of Clovis, CA

Table 2.5
2010 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	0.0008	0.0003	0.0001	0.001	0.003	0.0008	0.0001	0.008
	RL	0.005	0.005	0.001	0.01	0.01	0.005	0.001	0.05
	MCL/AL/SS	0.01	2.0	0.005	0.1	1.3	0.015 (AL)	0.002	5.0 (SS)
CS-1	3/8/2010	--	0.041	--	--	0.0057F	--	--	0.16
	6/14/2010	0.0023F	0.045	--	--	0.009F	--	--	0.081
	9/8/2010	0.0024F	0.036	0.0009F	--	--	--	--	0.1
	12/8/2010	--	0.0362	--	--	0.023	--	--	0.141
CS-2	9/16/2010	NA	NA	--	0.002F	NA	--	--	NA
CS-4	6/10/2010	NA	NA	--	--	NA	--	--	NA
	9/16/2010	NA	NA	--	--	NA	--	--	NA
CS-9	3/8/2010	--	0.04	--	0.0020F	0.0036F	0.015F	0.0005F	2.1
	6/14/2010	0.0004F	0.0455	--	0.002F	0.011	0.0168F	0.0036	1.939
	9/8/2010	0.0011F	0.046	0.0008F	--	--	0.0131F	0.0022	1.247
Duplicate	9/8/2010	0.0045F	0.0414	0.0009F	--	--	0.0125F	0.0021	1.212
	12/8/2010	0.0004F	0.0395	--	--	0.07	0.0474	0.0018	2.608
CS-10	3/8/2010	--	0.044	--	--	0.0083F	--	--	0.27
	6/14/2010	0.0035F	0.0503	--	--	0.008F	--	--	0.11
Duplicate	6/14/2010	0.0034F	0.0499	--	--	0.011	--	--	0.117
	9/8/2010	0.0046F	0.041	0.0006F	--	0.014	--	--	0.133
	12/8/2010	--	0.0404	--	--	0.033	--	--	0.108
CS-12	3/9/2010	0.0025F	0.03	0.0006F	0.0023F	0.047	0.025	--	1.4
	6/14/2010	0.0034F	0.038	0.0006F	0.002F	0.01	0.0039F	--	0.431
	9/17/2010	0.0082F	0.0335	--	--	0.008F	--	--	0.239
	12/8/2010	0.0013F	0.0308	--	--	0.043	0.0186F	--	0.397
CS-MW16-LGR	6/14/2010	NA	NA	--	--	NA	--	--	NA
	9/8/2010	NA	NA	0.0008F	--	NA	--	--	NA
CS-MW16-CC	6/14/2010	NA	NA	--	--	NA	--	--	NA
	9/8/2010	NA	NA	--	--	NA	--	--	NA
CS-D	6/10/2010	NA	NA	--	--	NA	--	--	NA
	9/16/2010	NA	NA	--	--	NA	--	--	NA
CS-MWG-LGR	9/14/2010	NA	NA	--	--	NA	--	--	NA
CS-I	6/14/2010	NA	NA	--	--	NA	--	--	NA
	9/13/2010	NA	NA	0.0008F	--	NA	--	--	NA
CS-MW1-LGR	6/9/2010	NA	NA	--	0.003F	NA	--	--	NA
	9/7/2010	NA	NA	0.0011F	0.002F	NA	--	--	NA
CS-MW1-BS	9/7/2010	NA	NA	--	--	NA	--	--	NA
CS-MW1-CC	9/7/2010	NA	NA	0.0006F	--	NA	--	--	NA
CS-MW2-LGR	6/9/2010	NA	NA	--	--	NA	--	--	NA
	9/16/2010	NA	NA	--	0.002F	NA	--	--	NA
CS-MW2-CC	9/16/2010	NA	NA	--	0.003F	NA	--	--	NA
CS-MW3-LGR	6/10/2010	NA	NA	--	--	NA	--	--	NA
	9/14/2010	NA	NA	--	--	NA	--	--	NA
CS-MW4-LGR	6/10/2010	NA	NA	--	--	NA	--	--	NA
	9/17/2010	NA	NA	--	0.002F	NA	--	--	NA
CS-MW5-LGR	6/9/2010	NA	NA	--	--	NA	--	--	NA
	9/9/2010	NA	NA	0.0010F	--	NA	--	--	NA
CS-MW6-LGR	6/8/2010	NA	NA	--	0.002F	NA	--	--	NA
	9/10/2010	NA	NA	0.0008F	--	NA	--	--	NA
CS-MW6-BS	9/10/2010	NA	NA	--	--	NA	--	--	NA
CS-MW6-CC	9/10/2010	NA	NA	--	--	NA	--	--	NA
CS-MW7-LGR	6/8/2010	NA	NA	--	0.004F	NA	--	--	NA
	9/15/2010	NA	NA	--	0.003F	NA	--	--	NA
CS-MW7-CC	9/15/2010	NA	NA	--	0.002F	NA	--	--	NA
Duplicate	9/15/2010	NA	NA	--	--	NA	--	--	NA
CS-MW8-LGR	9/15/2010	NA	NA	--	0.002F	NA	--	--	NA
CS-MW8-CC	9/15/2010	NA	NA	--	0.002F	NA	--	--	NA
CS-MW9-LGR	6/10/2010	NA	NA	--	0.002F	NA	--	--	NA
	9/14/2010	NA	NA	--	--	NA	--	--	NA
CS-MW9-BS	9/14/2010	NA	NA	--	--	NA	0.0327F	--	NA
CS-MW9-CC	9/14/2010	NA	NA	--	--	NA	--	--	NA
CS-MW10-LGR	9/15/2010	NA	NA	--	0.002F	NA	--	--	NA

Table 2.5
2010 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)
CS-MW10-CC	9/15/2010	NA	NA	--	--	NA	--	--	NA
CS-MW11A-LGR	6/8/2010	NA	NA	--	**0.002F**	NA	--	--	NA
	9/9/2010	NA	NA	**0.0011F**	**0.002F**	NA	--	--	NA
CS-MW11B-LGR	3/8/2010	NA	NA	--	**0.0022F**	NA	--	--	NA
Duplicate	3/8/2010	NA	NA	--	**0.0035F**	NA	--	--	NA
	9/9/2010	NA	NA	**0.0010F**	**0.024**	NA	--	--	NA
CS-MW12-LGR	9/10/2010	NA	NA	**0.0006F**	--	NA	--	--	NA
CS-MW12-BS	9/10/2010	NA	NA	**0.0008F**	--	NA	--	--	NA
CS-MW12-CC	9/10/2010	NA	NA	--	--	NA	--	--	NA
CS-MW17-LGR	9/14/2010	NA	NA	--	**0.002F**	NA	--	--	NA
CS-MW18-LGR	6/8/2010	NA	NA	--	--	NA	--	--	NA
	9/10/2010	NA	NA	**0.0007F**	--	NA	--	--	NA
CS-MW19-LGR	6/8/2010	NA	NA	--	**0.003F**	NA	--	--	NA
	9/17/2010	NA	NA	--	**0.003F**	NA	--	--	NA
Duplicate	9/17/2010	NA	NA	--	**0.003F**	NA	--	--	NA
CS-MW20-LGR	3/8/2010	NA	NA	--	**0.0019F**	NA	--	--	NA
	6/9/2010	NA	NA	--	--	NA	--	--	NA
	9/17/2010	NA	NA	--	--	NA	--	--	NA
	12/7/2010	NA	NA	--	--	NA	--	--	NA
CS-MW21-LGR	3/9/2010	NA	NA	--	**0.0015F**	NA	--	--	NA
	6/10/2010	NA	NA	--	--	NA	--	--	NA
	9/17/2010	NA	NA	--	**0.002F**	NA	--	--	NA
	12/7/2010	NA	NA	--	--	NA	--	--	NA
CS-MW22-LGR	3/8/2010	NA	NA	--	**0.0017F**	NA	--	--	NA
	6/9/2010	NA	NA	--	**0.002F**	NA	**0.0033F**	--	NA
	9/17/2010	NA	NA	--	**0.003F**	NA	**0.0021F**	--	NA
	12/7/2010	NA	NA	--	--	NA	--	--	NA
CS-MW23-LGR	3/9/2010	NA	NA	--	--	NA	--	--	NA
	6/8/2010	NA	NA	--	--	NA	--	--	NA
	9/15/2010	NA	NA	--	--	NA	--	--	NA
Duplicate	9/15/2010	NA	NA	--	--	NA	--	--	NA
	12/7/2010	NA	NA	--	--	NA	--	--	NA
CS-MW24-LGR	3/8/2010	NA	NA	--	**0.0011F**	NA	--	--	NA
	6/9/2010	NA	NA	--	--	NA	--	--	NA
Duplicate	6/9/2010	NA	NA	--	--	NA	--	--	NA
	9/17/2010	NA	NA	--	**0.002F**	NA	--	--	NA
Duplicate	9/17/2010	NA	NA	--	--	NA	--	--	NA
	12/7/2010	NA	NA	--	--	NA	--	--	NA
CS-MW25-LGR	3/9/2010	NA	NA	--	**0.017**	NA	--	--	NA
	6/10/2010	NA	NA	--	--	NA	--	--	NA
	9/14/2010	NA	NA	--	**0.011**	NA	--	--	NA
	12/8/2010	NA	NA	--	--	NA	**0.0183F**	--	NA
Duplicate	12/8/2010	NA	NA	--	--	NA	**0.0198F**	--	NA

Bold (red)	Value > or = MCL
Bold (blue)	MCL > Value > or = RL
Bold	RL > Value > MDL

Notes:
- mg/L = milligrams per liter
-- = analyte not detected above the MDL.
- 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
- *Duplicate* = field duplicate
- MDL = Method Detection Limit
- RL = Reporting Limit
- MCL = Maximum Contaminant Level
- AL = Action Level

In 2010 the pumping rate averaged about 12.48 gallons per minute (gpm) with a range of 6.19 gpm to 27.64 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 2010. Concentrations of TCE exceeded the MCL in June and September 2010. TCE, *cis*-1,2-DCE and *trans*-1,2-DCE were below their respective MCLs but above the RL in June and September 2010. 1,1-DCE was also detected but below the MCL in June 2010. No metals of concern were detected in this well in 2010. 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 2010 the pumping rate averaged about 21.97 gpm with a range of 14.03 to 31.56 gpm. VOC levels in 2010 were at the low end of the historical concentration range for this well.

- **CS-D** – This well was sampled twice in 2010. Concentrations of PCE, TCE, and *cis*-1,2-DCE exceeded their MCLs in June and September 2010. *Trans*-1,2-DCE was detected below its MCL during both sampling events. No metals of concern were detected in 2010.

- **CS-MW1-LGR** – This well was sampled twice in 2010. PCE and TCE concentrations were above their MCLs in June and September 2010. *Cis*-1,2-DCE and *trans*-1,2-DCE were also detected below their MCLs in June and September 2010. Cadmium and chromium were detected below their applicable MCLs in June and September 2010.

- **CS-9** – This well was sampled all four quarters in 2010. No VOCs were detected in this well in 2010. However, lead was above the AL in March, June and December 2010. Mercury was also above the MCL in June and September. Arsenic, barium, cadmium, chromium, copper, and zinc were also detected below their applicable MCLs in 2010. 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.

- **CS-12** – This well was sampled all four quarters in 2010. No VOCs were detected in this well in 2010. However, lead was above the AL in March and December 2010. Barium, copper, and zinc were also detected below the MCL but above the RL. Arsenic, cadmium, and chromium were detected below their applicable RLs in 2010. Well CS-12 is a future drinking water well that will be connected to the CSSA water system in summer 2011. Construction of the well house began in early 2011.

- **CS-MW9-BS** – This well was sampled once in 2010. No VOCs were detected in this well in 2010. Lead was above the MCL in September 2010. Lead has been detected above the MCL in this well since 2007.

- **CS-MW25-LGR** – This well was sampled all four quarters in 2010. No VOCs were detected in this well in 2010. Lead was above the AL in December 2010. Chromium was also detected below the MCL but above the RL in March and September 2010. Lead has been sporadically detected in this well, above the AL, since it was installed in 2007.

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-1, CS-2, CS-I, CS-MW1-BS, CS-MW1-CC, CS-MW2-LGR, CS-MW2-CC, CS-MW4-LGR, CS-MW5-LGR, CS-MW6-LGR, CS-MW7-LGR, CS-MW7-CC, CS-MW8-LGR, CS-MW8-CC, CS-MW9-LGR, CS-MW10-LGR, CS-MW11A-LGR, CS-MW11B-LGR, CS-MW12-LGR, CS-MW12-BS, CS-MW17-LGR, CS-MW18-LGR, CS-MW19-LGR, CS-MW20-LGR, CS-MW21-LGR, CS-MW22-LGR, and CS-MW24-LGR. The detections below the MCLs/ALs but above MDLs are summarized as follows:

- **CS-1 –** Concentrations of TCE were detected below the RL in September and December 2010.
- **CS-2** –Chromium was detected below the RL in September 2010.
- **CS-I** –Cadmium was detected just below the RL in September 2010.
- **CS-MW1-BS** – Concentrations of *cis*-1,2-DCE were detected below the MCL in September 2010.
- **CS-MW1-CC** –Concentrations of cadmium were detected below the RL in September 2010.
- **CS-MW2-LGR** – Concentrations of *cis*-1,2-DCE and TCE were detected below their MCLs and above the RLs in 2010. Chromium was detected in September 2010, below the RL. The pH at the time of sampling was 8.05 and 8.20 respectively, for the June and September 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 MW-2 LGR. The caustic waste has been removed and trenches backfilled with clean fill.
- **CS-MW2-CC** - Concentrations of chromium were below the RL in September 2010.
- **CS-MW4-LGR** –Concentrations of chromium were below the RL in September 2010.
- **CS-MW5-LGR** – Concentrations of PCE, TCE, and *cis*-1,2-DCE were detected below their MCLs and above RLs in June and September 2010. Low levels of cadmium were also detected below the RL in September 2010.
- **CS-MW6-LGR** - Low levels of cadmium and chromium below the RL were present in June and September 2010.
- **CS-MW7-LGR** –Low levels of chromium below the RL were detected in June and September 2010.
- **CS-MW7-CC** - Concentrations of chromium were below the RL in September 2010.

- **CS-MW8-LGR** – Concentrations of PCE were detected below the MCL and above the RL in September 2010. Chromium was also detected in this well below the RL in September 2010.
- **CS-MW8-CC** –Chromium was detected below the RL in September 2010.
- **CS-MW9-LGR** – Low levels of chromium were present below the RL in June 2010.
- **CS-MW10-LGR** – PCE and TCE concentrations were detected below the MCL and above the RL in September 2010. Chromium was also reported below the RL in September 2010.
- **CS-MW11A-LGR** – Concentrations of PCE were detected below the MCL and above the RL in June and September 2010. Chromium was reported below the RL in June and September 2010. Cadmium was reported below the RL in September 2010.
- **CS-MW11B-LGR** – This well had not been sampled since March 2008 due to water levels being below the bladder pumps. PCE was reported in this well below the RL in March and September 2010. Chromium was reported below the RL in March 2010, and above the RL in September 2010. Cadmium was reported below the RL in September 2010.
- **CS-MW12-LGR** - Cadmium was reported below the RL in September 2010.
- **CS-MW12-BS** - Cadmium was reported below the RL in September 2010.
- **CS-MW17-LGR** – Concentrations of PCE were reported below the RL in September 2010. Chromium was also detected below the RL in September 2010.
- **CS-MW18-LGR** - Concentrations of cadmium were below the RL in September 2010.
- **CS-MW19-LGR** – Concentrations of PCE were below the RL in June and September 2010. Chromium was reported below the RL in both sampling events as well.
- **CS-MW20-LGR** – Concentrations of PCE were detected below the MCL and above the RL in March, June, September, and December 2010. In March 2010, chromium was detected below the RL.
- **CS-MW21-LGR** –Chromium was detected at concentrations below the RL in March and September 2010.
- **CS-MW22-LGR** – Concentrations of chromium and lead were below the RL in June and September 2010. Chromium was also detected below the RL in March 2010.
- **CS-MW24-LGR** - Chromium concentrations were detected below the RL in March and September 2010.

2.2.1.3 On-Post Monitoring Wells with No COC Detections

Of the 45 monitoring wells sampled in 2010, 33 wells reported COC detections. A total o 9 wells (CS-I, CS-MWG-LGR, CS-MW3-LGR, CS-MW6-BS, CS-MW6-CC, CS-MW9-CC, CS-MW10-CC, CS-MW12-CC, and CS-MW23-LGR) reported no VOC or metals detections. Well CS-MWH-LGR was not sampled in 2010 due to a failure with the submersible pump. 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

Two current, one former, and one future CSSA drinking water supply wells CS-1, CS-10, CS-9, and CS-12, respectively were analyzed for VOCs and the 8 metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, and zinc) in 2010. Under the LTMO study, the drinking water supply wells are scheduled to be sampled every nine months (**Table 2.4**). However, due to increased metals concentrations in well CS-9 after well rehabilitation the sampling frequency was increased to quarterly monitoring. Future drinking water well CS-12 has yet to be connected into the CSSA water supply system. The detections are summarized as follows:

- **CS-1** – Concentrations of TCE were below the RL in September and December 2010. Concentrations of barium and zinc were below their respective MCLs and above the RLs in all four quarters in 2010. Copper was below the RL in March and September, then above the RL in December 2010. Arsenic was below the RL in June and September 2010 and chromium was below its RL in September 2010.
- **CS-9** –Concentrations of lead and mercury were above their AL/MCL in June 2010. By September mercury remained above the MCL while lead fell below its AL. In December mercury fell below its MCL and lead was back above its AL. Zinc and barium were also detected below their applicable MCLs in all four quarters in 2010. Concentrations of arsenic, cadmium, chromium, and copper were also detected below their applicable MCLs in 2010. This well remains disconnected from the CSSA drinking water system, and is listed as "inactive".
- **CS-10** – TCE was detected in this well in March 2010 below the RL. Arsenic, barium, cadmium, copper and zinc were all detected in this well below the applicable MCL/SSs in 2010. No metals in this well exceeded their applicable MCL/AL/SS in 2010.
- **CS-12** – No VOCs were detected in this well in 2010. Lead was detected above the AL in March and December 2010, it was also detected below the RL in June 2010. Arsenic, barium, cadmium, chromium, copper and zinc were detected in 2010, all below their applicable MCL/SSs. CS-12 has been intermittently pumped in 2010 to prevent stagnation until it is incorporated into the CSSA potable water distribution system. See **Section 3.0 CS-12 Supply Well** for more information regarding BACT testing at CS-12.

As of June 2007 the groundwater supply well CS-9 rehabilitation was completed. Initially, the investigation indicated debris (believed to be either old well casing, column pipe and/or an old broken pump) present in the bottom of the well borehole was the suspected source for the elevated lead and mercury detections noted after the initial well rehabilitation effort. The well was pressure-grouted to seal the debris in the bottom of the borehole. This was intended to eliminate contact with the water producing zones. The initial sampling indicated that metals levels were below MCLs. However, continued sampling in 2010 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 plan is based upon performance and known production capacity of well CS-10, which is the primary provider of potable water for the facility. The Drought Contingency Plan triggers are included in **Appendix E**.

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 LTMO study, the schedule for sampling the UGR and LGR zones in the four Westbay-equipped wells is semi-annual (twice per year). The schedule for sampling the BS and CC zones in Westbay well CS-WB04 is biennial (every two years). Samples were collected from UGR and LGR zones with water during the March and September 2010 events and no samples were collected from the BS and CC zones in 2010, they will be collected again in March 2011. 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 2.6**. Full analytical results are presented in **Appendix C**. **Appendix D** illustrates the historical changes in contaminant concentrations for each Westbay zone.

Due to a decrease in groundwater elevations, certain zones (CS-WB01-UGR-01, CS-WB02-UGR-01, CS-WB03-LGR-02 and CS-WB04-UGR-01) could not be sampled in March or September because they were dry. Zones CS-WB02-LGR-02 and CS-WB04-LGR-02 were not sampled in September because they were dry. CS-WB04-LGR-05 was not sampled due to a non-operational sampling port. The remaining 37 zones contained water and were sampled. The Westbay-equipped wells are sampled using Westbay Instruments, Inc., equipment and sampling methods.

Table 2.6
2010 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
Method Detection Limit	MDL	0.3	0.16	0.19	0.16	0.15	0.23
Current Reporting Limit	RL	1.2	1.2	0.6	1.0	1.4	1.1
Max. Contaminant Level	MCL	7.0	70	100	5.0	5.0	2.0
CS-WB01-UGR-01	10-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	1-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB01-LGR-01	10-Mar-10	--	--	--	--	3.7	--
	1-Sep-10	--	--	--	0.25F	5	--
CS-WB01-LGR-02	10-Mar-10	--	--	--	2.6	8.0	--
	1-Sep-10	--	--	--	2.9	8.1	--
CS-WB01-LGR-03	10-Mar-10	--	--	--	15	4.6	--
	1-Sep-10	--	--	--	10	2.8	--
CS-WB01-LGR-04	10-Mar-10	--	--	--	0.23J	--	--
	1-Sep-10	--	--	--	--	--	--
CS-WB01-LGR-05	10-Mar-10	--	--	--	0.61J	0.17J	--
	1-Sep-10	--	--	--	0.35F	--	--
CS-WB01-LGR-06	10-Mar-10	--	0.18J	--	1.7	0.54J	--
	1-Sep-10	--	--	--	1.5	--	--
CS-WB01-LGR-07	10-Mar-10	--	0.22J	--	16	19	--
	1-Sep-10	--	0.26F	--	22	19	--
CS-WB01-LGR-08	10-Mar-10	--	--	--	3.4	1.5	--
	1-Sep-10	--	--	--	3.9	1.2F	--
CS-WB01-LGR-09	10-Mar-10	--	0.21J	--	19	14	--
	1-Sep-10	--	0.27F	--	19	12	--
CS-WB02-UGR-01	11-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-01	11-Mar-10	--	--	--	1.9	0.71J	--
	3-Sep-10	--	--	--	1.7	0.64F	--
CS-WB02-LGR-02	11-Mar-10	--	--	--	0.37J	2.2	--
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-03	11-Mar-10	--	--	--	0.33J	3.7	--
	3-Sep-10	--	--	--	0.26F	3.3	--
CS-WB02-LGR-04	11-Mar-10	--	--	--	14	4.2	--
	3-Sep-10	--	--	--	8.4	2.2	--
CS-WB02-LGR-05	11-Mar-10	--	--	--	4.1	1.2J	--
	3-Sep-10	--	--	0.33F	3.6	0.93F	--
CS-WB02-LGR-06	11-Mar-10	--	0.20J	--	5.9	9.0	--
	3-Sep-10	--	0.26F	0.35F	4.7	4.8	--
CS-WB02-LGR-07	11-Mar-10	--	--	--	2.2	2.1	--
	3-Sep-10	--	--	--	1.3	1.1F	--
CS-WB02-LGR-08	11-Mar-10	--	0.33J	0.28J	2.4	2.5	--
	3-Sep-10	--	1.8	1.4	2.7	0.50F	--
CS-WB02-LGR-09	11-Mar-10	--	--	--	11	11	--
	3-Sep-10	--	0.20F	--	15	18	--
CS-WB03-UGR-01	11-Mar-10	--	--	--	45J*	4400*	--
	8-Sep-10	--	--	--	59F*	5700*	--
CS-WB03-LGR-01	11-Mar-10	--	--	--	30J*	430*	--
	8-Sep-10	--	--	--	--	520*	--
CS-WB03-LGR-02	11-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	8-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB03-LGR-03	11-Mar-10	--	0.32J	--	13	27	--
	8-Sep-10	--	--	--	5.9	9.3	--
CS-WB03-LGR-04	11-Mar-10	--	--	--	8.0	24	--
	8-Sep-10	--	--	--	8.3	21	--
CS-WB03-LGR-05	11-Mar-10	--	--	--	5.9	22	--

Table 2.6
2010 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
Method Detection Limit	**MDL**	**0.3**	**0.16**	**0.19**	**0.16**	**0.15**	**0.23**
Current Reporting Limit	**RL**	**1.2**	**1.2**	**0.6**	**1.0**	**1.4**	**1.1**
Max. Contaminant Level	**MCL**	**7.0**	**70**	**100**	**5.0**	**5.0**	**2.0**
	8-Sep-10	--	--	--	**5.7**	**21**	--
CS-WB03-LGR-06	11-Mar-10	--	--	--	**0.98J**	**7.2**	--
	8-Sep-10	--	--	--	**1.2**	**8.5**	--
CS-WB03-LGR-07	11-Mar-10	--	**0.71J**	--	**20**	**10**	--
	8-Sep-10	--	**0.78F**	--	**16**	**14**	--
CS-WB03-LGR-08	11-Mar-10	--	--	--	**1.3**	**9.3**	--
	8-Sep-10	--	**1.4**	--	**2**	**10**	--
CS-WB03-LGR-09	11-Mar-10	--	--	--	**6.5**	**6.6**	--
	8-Sep-10	--	--	--	**7.6**	**5**	--
CS-WB04-UGR-01	10-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-01	10-Mar-10	--	--	--	--	**0.60J**	--
	3-Sep-10	--	--	--	--	**0.44F**	--
CS-WB04-LGR-02	10-Mar-10	--	--	--	--	**0.33J**	--
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-03	10-Mar-10	--	--	--	**0.18J**	**0.19J**	--
	3-Sep-10	--	--	--	--	--	--
CS-WB04-LGR-04	10-Mar-10	--	--	--	**0.24J**	--	--
	3-Sep-10	--	--	--	--	--	--
CS-WB04-LGR-06	10-Mar-10	--	**3.2**	**0.23J**	**14**	**12**	--
	3-Sep-10	--	**2.8**	**0.53F**	**15**	**11**	--
CS-WB04-LGR-07	10-Mar-10	--	**32**	**0.33J**	**6.8**	**0.34J**	--
	3-Sep-10	--	**13**	**1.2**	**18**	**1.7**	--
CS-WB04-LGR-08	10-Mar-10	--	--	--	**1.0**	**0.40J**	--
	3-Sep-10	--	--	--	**0.92F**	**0.31F**	--
CS-WB04-LGR-09	10-Mar-10	--	--	--	**7.0**	**9.0**	--
	3-Sep-10	--	--	--	**8.4**	**11**	--
CS-WB04-LGR10	10-Mar-10	--	--	--	**0.81J**	**0.59J**	--
	3-Sep-10	--	--	--	**0.76F**	**0.78F**	--
CS-WB04-LGR-11	10-Mar-10	--	--	--	--	--	--
	3-Sep-10	--	--	--	--	--	--

Data Qualifiers
- J = The analyte was positively identified; the quantitation is an estimation.
- F = The analyte was positively identified but the associated numerical value is below the RL.
* dilution of 100 run for this sample.
All values are reported in µg/L.

Bold (red)	Value > or = MCL
Bold (blue)	MCL > Value > or = RL
Bold	RL > Value > MDL

The following Westbay intervals reported detections of PCE and/or TCE above the MCL in 2010.

CS-WB01	CS-WB02	CS-WB03	CS-WB04
• LGR-01 • LGR-02 • LGR-03 • LGR-07 • LGR-09	• LGR-04 • LGR-06 • LGR-09	• UGR-01 • LGR-01 • LGR-03 • LGR-04 • LGR-05 • LGR-06 • LGR-07 • LGR-08 • LGR-09	• LGR-06 • LGR-07 • 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 an average saturation in the aquifer, where the post had received approximately 35 inches of rainfall through December 2010. The following discussion presents general observations that have been noted since the inception of Westbay monitoring at AOC-65.

In 2010, 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. 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.

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. Fortunately, the zones were saturated during both 2010 sampling events and a more complete vertical distribution model can be created. There is conjecture that a potable water leak exists in the fire suppression west of Building 90, and may be contributing to presence of water seen in shallow monitoring wells in the vicinity, including CS-WB03.

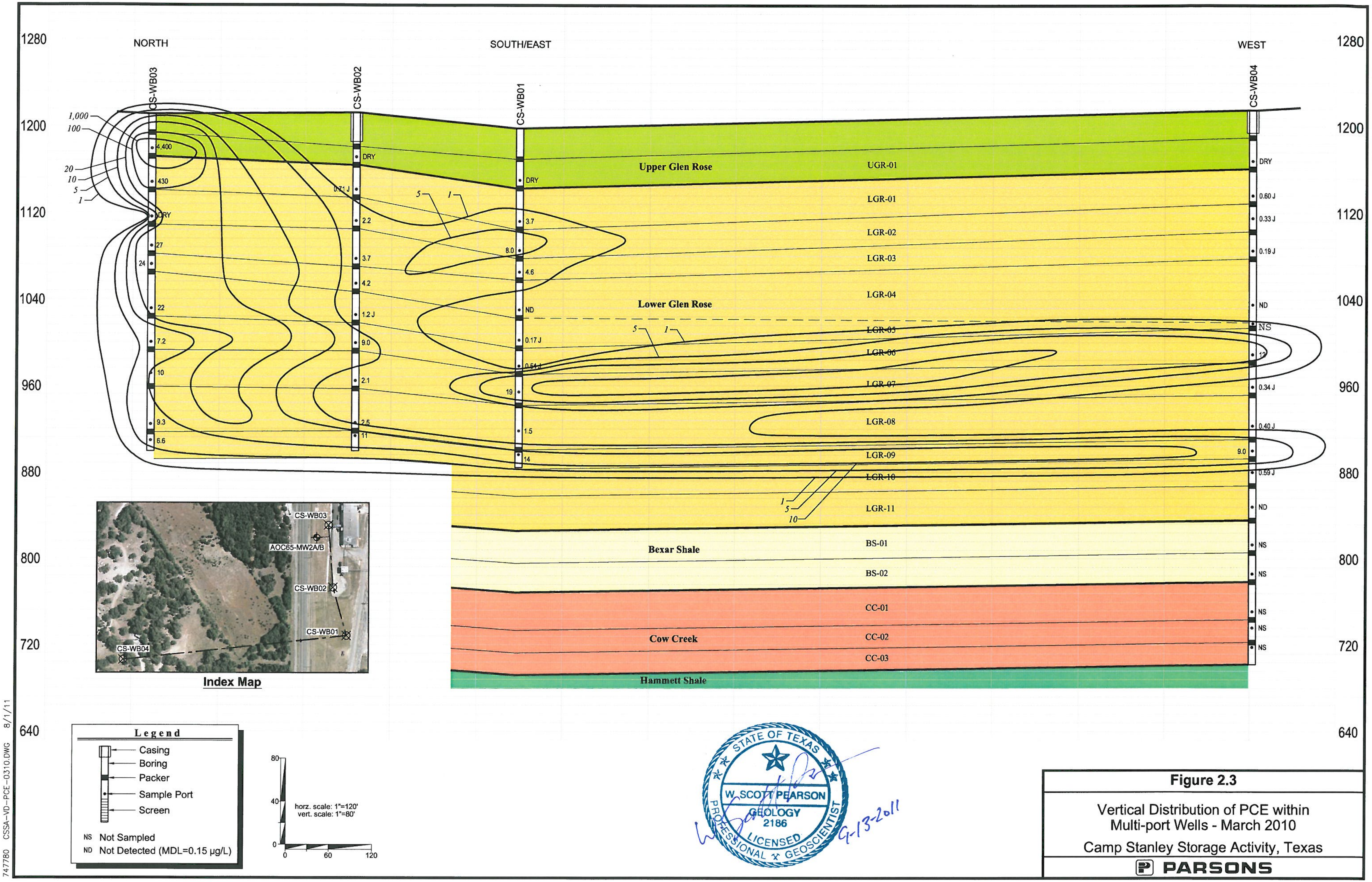


Figure 2.3

Vertical Distribution of PCE within Multi-port Wells - March 2010

Camp Stanley Storage Activity, Texas

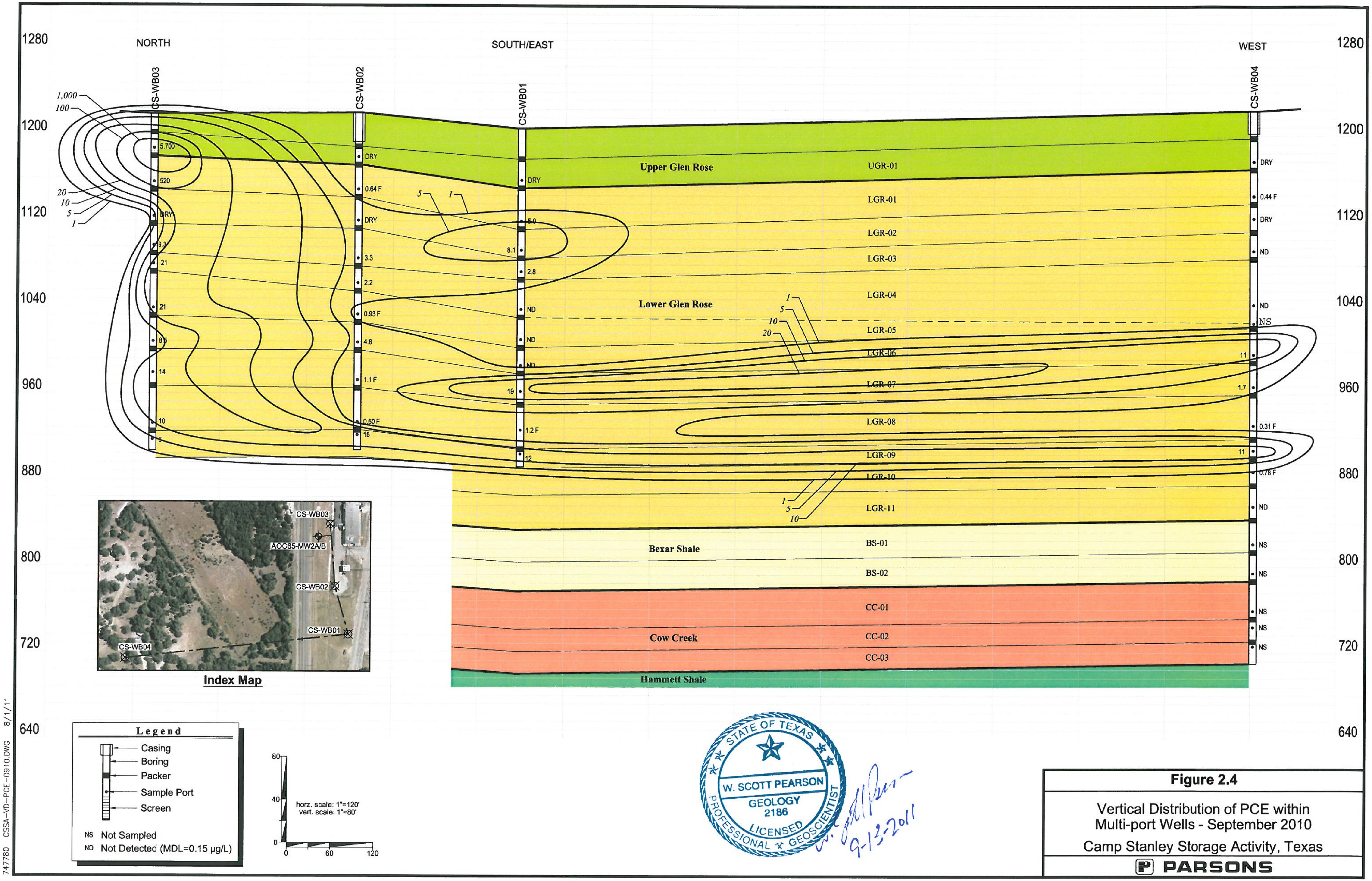


Figure 2.4

Vertical Distribution of PCE within Multi-port Wells - September 2010

Camp Stanley Storage Activity, Texas

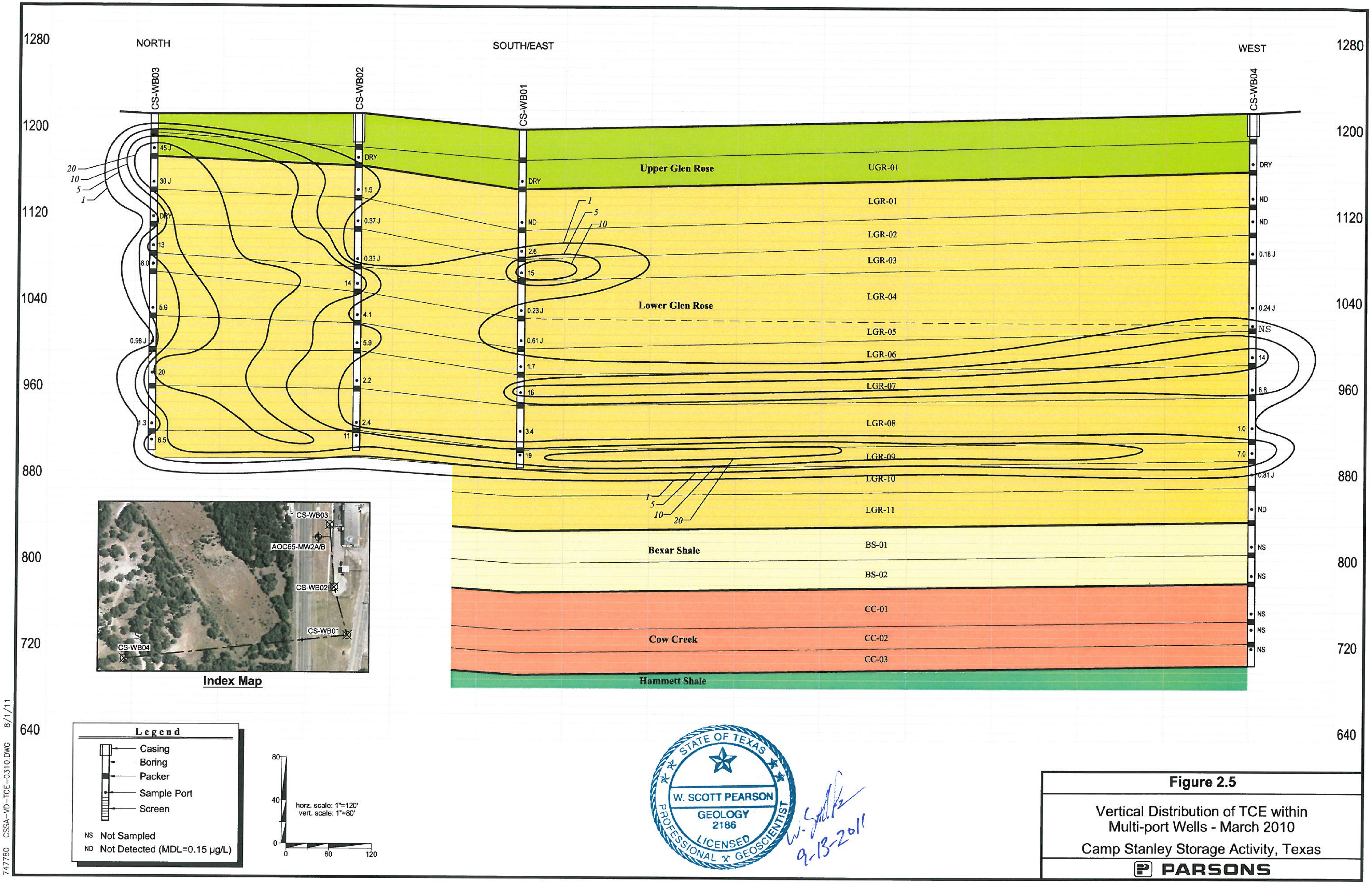


Figure 2.5

Vertical Distribution of TCE within Multi-port Wells - March 2010

Camp Stanley Storage Activity, Texas

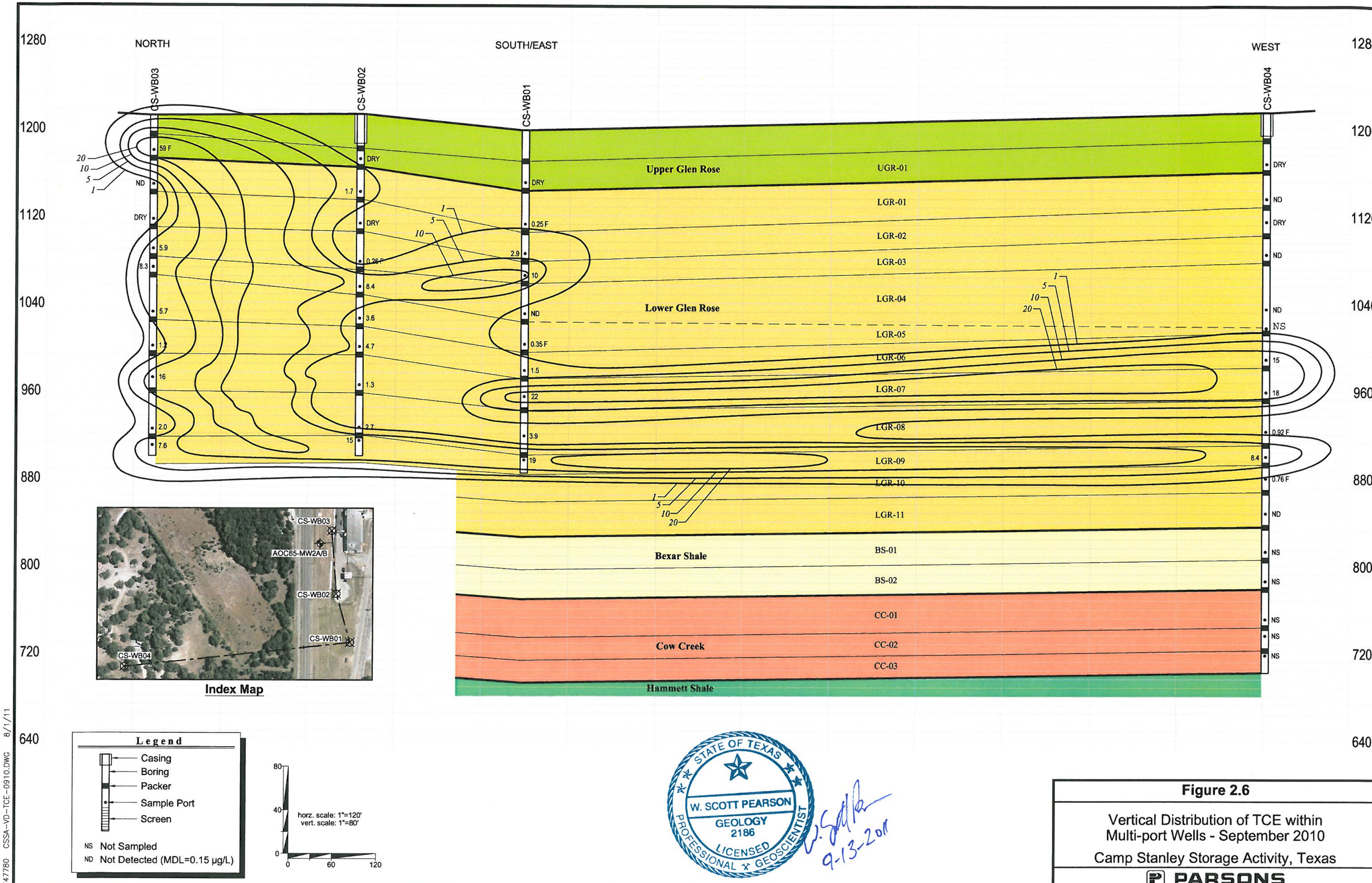


Figure 2.6

Vertical Distribution of TCE within Multi-port Wells - September 2010

Camp Stanley Storage Activity, Texas

The results indicate that a persistent source 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 2010 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 2010 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 2010, zone UGR-01 was dry for both sampling events and zone LGR-02 was dry for the September sampling event.

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 2010 data continue to show a subtle increasing trend in concentrations. In zones –LGR02 and –LGR07, however, zone –LGR09 showed a slight decrease in concentrations over the previous two 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-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**). Since 2009, 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. The drop in concentration levels may be attributed to the increased precipitation amount over the previous years.

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 2010 were determined by compliance with the Plan and *Final DQOs for the Groundwater Monitoring Program* (Parsons 2006). An overview of sampling frequencies for off-post wells is given in **Table 2.7**. Forty-four off-post wells were sampled during the 2010 quarterly monitoring events, and their locations are illustrated on **Figure 1.1**. With the advent of the 2010 LTMO study, the same process implemented on-post will be applied to sampling frequencies for off-post monitoring performed by CSSA beginning with the June 2011 event. The TCEQ and EPA approval for implementing the LTMO off-post was given in February 2011, see **Appendix I**.

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 2010 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).
- Three wells used by the general public (I10-2, I10-5 & I10-8) and two privately-owned wells in the Interstate I-10 area (I10-4 & I10-7).
- 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).

Table 2.7
2010 Off-Post Groundwater Sampling Rationale

Well ID	2010 Mar	June	Sept	Dec	Sampling Frequency:
DOM-2	NA	NA	NA	NA	main electricity has been disconnected
FO-8		NS	NS	NS	As needed, once annually
FO-17	NS		NS	NS	As needed, once annually
FO-22		NS	NS	NS	As needed, once annually
FO-J1					Qtrly, 1 year thru Dec. 11
HS-1	NS	NS	NS		Qtrly, 1 year thru Dec. 11
HS-2		NS			Qtrly, 1 year thru June 11
HS-3	NS		NS	NS	As needed, once annually
I10-2				NA	access agreement expired
I10-4					Quarterly
I10-5		NS	NS	NS	As needed, once annually
I10-7		NS	NA	NA	access agreement expired
I10-8					Qtrly, for delineation
JW-5		NS	NS	NS	As needed, once annually
JW-6	NS		NS	NS	As needed, once annually
JW-7					Qtrly, 1 year thru Dec. 11
JW-8					Qtrly, 1 year thru Dec. 11
JW-9		NS	NS	NS	As needed, once annually
JW-9-A2*	NS	NS	NS	NS	As needed
JW-12	NA	NA	NA	NA	Access agreement expired, owner won't call back
JW-13	NS		NS	NS	As needed, once annually
JW-14					Qtrly, due to location
JW-15		NS	NS	NS	As needed, once annually
JW-26	NA	NA		NS	Qtrly, 1 year thru Dec. 11
JW-27		NS	NS	NS	As needed, once annually
JW-28					Qtrly, due to location
JW-29					Qtrly, due to location
JW-30					Qtrly, due to location
JW-31				NS	As needed, once annually
LS-1					QED low flow pump installed
LS-2	NA	NA	NA	NA	Well is offline, to be plugged soon
LS-2/LS-3-A1	NA	NA	NA	NA	GAC unit removed
LS-3	NA	NA	NA	NA	Well is offline, to be plugged soon
LS-2/LS-3-A2	NA	NA	NA	NA	GAC unit removed
LS-4					QED low flow pump installed
LS-5					Qtrly, 1 year thru Dec. 11
LS-6					Qtrly, 1 year thru Dec. 11
LS-6-A2		NS		NS	Biannually (Mar & Sept)
LS-7					Qtrly, 1 year thru Dec. 11
LS-7-A2		NS		NS	Biannually (Mar & Sept)
OFR-1					Qtrly, 1 year thru Dec. 11
OFR-2	NA	NA	NA	NA	Well was P&A by Centex
OFR-3				NA	access agreement expired
OFR-3-A2		NS		NS	Biannually (Mar & Sept)
OFR-4		NS	NS	NS	As needed, once annually
RFR-3	NS	NS	NS		As needed, once annually
RFR-4	NS	NS	NS		As needed, once annually
RFR-5	NS	NS	NS		As needed, once annually
RFR-6	NA	NA	NA	NA	Plugged & abandoned
RFR-7	NA	NA	NA	NA	Plugged & abandoned
RFR-8	NS		NS	NS	As needed, once annually
RFR-9				NS	As needed, once annually
RFR-10					Qtrly, 1 year thru Dec. 11
RFR-10-A2		NS		NS	Biannually (Mar & Sept)
RFR-10-B2		NS		NS	Biannually (Mar & Sept)
RFR-11					Qtrly, 1 year thru Dec. 11
RFR-11-A2		NS		NS	Biannually (Mar & Sept)
RFR-12				NA	access agreement expired
RFR-13	NS		NS	NS	As needed, once annually
RFR-14					Qtrly, 1 year thru Sept. 11

	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.
NA	Not applicable, samples can no longer be collected from this locaiton due to reason stated.

J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2010\Annual Report\Table 2-7 2010 Off-Post Sampling Rationale.xlsx

- 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).

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.

The use of wells LS-1, LS-2, LS-3, and LS-4 in the Bexar Metropolitan (Bexar Met) water system has been discontinued due to purchase of this water system by the San Antonio Water System (SAWS). These wells are still owned by Bexar Met but have been taken offline and are no longer used to supply water to residents. The local residences are now supplied with drinking water from the SAWS system which is sourced elsewhere. The GAC system used for wells LS-2 and LS-3 was traded from CSSA to Bexar Met for access to sampling of wells LS-1 and LS-4. Low flow QED bladder pumps have been installed within LS-1 and LS-4 for obtaining groundwater samples. The monitoring of these two wells will continue as part of the CSSA groundwater program. Wells HS-1, HS-2, HS-3, and HS-4 previously owned by Bexar Met have been taken over by SAWS and are still included in the monitoring program as well.

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 2010 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 0.5 mile beyond the south and west boundaries of CSSA (well I10-7 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 2010 are presented in **Table 2.8**. Full analytical results from the 2010 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 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

Table 2.8
2010 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)	Trichloroe thene (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	3/3/2010	--	--	--	--	--	--
FO-17	6/1/2010	--	--	--	--	--	--
FO-22	3/3/2010	--	--	--	--	--	--
FO-J1	3/2/2010	--	--	--	**0.21F**	--	--
	6/2/2010	--	--	--	--	--	--
	9/1/2010	--	--	--	--	--	--
	12/14/2010	--	--	--	**0.32F**	--	--
HS-1	12/16/2010	--	--	--	**0.24F**	--	--
HS-2	3/3/2010	--	--	--	**0.19F**	--	--
	9/2/2010	--	--	--	--	--	--
	12/16/2010	--	--	--	--	--	--
HS-3	6/4/2010	--	--	--	--	--	--
I10-2	3/3/2010	--	--	--	**0.19F**	--	--
	6/2/2010	--	--	--	--	--	--
	8/31/2010	--	--	--	--	--	--
I10-4	3/2/2010	--	--	--	**0.69F**	**0.21F**	--
Duplicate	3/2/2010	--	--	--	**0.59F**	**0.20F**	--
	6/1/2010	--	--	--	--	--	--
	8/31/2010	--	--	--	**7.02**	**3.55**	--
	12/13/2010	--	--	--	**7.86**	**3.15**	--
I10-5	3/3/2010	--	--	--	--	--	--
I10-7	3/2/2010	--	--	--	--	--	--
I10-8	3/3/2010	--	--	--	--	--	--
	6/4/2010	--	--	--	--	--	--
	9/2/2010	--	--	--	--	--	--
	12/16/2010	--	--	--	--	--	--
JW-5	3/2/2010	--	--	--	--	--	--
JW-6	6/2/2010	--	--	--	--	--	--
JW-7	3/4/2010	--	--	--	**0.46F**	--	--
	6/3/2010	--	--	--	**0.36F**	--	--
	8/31/2010	--	--	--	**0.26F**	--	--
	12/14/2010	--	--	--	**0.47F**	--	--
JW-8	3/4/2010	--	--	--	**0.19F**	--	--
	6/2/2010	--	--	--	--	--	--
	9/1/2010	--	--	--	**0.22F**	--	--
	12/14/2010	--	--	--	**0.30F**	--	--
JW-9	3/4/2010	--	--	--	--	--	--
JW-13	6/9/2010	--	--	--	--	--	--
JW-14	3/2/2010	--	--	--	--	--	--
	6/2/2010	--	--	--	--	--	--
	9/1/2010	--	--	--	--	--	--
	12/14/2010	--	--	--	--	--	--
JW-15	3/2/2010	--	--	--	--	--	--
JW-26	8/30/2010	--	--	--	--	--	--
JW-27	3/4/2010	--	--	--	--	--	--
Duplicate	3/4/2010	--	--	--	--	--	--
JW-28	3/4/2010	--	--	--	--	--	--
	6/3/2010	--	--	--	--	--	--
	9/2/2010	--	--	--	--	--	--
	12/28/2010	--	--	--	--	--	--
JW-29	3/4/2010	--	--	--	--	--	--
	6/3/2010	--	--	--	--	--	--
	9/2/2010	--	--	--	--	--	--
	12/16/2010	--	--	--	--	--	--

Table 2.8
2010 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)	Trichloroethene (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**
JW-30	3/2/2010	--	**0.21F**	--	**0.15F**	--	--
	6/3/2010	--	--	--	--	--	--
Duplicate	6/3/2010	--	--	--	--	--	--
	8/31/2010	--	--	--	--	--	--
	12/16/2010	--	--	--	**0.17F**	--	--
JW-31	3/2/2010	--	--	--	--	--	--
	6/3/2010	--	--	--	--	--	--
	9/1/2010	--	--	--	--	--	--
Duplicate	9/1/2010	--	--	--	--	--	--
LS-1	3/1/2010	--	**0.36F**	--	**0.35F**	--	--
	6/3/2010	--	**0.19F**	--	--	--	--
	8/30/2010	--	--	--	**0.22F**	--	--
Duplicate	8/30/2010	--	--	--	**0.24F**	--	--
	12/16/2010	--	--	--	**0.33F**	--	--
Duplicate	12/16/2010	--	--	--	**0.34F**	--	--
LS-4	3/1/2010	--	--	--	**0.17F**	--	--
	6/3/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
	12/14/2010	--	--	--	--	--	--
LS-5	3/1/2010	--	--	--	**1.1F**	**2.70**	--
	6/1/2010	--	--	--	**0.98F**	**2.22**	--
	8/30/2010	--	--	--	**0.82F**	**2.73**	--
	12/13/2010	--	--	--	**1.02F**	**2.17**	--
LS-6	3/1/2010	--	--	--	**1.1F**	**0.23F**	--
	6/1/2010	--	--	--	**0.95F**	**0.23F**	--
	8/30/2010	--	--	--	**0.78F**	**0.27F**	--
	12/13/2010	--	--	--	**0.86F**	**0.48F**	--
LS-6-A2	3/1/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
LS-7	3/1/2010	--	--	--	**0.99F**	**0.50F**	--
	6/1/2010	--	--	--	**0.47F**	**0.19F**	--
	8/30/2010	--	--	--	**1.68**	**0.24F**	--
	12/13/2010	--	--	--	**1.75**	**0.35F**	--
LS-7-A2	3/1/2010	--	--	--	--	--	--
Duplicate	3/1/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
OFR-1	3/3/2010	--	--	--	**0.31F**	--	--
	6/2/2010	--	--	--	--	--	--
	8/31/2010	--	--	--	**0.16F**	--	--
	12/14/2010	--	--	--	**0.29F**	--	--
Duplicate	12/14/2010	--	--	--	**0.32F**	--	--
OFR-3	3/1/2010	--	--	--	**2.3**	**2.4**	--
	6/1/2010	--	--	--	**3.23**	**3.04**	--
	8/30/2010	--	--	--	**7.97**	**4.96**	--
OFR-3-A2	3/1/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
OFR-4	3/5/2010	--	--	--	--	--	--
Duplicate	3/5/2010	--	--	--	--	--	--
RFR-3	12/21/2010	--	--	--	--	--	--
RFR-4	12/21/2010	--	--	--	--	--	--
RFR-5	12/21/2010	--	--	--	--	--	--
Duplicate	12/21/2010	--	--	--	--	--	--
RFR-8	6/4/2010	--	--	--	--	--	--

J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2010\Annual Report\Table 2-8 Off post detections.xlsx

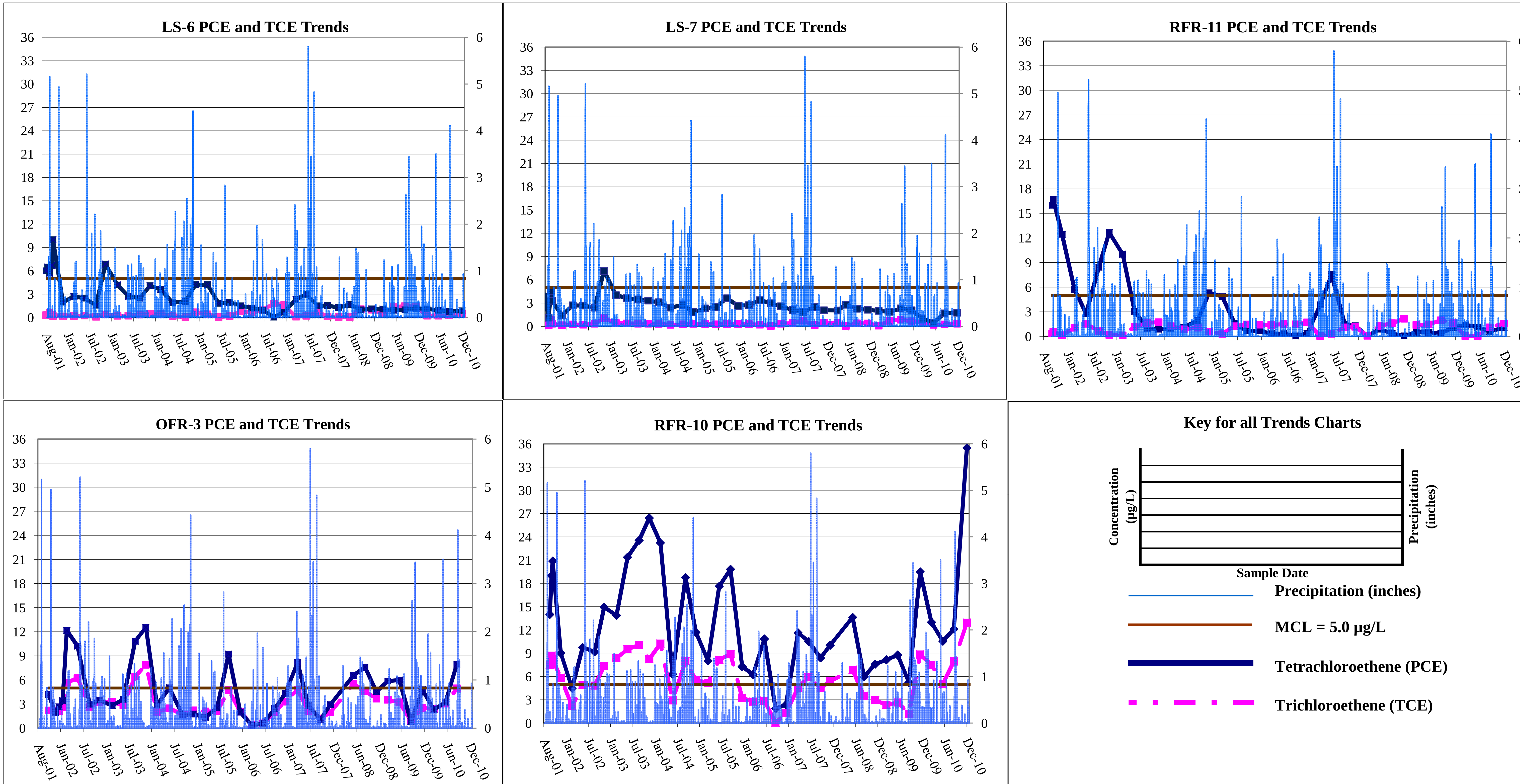
Table 2.8
2010 Off-Post Groundwater COCs Analytical Results, Detections Only

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)	Trichloroe thene (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-9	3/5/2010	--	--	--	--	--	--
	6/23/2010	--	--	--	--	--	--
	9/16/2010	--	--	--	--	--	--
RFR-10	3/1/2010	--	0.21F	--	13	7.5	--
	6/2/2010	--	0.21F	--	10.56	5.05	--
	8/30/2010	--	--	--	12.12	7.96	--
	12/13/2010	--	0.45F	--	35.48	12.94	--
RFR-10-A2	3/1/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
RFR-10-B2	3/1/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
RFR-11	3/1/2010	--	--	--	1.4	--	--
	6/1/2010	--	--	--	1.13F	--	--
	8/30/2010	--	--	--	0.59F	1.11	--
	12/13/2010	--	--	--	1.07F	1.56	--
RFR-11-A2	3/1/2010	--	--	--	--	--	--
	8/30/2010	--	--	--	--	--	--
RFR-12	3/3/2010	--	--	--	0.26F	0.38F	--
	6/2/2010	--	--	--	--	0.38F	--
Duplicate	6/2/2010	--	--	--	--	0.35F	--
	8/31/2010	--	--	--	--	0.25F	--
RFR-13	6/2/2010	--	--	--	--	--	--
RFR-14	3/3/2010	--	--	--	0.21F	--	--
	6/4/2010	--	--	--	0.16F	--	--
Duplicate	6/4/2010	--	--	--	0.17F	--	--
	8/31/2010	--	--	--	0.18F	--	--
Duplicate	8/31/2010	--	--	--	0.15F	--	--
	12/16/2010	--	--	--	--	--	--

BOLD (red)	Value > or = MCL
BOLD (blue)	MCL > Value > or = RL
BOLD	RL > Value > MDL

Notes:
- ug/L = miligrams 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.
- 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

Figure 2.7 PCE and TCE Concentration Trends and Precipitation



J:\CSSA Program\Restoration\Groundwater\GW Monitoring Reports\2010\Annual Report\Figure 2-7 & 2-8 Off-post GAC flows.xls 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 August 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 flow meters 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. These wells, and the date the filtration system was installed, are listed in **Table 2.9**. CSSA maintains and operates these GAC filtration systems at no cost or inconvenience to the well owners.

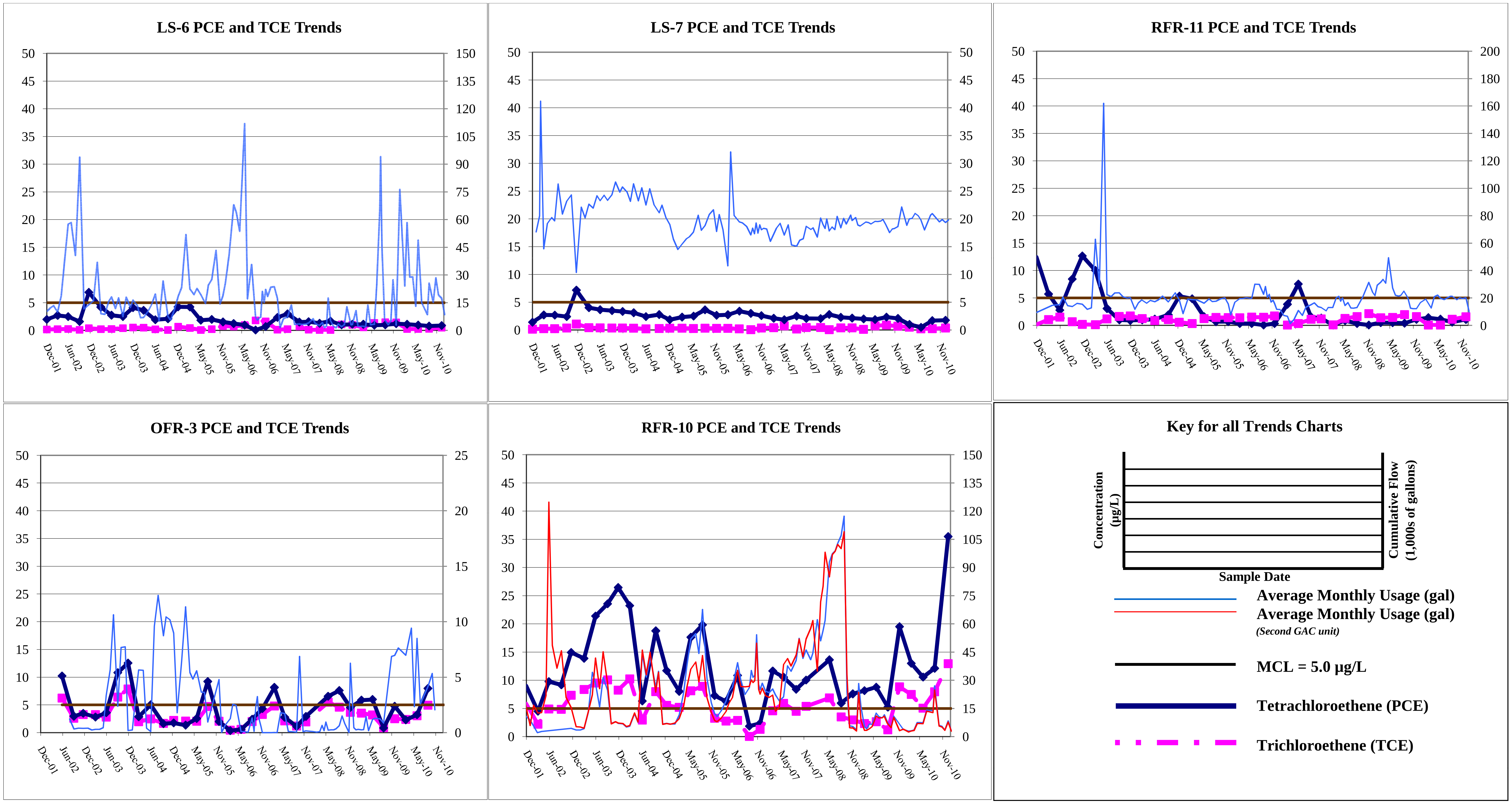
Table 2.9 GAC Filtration Systems Installed

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

During 2010, 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 March, June, September, and December. PCE exceeded the MCL in September 2010 in well OFR-3. An evaluation of concentration trends through 2010 are included in **Figures 2.7** and **2.8**.

Well I10-4 fell off the sampling schedule in June 2007 due to pending sale of the property and information from the well owner that the well would be plugged and abandoned in the near future. In December 2008, after following up on the status of the plugging and abandonment report, it was discovered that the well was still intact. After speaking to the well owner, an access agreement was signed and an agreement was reached to not plug the well so it could remain in the CSSA quarterly groundwater monitoring program. Although the electricity and pump have been removed from the well, samples can be collected using a bailer sampling device. PCE was above the MCL in September and December 2010,

Figure 2.8 PCE and TCE Concentration Trends and Monthly Water Usage



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 land owner 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 2010 events in accordance with project DQOs. 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 11, 2010 the carbon in the GAC filtration systems (LS-6, LS-7, RFR-10, and RFR-11) was changed out. The GAC filtration system at OFR-3 was not serviced during this visit due to an expired access agreement. The property has been foreclosed on and vacated. Ongoing attempts are being made to identify ownership of this well.

2.2.2.3 Off-Post Wells with COC Detections below the MCL

Detections from all wells sampled off-post are presented in **Table 2.8** and complete 2010 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 LS-5, LS-7 and RFR-11. The detections below the MCL and above the RL are summarized as follows:

- **LS-5** –Concentration of TCE exceeded the RL in March, June, September, and December 2010. TCE levels ranged from 2.17 to 2.73 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. A water leak at the LS-5 residence caused excessive pumping at this well and may have contributed to the VOC increases.
- **LS-7** – Concentrations of PCE exceeded the RL in September and December 2010. Concentrations of PCE were also present in March and June 2010 but below the RL. TCE was reported below the RL in all sampling events in 2010 also.
- **RFR-11** - Concentration of PCE exceeded the RL in September and December 2010. TCE was detected above the RL in March 2010 and then dropped below the

RL during the next three quarterly sampling events.

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 2010, this included wells FO-J1, HS-1, HS-2, I10-2, JW-7, JW-8, JW-30, LS-1, LS-4, LS-6, OFR-1, 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 December 2010.
- **HS-1** – Concentrations of PCE detected below the RL in December 2010.
- **HS-2** – Concentrations of PCE detected below the RL in March 2010.
- **I10-2** - Concentrations of PCE detected below the RL in March 2010.
- **JW-7** – Concentrations of PCE detected below the RL in all four quarters of 2010.
- **JW-8** – Concentrations of PCE detected below the RL in March, September, and December 2010.
- **JW-30** – Concentrations of PCE and *cis*-1,2-DCE were detected below the RL in March 2010 and PCE was also detected, below the RL, in December 2010.
- **LS-1** – Concentrations of PCE detected below the RL in March, September, and December 2010. Concentrations of *cis*-1.2-DCE detected below the RL in March and June 2010.
- **LS-4** – Concentrations of PCE detected below the RL in March 2010.
- **LS-6** - Concentrations of PCE and TCE detected below the RL in all four quarters of 2010.
- **OFR-1** – Concentrations of PCE detected below the RL in March, September, and December 2010.
- **RFR-12** – Concentrations of PCE detected below the RL in March 2010. TCE was also detected below the RL in March, June, and September 2010.
- **RFR-14** – Concentrations of PCE detected below the RL in March, June, and September 2010.

2.2.3 Isoconcentration Mapping

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

In prior annual reports, 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. Therefore, for September 2010, a "snapshot" sampling event was performed and samples were collected from all operable on post wells.

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 September 2010 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 October 2010, 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.

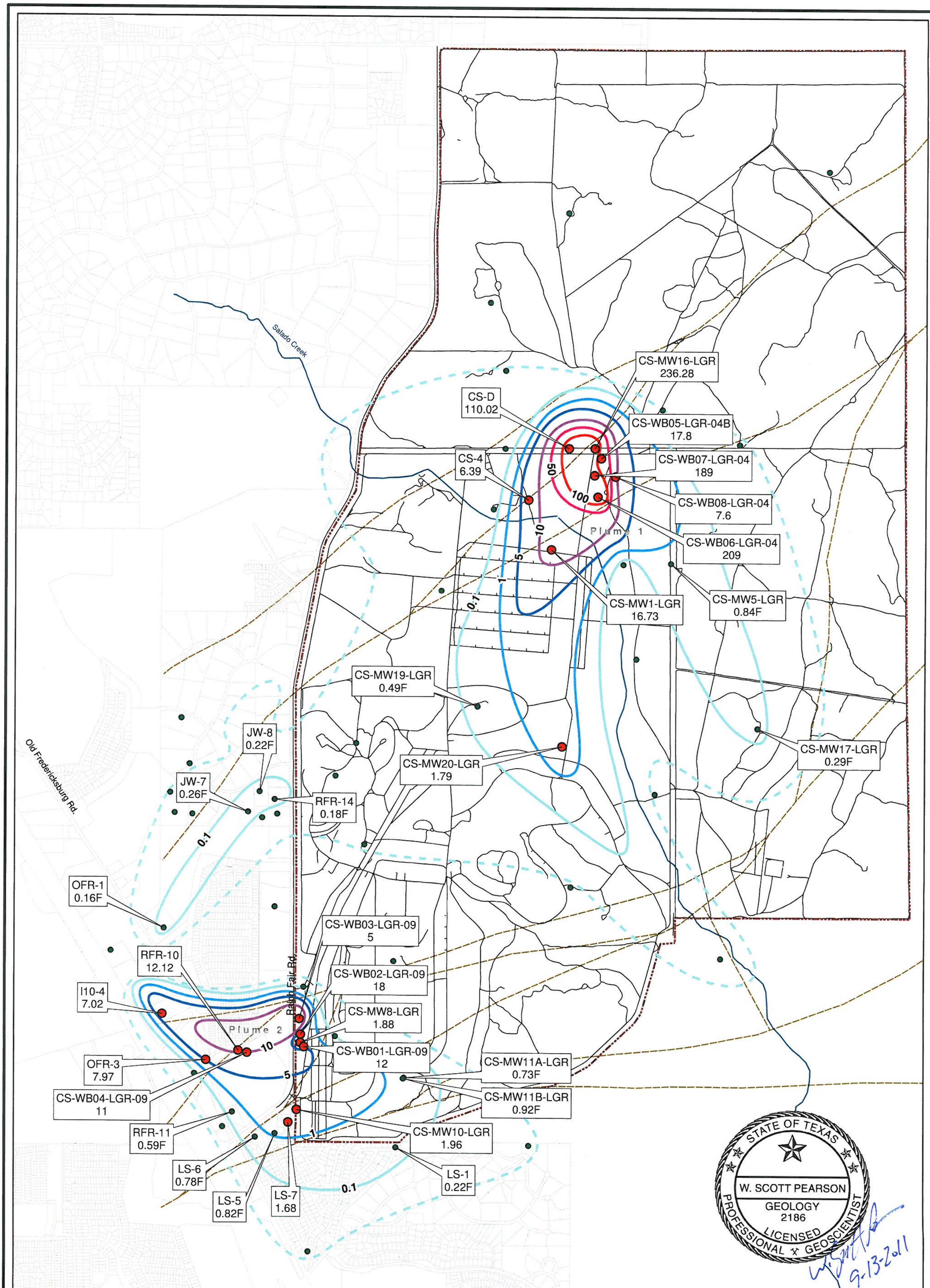
The 2010 extent of COCs above 1.0 µg/L for each of PCE, TCE and *cis*-1,2-DCE can be determined by reviewing the figures. PCE concentrations above 1.0 µg/L are detected on-post in wells CS-4, CS-MW16-LGR, CS-D, CS-MW1-LGR, CS-MW8-LGR, CS-MW10-LGR, and CS-MW20-LGR. Additionally, the LGR-09 zone from CS-WB01 and CS-WB03

and the LGR-04 zones from CS-WB05 through CS-WB08 are all above 1.0 µg/L PCE (**Figure 2.9**). Off-post detections of PCE above 1.0 µg/L include I10-4, LS-7, OFR-3, RFR-10, and CS-WB04-LGR-09.

TCE follows a similar pattern, and has been detected above 1.0 µg/L in Plume 1 wells CS-4, CS-D, CS-MW16-LGR, CS-MW16-CC, CS-MW5-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 2010. 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 1.0 µg/L, however, it was reported at levels above 1.0 µg/L in on-post wells CS-D, CS-MW16-LGR, CS-MW1-LGR, CS-MW2-LGR, CS-4, CS-MW5-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, and 2009. Those isoconcentration maps are available for review in the ***CSSA Environmental Encyclopedia, Volume 5 Groundwater***, in the *2006, 2007, 2008, and 2009 Annual Groundwater Reports*. In general, the plume extent and geometry is consistent with 2009 data.



Wells with PCE values
ND

PCE Concentrations (µg/L)
- Estimated Plume Boundary Based on Historical Data
- 0.1
- 1.00
- 5.00 (MCL)
- 10.00
- 50.00
- 100.00

- Parcels
- CSSA Boundary
- Salado Creek
- Faults
- CSSA Roads

Figure 2.9

PCE Concentrations for LGR Wells, Sept. - Oct. 2010

PARSONS

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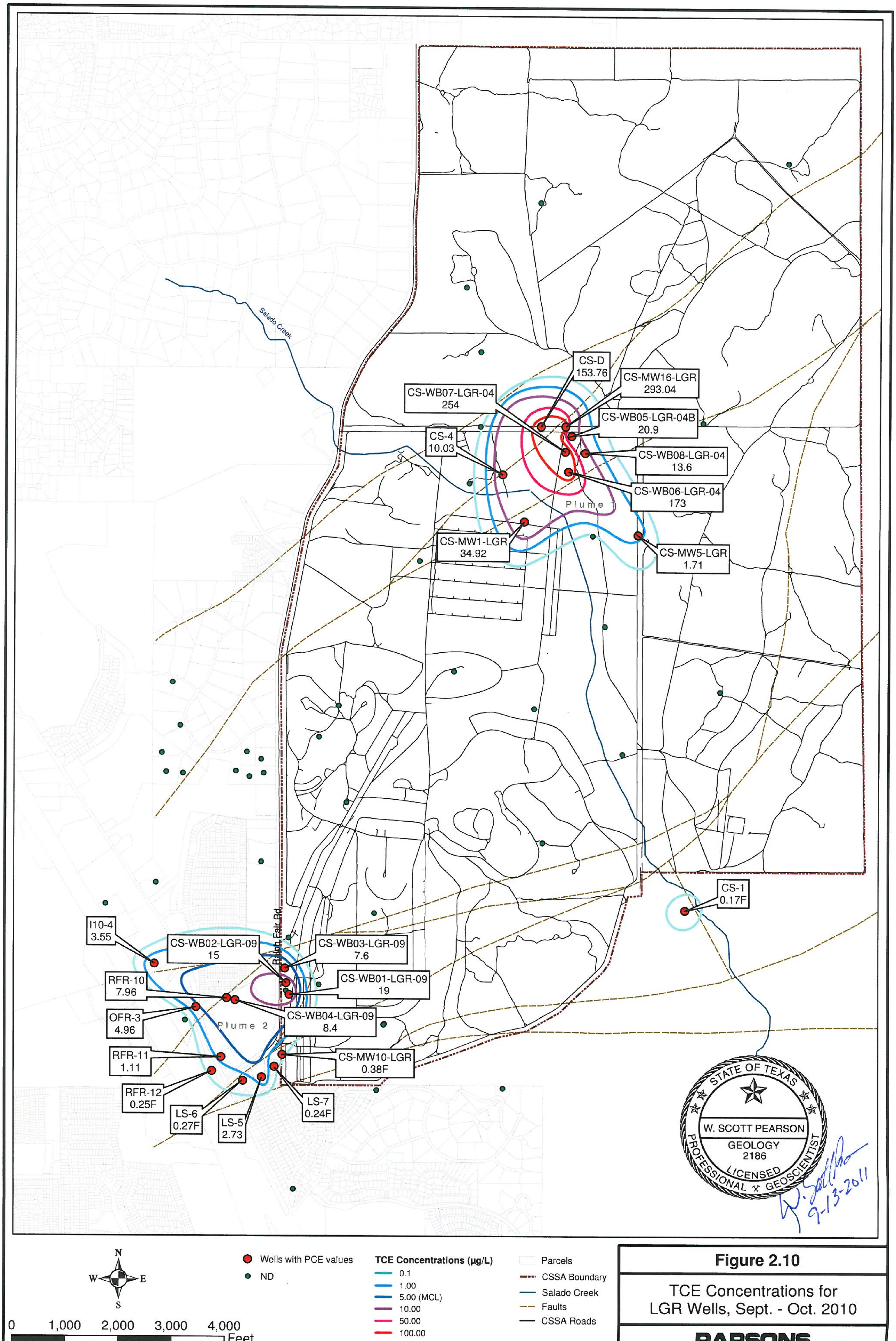

Figure 2.10

TCE Concentrations for LGR Wells, Sept. - Oct. 2010

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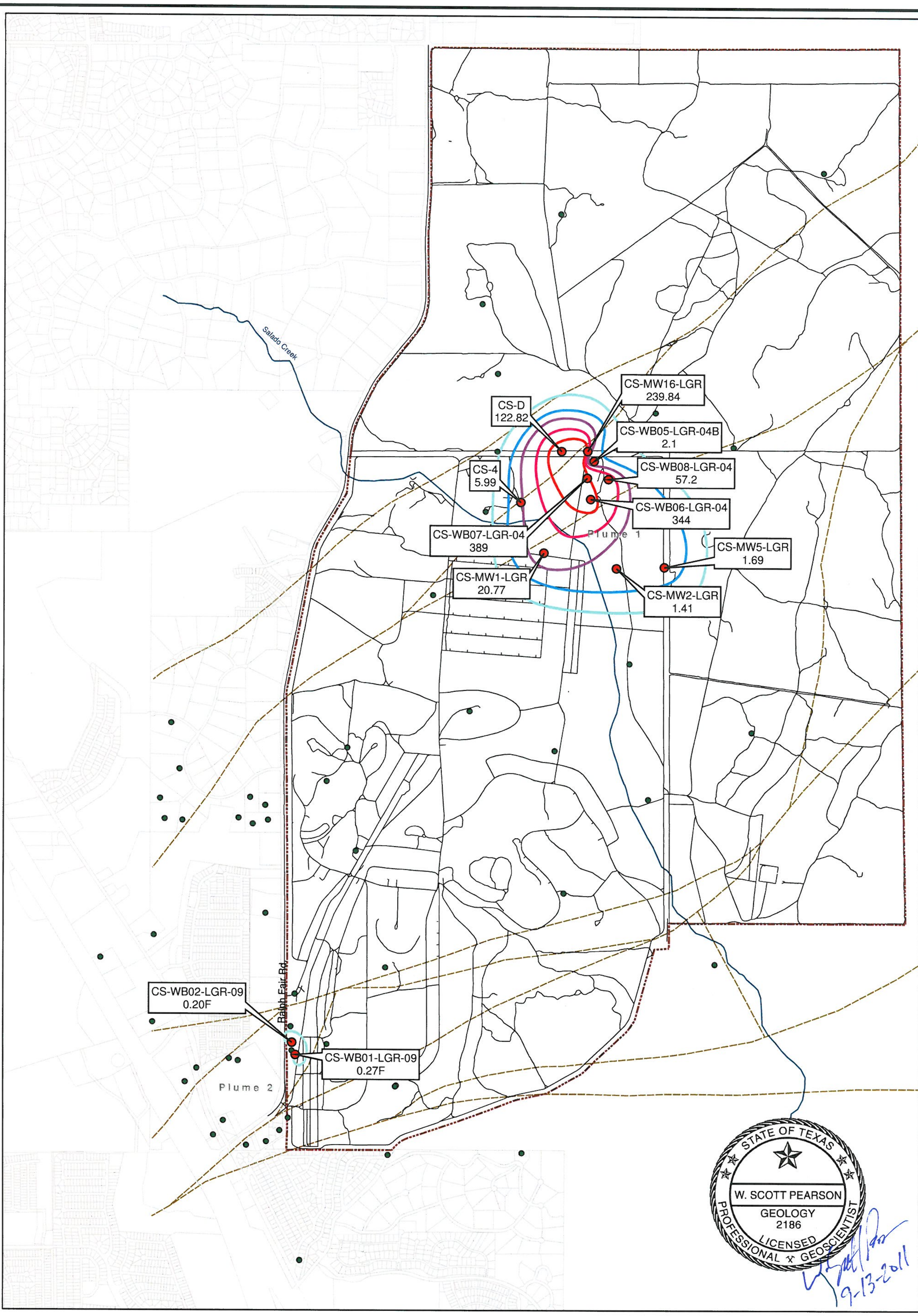

N
W E
S

0 1,000 2,000 3,000 4,000
Feet

- Wells with PCE values
- ND

cis-1,2-DCE Concentrations (µg/L)
- 0.1
- 1.00
- 5.00 (MCL)
- 10.00
- 50.00
- 100.00

- Parcels
- CSSA Boundary
- Salado Creek
- Faults
- CSSA Roads

Figure 2.11

cis-1,2-DCE Concentrations for LGR Wells, Sept. - Oct. 2010

PARSONS

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Finally, the maximum annual concentrations detected near the plume centers are generally higher than in 2009. See **Table 2.10** for comparison of the 2009 and 2010 data near the plume centers. In contrast to the trend, well CS-4 showed a dramatic decrease in concentration over maximum concentrations reported in December 2009. This well was generally below the MCLs for all COCs, and had not been above the MCL since June 2004. The well was re-sampled in February 2010, and the concentrations had returned to their pre-December 2009 levels below the MCLs for PCE, TCE, and *cis*-1,2-DCE.

The December 2009 results are unusual for CS-4 and do raise some questions. The former agricultural well is only 252 feet deep with casing set to 200 ft and is located adjacent to a projected fault that trends NE to SW. This well is also shallower than the typical LGR well completed into the production zone. Because of its shallow nature and open borehole construction, the well is able to receive perched waters that are typically cased off in a normal LGR monitoring well. Clearly the borehole received a slug of contaminated water in the December 2009 timeframe. It is unclear if the slug originated from a precipitation event or was generated from the Bioreactor Flood Test that was conducted between September 2009 and February 2010.

Table 2.10 Comparison of 2009 & 2010 PCE, TCE, and *cis*-1,2-DCE Max. Levels

	PCE		TCE		*cis*-1,2-DCE	
	2009	*2010*	*2009*	*2010*	*2009*	*2010*
B-3 Plume 1						
CS-MW16-LGR	193.36	236.28	177.44	293.04	152.57	239.84
CS-D	92.84	110.02	126.54	153.76	102.36	122.82
CS-MW1-LGR	13.76	37.85	34.44	51.15	21.98	54.84
CS-4	43.44	6.39	86.89	10.03	65.09	5.99
AOC-65 Plume 2						
RFR-10	19.5	35.48	8.84	12.94	0.25	0.45
OFR-3	5.98	7.97	3.52	4.96	ND	ND
I10-4	7.36	7.86	2.72	3.55	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 will 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 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.

3.2 CS-12 Activities in 2010

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.

4.0 GROUNDWATER MONITORING PROGRAM CHANGES

4.1 Access Agreements Obtained in 2010

Access agreements are signed by off-post well owners to grant permission to CSSA to collect groundwater samples from each well. In July 2010 CSSA mailed out new right-of-entry agreements to owners to solicit new access agreements. The new agreements are for a five year term.

Currently five access agreements have expired. Wells I10-2, I10-7, JW-9, OFR-3, and RFR-12. The new owner of well I10-2 has been contacted by email and a new agreement was mailed out. Agreements were mailed out to the owners of wells I10-7, JW-9, and RFR-12 with no reply as of date. The property of OFR-3 has been foreclosed on, the leasing or rental agent has been contacted and they agreed to pass on CSSA contact information to the new owners. Well OFR-3 currently has a GAC unit that will need to be maintained when this property is utilized. Attempts to contact these well owners will continue.

A new access agreement was obtained from the new well owner of JW-26. This well was added back into the sampling program in September 2010 due to the property changing ownership and the new owners' interest in the sampling program.

4.2 Wells Added to or Removed From Program

Of the five outstanding agreements, these wells will not be removed from the program until an official CSSA representative has attempted contact.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the on- and off-post groundwater monitoring program data collected in 2010, the following conclusions and recommendations can be made:

- On-post wells CS-MW16-LGR, CS-MW16-CC, CS-D, CS-4, and CS-MW1-LGR all exceeded VOC MCLs in 2010 and should remain on the sampling schedule in the future.
- Well CS-4 continues to show VOC levels above the MCL for PCE and TCE in June and September 2010. There is speculation that the TCE spike of 86.89 ug/L in December 2009 was a result of the Flood Test being performed at the B-3 Bioreactor. An effort to determine how and when this condition occurs should be undertaken. This would include an increased sampling frequency (currently annual) that should correspond with precipitation events or above-average aquifer levels.
- CS-9, CS-12, CS-MW9-BS, and CS-MW25-LGR all exceeded Als/MCLs for lead and/or mercury in 2010, and should remain on the sampling schedule in the future.
- Continue with the initiative to collect a "snapshot" event from all on- and off-post wells. The current recommendation is to collect a snapshot event every 9 months so that the changes in the plume can be monitored seasonally.
- Twenty Westbay intervals had detections above the MCL in 2010. These intervals should remain on the semi-annual 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. An investigation into the source of the UGR water near Building 90 is recommended.
- Wells OFR-3 and RFR-10 exceeded the MCL for PCE and/or TCE in 2010 off-post. These wells, along with wells 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.
- TCE concentrations at LS-5 were consistently at about 50 percent of the MCL in 2010. Considering this well is surrounded by wells that are currently (LS-6 and LS-7) or formerly (LS-2 and LS-3) treated with GAC units, it may be prudent to install a treatment unit at this location.
- After exceeding the MCL for PCE in December 2008 well I10-4 remained above the MCL in 2009. In 2010, PCE was just above the MDL in March 2010 and then non-detect in June. In September PCE was back above the MCL and in December 2010 PCE peaked in well I10-4 at 7.86 µg/L. However the well is not equipped with a GAC unit because this well is not currently being used as drinking water. When and if the

property is developed, a connection to the SAWS will be established to supply drinking water as needed. Locating a well to sample west of IH-10 and I10-4 would be helpful in monitoring the progression of Plume 2 towards the west.

- From the 2010 Well Survey, eleven additional wells have been 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. These wells include 8 active supply wells operated by The Oaks Water Supply Corporation (TOWSC), one plugged well owned by TOWSC, and two private wells (I10-9 and I10-10) utilized for domestic/stock purposes. These wells should be considered for additional monitoring to determine if Plume 2 VOCs are migrating westward below Interstate Highway 10.
- Off-post wells with detections of VOCs below the MCL will continue to be sampled in accordance with DQO requirements in March 2011. Beginning June 2011, the updated LTMO sampling schedule will be implemented at both on- and off-post well locations upon regulatory concurrence and approval.
- For future sampling events, off-post wells where no VOCs were detected will be sampled as needed, depending on historical detections.
- Production well CS-9 continues to have lead and mercury issues above regulatory standards. Therefore, CS-9 will remain inactive as a public water supply well.
- The housing and treatment facilities for well CS-12 should be complete in 2011. Upon final approval from the TCEQ the well will be able to provide potable water to CSSA. Five months of continuous pumping demonstrated the well can maintain at least 55 gpm under drought conditions, and more than 85 gpm under plentiful conditions. Because of the prior history with coliform detections, monthly BACT sampling will be required for the service life of the well.
- Analytical data indicates CS-16 CC is at the low end of historical VOC contamination levels for this well. This data suggests nearly continuous pumping of CS-16 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-16 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

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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 2010.	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 2010 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 semiannually and will be sampled again during the March and September 2011 events.	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-MW18-LGR, 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 2010 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 45 of 48 CSSA wells. Of the 64 samples scheduled to be collected in 2010 92 samples were actually collected. In September, 28 additional wells were sampled to gather data for the annual snapshot event. Well CS-MWH-LGR was not sampled due to an electrical problem with the pump.	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
		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		
Contamination Characterization (Groundwater Contamination) (Continued)	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 2003).	Samples for laboratory analysis were collected from selected off-post public and private wells, which are located within a ½ mile radius of CSSA.	Partially	Replace wells where no VOCs were detected with wells that may be identified in the future, located to the west and southwest of 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 2003). 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 2003).	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

2010 QUARTERLY ON-POST GROUNDWATER ANALYTICAL RESULTS

Appendix B
2010 Quarterly On-Post Groundwater Monitoring Analytical Results

Well Number	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)	Trichloro-ethene (ug/L)	Vinyl chloride (ug/L)	pH	Temp. (deg. C)	Specific Conductivity (mS/cm)
								Field Measurements		
CS-1	3/8/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	8.02	21.50	0.573
	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.19	22.63	0.549
	9/8/2010	0.12U	0.07U	0.08U	0.06U	**0.17F**	0.08U	7.10	22.10	0.607
	12/8/2010	0.12U	0.07U	0.08U	0.06U	**0.23F**	0.08U	7.32	21.60	0.487
CS-2	9/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.79	21.60	0.732
CS-4	6/10/2010	0.12U	**2.03**	0.08U	**4.34**	**5.55**	0.08U	7.01	21.22	0.527
	9/16/2010	0.12U	**5.99**	**0.6**	**6.39**	**10.03**	0.08U	7.02	21.90	0.522
CS-9	3/8/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.29	21.80	0.634
	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.93	22.22	0.587
	9/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.07	22.10	0.658
Duplicate	9/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.07	22.10	0.658
	12/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.18	21.60	0.557
CS-10	3/8/2010	0.30U	0.16U	0.19U	0.15U	**0.24F**	0.23U	7.13	22.00	0.592
	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.09	22.88	0.565
Duplicate	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.09	22.88	0.565
	9/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.16	22.60	0.611
	12/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.37	22.10	0.522
CS-12	3/9/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.95	22.50	0.447
	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.19	22.54	0.516
	9/17/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.34	23.70	0.552
	12/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.46	22.00	0.479
CS-MW16-LGR	6/14/2010	0.12U	**136.56**	**0.22F**	**142.56**	**162.6**	0.08U	7.10	22.13	0.541
	9/8/2010	0.12U	**239.84**	**0.6**	**236.28**	**293.04**	0.08U	7.08	22.40	0.583
CS-MW16-CC	6/14/2010	**0.33F**	**33.86**	**3.92**	**4.9**	**42.6**	0.08U	7.18	23.02	0.647
	9/8/2010	0.12U	**30.27**	**4.03**	**2.99**	**38.4**	0.08U	7.24	23.00	0.697
CS-D	6/10/2010	0.12U	**98.94**	**0.88**	**100.03**	**137.52**	0.08U	6.92	21.84	0.537
	9/16/2010	0.12U	**122.82**	**3.98**	**110.02**	**153.76**	0.08U	6.94	21.90	0.561
CS-MWG-LGR	9/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.25	21.60	0.474
CS-I	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.16	22.49	0.555
	9/13/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.19	22.10	0.570
CS-MW1-LGR	6/9/2010	0.12U	**54.85**	**0.68**	**37.85**	**51.15**	0.08U	6.88	21.55	0.530
	9/7/2010	0.12U	**20.77**	**0.31F**	**16.73**	**34.92**	0.08U	7.25	21.90	0.538
CS-MW1-BS	9/7/2010	0.12U	**1.38**	0.08U	0.06U	0.05U	0.08U	7.53	21.50	0.522
CS-MW1-CC	9/7/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.26	21.60	0.736
CS-MW2-LGR	6/9/2010	0.12U	**1.13F**	0.08U	**0.16F**	0.05U	0.08U	8.05	21.37	0.435
	9/16/2010	0.12U	**1.41**	0.08U	0.06U	0.05U	0.08U	8.20	23.10	0.436
CS-MW2-CC	9/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.34	22.80	0.627
CS-MW3-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.05	21.76	0.508
	9/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.24	22.70	0.530

Appendix B
2010 Quarterly On-Post Groundwater Monitoring Analytical Results

Well Number	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)	Trichloro-ethene (ug/L)	Vinyl chloride (ug/L)	pH	Temp. (deg. C)	Specific Conductivity (mS/cm)
								Field Measurements		
CS-MW4-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.94	21.69	0.643
	9/17/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.15	21.40	0.661
CS-MW5-LGR	6/9/2010	0.12U	**0.96F**	0.08U	**0.88F**	**0.94F**	0.08U	6.89	21.79	0.528
	9/9/2010	0.12U	**1.69**	0.08U	**0.84F**	**1.71**	0.08U	7.13	24.30	0.547
CS-MW6-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.96	22.11	0.588
	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.10	22.30	0.602
CS-MW6-BS	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.53	23.80	0.770
CS-MW6-CC	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.27	23.70	0.808
CS-MW7-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.81	21.21	0.654
	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.06	23.80	0.670
CS-MW7-CC	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.27	22.80	0.837
Duplicate	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.27	22.80	0.837
CS-MW8-LGR	9/15/2010	0.12U	0.07U	0.08U	**1.88**	0.05U	0.08U	7.01	22.50	0.681
CS-MW8-CC	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.48	22.60	0.856
CS-MW9-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.78	21.32	0.541
	9/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.08	21.40	0.541
CS-MW9-BS	9/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.50	21.70	0.631
CS-MW9-CC	9/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.65	21.40	0.716
CS-MW10-LGR	9/15/2010	0.12U	0.07U	0.08U	**1.96**	**0.38F**	0.08U	6.96	22.30	0.689
CS-MW10-CC	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.39	22.30	0.835
CS-MW11A-LGR	6/8/2010	0.12U	0.07U	0.08U	**0.86F**	0.05U	0.08U	6.85	21.44	0.564
	9/9/2010	0.12U	0.07U	0.08U	**0.73F**	0.05U	0.08U	7.05	23.30	0.569
CS-MW11B-LGR	3/8/2010	0.30U	0.16U	0.19U	**0.94F**	0.16U	0.23U	7.60	20.60	0.526
Duplicate	3/8/2010	0.30U	0.16U	0.19U	**0.92F**	0.16U	0.23U	7.60	20.60	0.526
	9/9/2010	0.12U	0.07U	0.08U	**0.92F**	0.05U	0.08U	7.09	21.90	0.603
CS-MW12-LGR	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	22.80	0.575
CS-MW12-BS	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.27	22.70	0.460
CS-MW12-CC	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.30	22.40	0.728
CS-MW17-LGR	9/14/2010	0.12U	0.07U	0.08U	**0.29F**	0.05U	0.08U	7.20	22.40	0.651
CS-MW18-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.99	21.97	0.547
	9/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	22.50	0.563
CS-MW19-LGR	6/8/2010	0.12U	0.07U	0.08U	**0.43F**	0.05U	0.08U	6.88	21.84	0.625
	9/17/2010	0.12U	0.07U	0.08U	**0.41F**	0.05U	0.08U	7.10	22.00	0.658
Duplicate	9/17/2010	0.12U	0.07U	0.08U	**0.49F**	0.05U	0.08U	7.10	22.00	0.658
CS-MW20-LGR	3/8/2010	0.30U	0.16U	0.19U	**1.8**	0.16U	0.23U	6.96	20.90	0.614
	6/9/2010	0.12U	0.07U	0.08U	**1.95**	0.05U	0.08U	6.76	21.66	0.608
	9/17/2010	0.12U	0.07U	0.08U	**1.79**	0.05U	0.08U	7.00	21.90	0.624
	12/7/2010	0.12U	0.07U	0.08U	**1.71**	0.05U	0.08U	7.81	21.00	0.545

Appendix B
2010 Quarterly On-Post Groundwater Monitoring Analytical Results

Well Number	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)	Trichloro-ethene (ug/L)	Vinyl chloride (ug/L)	pH	Temp. (deg. C)	Specific Conductivity (mS/cm)
								Field Measurements		
CS-MW21-LGR	3/9/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.54	21.20	0.560
	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.92	21.20	0.553
	9/17/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.15	21.50	0.573
	12/7/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.07	20.90	0.501
CS-MW22-LGR	3/8/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.25	20.50	0.564
	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.98	21.42	0.565
	9/17/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.25	22.90	0.575
	12/7/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.19	20.40	0.502
CS-MW23-LGR	3/9/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.80	21.60	0.537
	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.98	21.44	0.533
	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.24	22.20	0.551
Duplicate	9/15/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.24	22.20	0.551
	12/7/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.63	20.80	0.478
CS-MW24-LGR	3/8/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.43	21.10	0.559
	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.99	21.90	0.557
Duplicate	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.99	21.90	0.557
	9/17/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.23	21.90	0.565
Duplicate	9/17/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.23	21.90	0.565
	12/7/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.88	21.00	0.498
CS-MW25-LGR	3/9/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.72	20.90	0.500
	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.00	21.61	0.502
	9/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.59	22.40	0.469
	12/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.30	21.40	0.441
Duplicate	12/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.30	21.40	0.441

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Notes:
- µg/L = micrograms per liter
- µS/cm = microseimens per centimeter
- 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.
- *Duplicate* = field duplicate

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

Appendix B
2010 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-1		3/8/2010	0.002U	**0.041**	0.0005U	0.001U	**0.0057F**	0.0016U	0.0001U	**0.16**
		6/14/2010	**0.0023F**	**0.045**	0.0005U	0.001U	**0.009F**	0.0019U	0.0001U	**0.081**
		9/8/2010	**0.0024F**	**0.036**	**0.0009F**	0.001U	0.003U	0.0019U	0.0001U	**0.1**
		12/8/2010	0.0002U	**0.0362**	0.0005U	0.001U	**0.023**	0.0019U	0.0001U	**0.141**
CS-2		9/16/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-4		6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/16/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-9		3/8/2010	0.002U	**0.04**	0.0005U	**0.0020F**	**0.0036F**	**0.015F**	**0.0005F**	**2.1**
		6/14/2010	**0.0004F**	**0.0455**	0.0005U	**0.002F**	**0.011**	**0.0168F**	**0.0036**	**1.939**
		9/8/2010	**0.0011F**	**0.046**	**0.0008F**	0.001U	0.003U	**0.0131F**	**0.0022**	**1.247**
	Duplicate	9/8/2010	**0.0045F**	**0.0414**	**0.0009F**	0.001U	0.003U	**0.0125F**	**0.0021**	**1.212**
		12/8/2010	**0.0004F**	**0.0395**	0.0005U	0.001U	**0.07**	**0.0474**	**0.0018**	**2.608**
CS-10		3/8/2010	0.002U	**0.044**	0.0005U	0.001U	**0.0083F**	0.0016U	0.0001U	**0.27**
		6/14/2010	**0.0035F**	**0.0503**	0.0005U	0.001U	**0.008F**	0.0019U	0.0001U	**0.11**
	Duplicate	6/14/2010	**0.0034F**	**0.0499**	0.0005U	0.001U	**0.011**	0.0019U	0.0001U	**0.117**
		9/8/2010	**0.0046F**	**0.041**	**0.0006F**	0.001U	**0.014**	0.0019U	0.0001U	**0.133**
		12/8/2010	0.0002U	**0.0404**	0.0005U	0.001U	**0.033**	0.0019U	0.0001U	**0.108**
CS-12		3/9/2010	**0.0025F**	**0.03**	**0.0006F**	**0.0023F**	**0.047**	**0.025**	0.0001U	**1.4**
		6/14/2010	**0.0034F**	**0.038**	**0.0006F**	**0.002F**	**0.01**	**0.0039F**	0.0001U	**0.431**
		9/17/2010	**0.0082F**	**0.0335**	0.0005U	0.001U	**0.008F**	0.0019U	0.0001U	**0.239**
		12/8/2010	**0.0013F**	**0.0308**	0.0005U	0.001U	**0.043**	**0.0186F**	0.0001U	**0.397**
CS-MW16-LGR		6/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/8/2010	NA	NA	**0.0008F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW16-CC		6/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/8/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-D		6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/16/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MWG-LGR		9/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-I		6/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/13/2010	NA	NA	**0.0008F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW1-LGR		6/9/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	0.0001U	NA
		9/7/2010	NA	NA	**0.0011F**	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW1-BS		9/7/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW1-CC		9/7/2010	NA	NA	**0.0006F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW2-LGR		6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/16/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA

Appendix B
2010 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-MW2-CC	9/16/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	0.0001U	NA
CS-MW3-LGR	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	9/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW4-LGR	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	9/17/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW5-LGR	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	9/9/2010	NA	NA	**0.0010F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW6-LGR	6/8/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
	9/10/2010	NA	NA	**0.0008F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW6-BS	9/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW6-CC	9/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW7-LGR	6/8/2010	NA	NA	0.0005U	**0.004F**	NA	0.0019U	0.0001U	NA
	9/15/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	0.0001U	NA
CS-MW7-CC	9/15/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
Duplicate	9/15/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW8-LGR	9/15/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW8-CC	9/15/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW9-LGR	6/10/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
	9/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW9-BS	9/14/2010	NA	NA	0.0025U	0.005U	NA	**0.0327F**	0.0005U	NA
CS-MW9-CC	9/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW10-LGR	9/15/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW10-CC	9/15/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW11A-LGR	6/8/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
	9/9/2010	NA	NA	**0.0011F**	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW11B-LGR	3/8/2010	NA	NA	0.0005U	**0.0022F**	NA	0.0016U	0.0001U	NA
Duplicate	3/8/2010	NA	NA	0.0005U	**0.0035F**	NA	0.0016U	0.0001U	NA
	9/9/2010	NA	NA	**0.0010F**	**0.024**	NA	0.0019U	0.0001U	NA
CS-MW12-LGR	9/10/2010	NA	NA	**0.0006F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW12-BS	9/10/2010	NA	NA	**0.0008F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW12-CC	9/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW17-LGR	9/14/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
CS-MW18-LGR	6/8/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	9/10/2010	NA	NA	**0.0007F**	0.001U	NA	0.0019U	0.0001U	NA
CS-MW19-LGR	6/8/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	0.0001U	NA
	9/17/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	0.0001U	NA
Duplicate	9/17/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	0.0001U	NA

Appendix B
2010 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-MW20-LGR		3/8/2010	NA	NA	0.0005U	**0.0019F**	NA	0.0016U	0.0001U	NA
		6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/17/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		12/7/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW21-LGR		3/9/2010	NA	NA	0.0005U	**0.0015F**	NA	0.0016U	0.0001U	NA
		6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/17/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
		12/7/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW22-LGR		3/8/2010	NA	NA	0.0005U	**0.0017F**	NA	0.0016U	0.0001U	NA
		6/9/2010	NA	NA	0.0005U	**0.002F**	NA	**0.0033F**	0.0001U	NA
		9/17/2010	NA	NA	0.0005U	**0.003F**	NA	**0.0021F**	0.0001U	NA
		12/7/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW23-LGR		3/9/2010	NA	NA	0.0005U	0.001U	NA	0.0016U	0.0001U	NA
		6/8/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/15/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	Duplicate	9/15/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		12/7/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW24-LGR		3/8/2010	NA	NA	0.0005U	**0.0011F**	NA	0.0016U	0.0001U	NA
		6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
	Duplicate	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/17/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	0.0001U	NA
	Duplicate	9/17/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		12/7/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
CS-MW25-LGR		3/9/2010	NA	NA	0.0005U	**0.017**	NA	0.0016U	0.0001U	NA
		6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	0.0001U	NA
		9/14/2010	NA	NA	0.0005U	**0.011**	NA	0.0019U	0.0001U	NA
		12/8/2010	NA	NA	0.0005U	0.001U	NA	**0.0183F**	0.0001U	NA
	Duplicate	12/8/2010	NA	NA	0.0005U	0.001U	NA	**0.0198F**	0.0001U	NA

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Notes:
- F = The analyte was positively identified but the associated numerical value is below the RL.
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- NA = Not sampled for this parameter.
- mg/L = milligrams per liter

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

APPENDIX C

2010 WESTBAY® ANALYTICAL RESULTS

Appendix C
2010 Westbay Analytical Results

Well ID	Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	TCE	PCE	Vinyl Chloride
CS-WB01-UGR-01	10-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	1-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB01-LGR-01	10-Mar-10	<0.30	<0.16	<0.19	<0.16	**3.7**	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	**0.25F**	**5**	<0.23
CS-WB01-LGR-02	10-Mar-10	<0.30	<0.16	<0.19	**2.6**	**8.0**	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	**2.9**	**8.1**	<0.23
CS-WB01-LGR-03	10-Mar-10	<0.30	<0.16	<0.19	**15**	**4.6**	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	**10**	**2.8**	<0.23
CS-WB01-LGR-04	10-Mar-10	<0.30	<0.16	<0.19	**0.23J**	<0.15	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	<0.16	<0.15	<0.23
CS-WB01-LGR-05	10-Mar-10	<0.30	<0.16	<0.19	**0.61J**	**0.17J**	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	**0.35F**	<0.15	<0.23
CS-WB01-LGR-06	10-Mar-10	<0.30	**0.18J**	<0.19	**1.7**	**0.54J**	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	**1.5**	<0.15	<0.23
CS-WB01-LGR-07	10-Mar-10	<0.30	**0.22J**	<0.19	**16**	**19**	<0.23
	1-Sep-10	<0.30	**0.26F**	<0.19	**22**	**19**	<0.23
CS-WB01-LGR-08	10-Mar-10	<0.30	<0.16	<0.19	**3.4**	**1.5**	<0.23
	1-Sep-10	<0.30	<0.16	<0.19	**3.9**	**1.2F**	<0.23
CS-WB01-LGR-09	10-Mar-10	<0.30	**0.21J**	<0.19	**19**	**14**	<0.23
	1-Sep-10	<0.30	**0.27F**	<0.19	**19**	**12**	<0.23
CS-WB02-UGR-01	11-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-01	11-Mar-10	<0.30	<0.16	<0.19	**1.9**	**0.71J**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**1.7**	**0.64F**	<0.23
CS-WB02-LGR-02	11-Mar-10	<0.30	<0.16	<0.19	**0.37J**	**2.2**	<0.23
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB02-LGR-03	11-Mar-10	<0.30	<0.16	<0.19	**0.33J**	**3.7**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**0.26F**	**3.3**	<0.23
CS-WB02-LGR-04	11-Mar-10	<0.30	<0.16	<0.19	**14**	**4.2**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**8.4**	**2.2**	<0.23
CS-WB02-LGR-05	11-Mar-10	<0.30	<0.16	<0.19	**4.1**	**1.2J**	<0.23
	3-Sep-10	<0.30	<0.16	**0.33F**	**3.6**	**0.93F**	<0.23
CS-WB02-LGR-06	11-Mar-10	<0.30	**0.20J**	<0.19	**5.9**	**9.0**	<0.23
	3-Sep-10	<0.30	**0.26F**	**0.35F**	**4.7**	**4.8**	<0.23
CS-WB02-LGR-07	11-Mar-10	<0.30	<0.16	<0.19	**2.2**	**2.1**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**1.3**	**1.1F**	<0.23
CS-WB02-LGR-08	11-Mar-10	<0.30	**0.33J**	**0.28J**	**2.4**	**2.5**	<0.23
	3-Sep-10	<0.30	**1.8**	**1.4**	**2.7**	**0.50F**	<0.23
CS-WB02-LGR-09	11-Mar-10	<0.30	<0.16	<0.19	**11**	**11**	<0.23
	3-Sep-10	<0.30	**0.20F**	<0.19	**15**	**18**	<0.23

Appendix C
2010 Westbay Analytical Results

Well ID	Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	TCE	PCE	Vinyl Chloride
CS-WB03-UGR-01	11-Mar-10	<30.00*	<16.00*	<19.00*	**45J***	**4400***	<23.00*
	8-Sep-10	<30.00*	<16.00*	<19.00*	**59F***	**5700***	<23.00*
CS-WB03-LGR-01	11-Mar-10	<30.00*	<16.00*	<19.00*	**30J***	**430***	<23.00*
	8-Sep-10	<30.00*	<16.00*	<19.00*	<16.00*	**520***	<23.00*
CS-WB03-LGR-02	11-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	8-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB03-LGR-03	11-Mar-10	<0.30	**0.32J**	<0.19	**13**	**27**	<0.23
	8-Sep-10	<0.30	<0.16	<0.19	**5.9**	**9.3**	<0.23
CS-WB03-LGR-04	11-Mar-10	<0.30	<0.16	<0.19	**8.0**	**24**	<0.23
	8-Sep-10	<0.30	<0.16	<0.19	**8.3**	**21**	<0.23
CS-WB03-LGR-05	11-Mar-10	<0.30	<0.16	<0.19	**5.9**	**22**	<0.23
	8-Sep-10	<0.30	<0.16	<0.19	**5.7**	**21**	<0.23
CS-WB03-LGR-06	11-Mar-10	<0.30	<0.16	<0.19	**0.98J**	**7.2**	<0.23
	8-Sep-10	<0.30	<0.16	<0.19	**1.2**	**8.5**	<0.23
CS-WB03-LGR-07	11-Mar-10	<0.30	**0.71J**	<0.19	**20**	**10**	<0.23
	8-Sep-10	<0.30	**0.78F**	<0.19	**16**	**14**	<0.23
CS-WB03-LGR-08	11-Mar-10	<0.30	<0.16	<0.19	**1.3**	**9.3**	<0.23
	8-Sep-10	<0.30	**1.4**	<0.19	**2**	**10**	<0.23
CS-WB03-LGR-09	11-Mar-10	<0.30	<0.16	<0.19	**6.5**	**6.6**	<0.23
	8-Sep-10	<0.30	<0.16	<0.19	**7.6**	**5**	<0.23
CS-WB04-UGR-01	10-Mar-10	Dry	Dry	Dry	Dry	Dry	Dry
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-01	10-Mar-10	<0.30	<0.16	<0.19	<0.16	**0.60J**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	<0.16	**0.44F**	<0.23
CS-WB04-LGR-02	10-Mar-10	<0.30	<0.16	<0.19	<0.16	**0.33J**	<0.23
	3-Sep-10	Dry	Dry	Dry	Dry	Dry	Dry
CS-WB04-LGR-03	10-Mar-10	<0.30	<0.16	<0.19	**0.18J**	**0.19J**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	<0.16	<0.15	<0.23
CS-WB04-LGR-04	10-Mar-10	<0.30	<0.16	<0.19	**0.24J**	<0.15	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	<0.16	<0.15	<0.23
CS-WB04-LGR-06	10-Mar-10	<0.30	**3.2**	**0.23J**	**14**	**12**	<0.23
	3-Sep-10	<0.30	**2.8**	**0.53F**	**15**	**11**	<0.23
CS-WB04-LGR-07	10-Mar-10	<0.30	**32**	**0.33J**	**6.8**	**0.34J**	<0.23
	3-Sep-10	<0.30	**13**	**1.2**	**18**	**1.7**	<0.23
CS-WB04-LGR-08	10-Mar-10	<0.30	<0.16	<0.19	**1.0**	**0.40J**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**0.92F**	**0.31F**	<0.23
CS-WB04-LGR-09	10-Mar-10	<0.30	<0.16	<0.19	**7.0**	**9.0**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**8.4**	**11**	<0.23
CS-WB04-LGR10	10-Mar-10	<0.30	<0.16	<0.19	**0.81J**	**0.59J**	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	**0.76F**	**0.78F**	<0.23
CS-WB04-LGR-11	10-Mar-10	<0.30	<0.16	<0.19	<0.16	<0.15	<0.23
	3-Sep-10	<0.30	<0.16	<0.19	<0.16	<0.15	<0.23

Data Qualifiers

J = The analyte was positively identified; the quantitation is an estimation.

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

* dilution run for this sample.

All values are reported in µg/L.

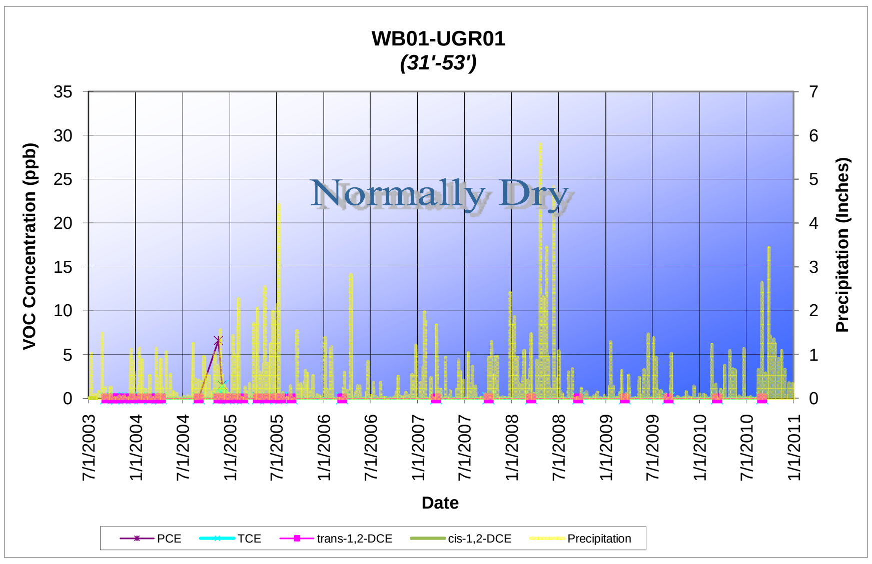
BOLD	Value > or = MCL
BOLD	MCL > Value > or = RL
BOLD	RL > Value > MDL

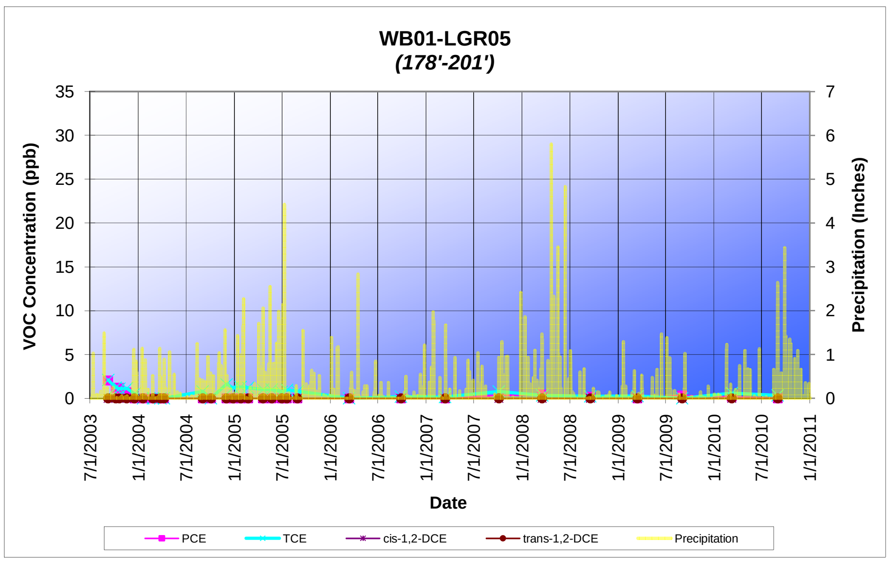
APPENDIX D

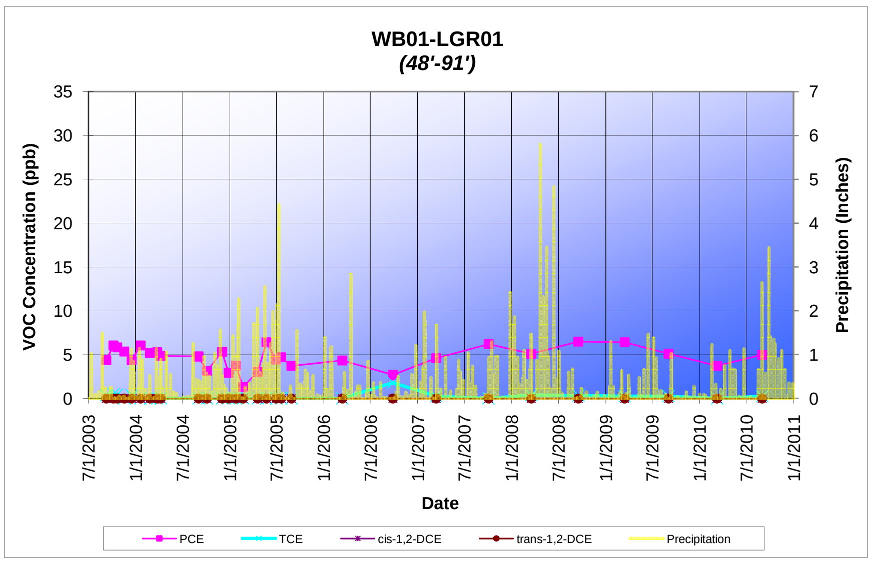
CUMULATIVE WESTBAY® ANALYTICAL GRAPHS

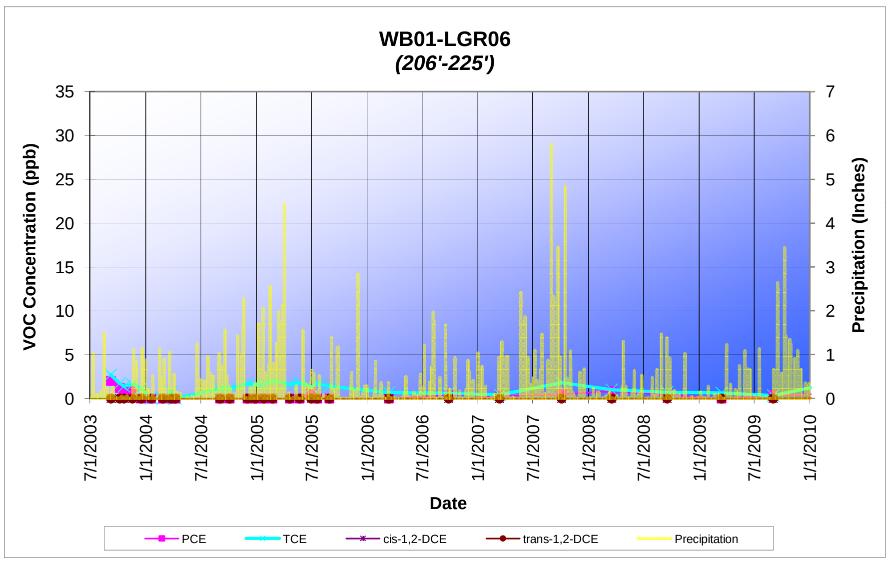
Appendix D.1

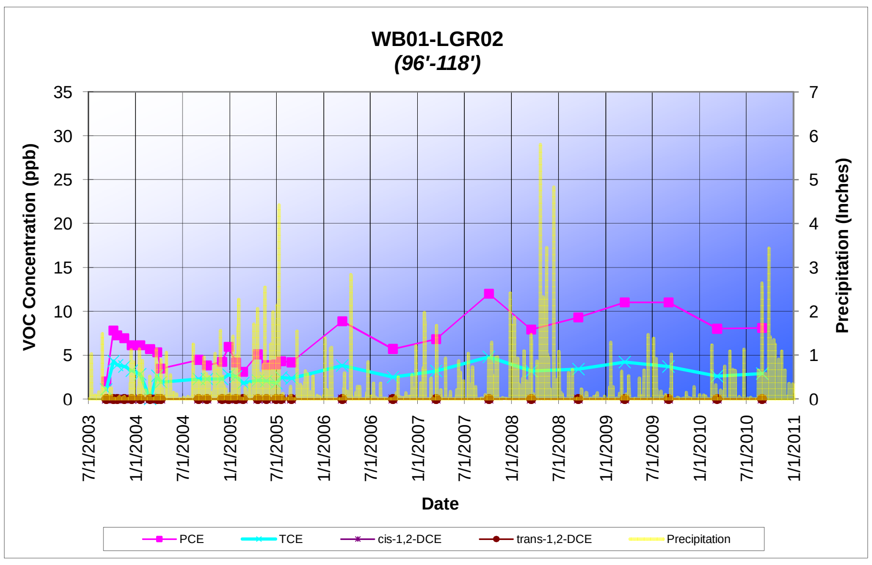
CS-WB01
Combined Concentration Data
Camp Stanley Storage Activity

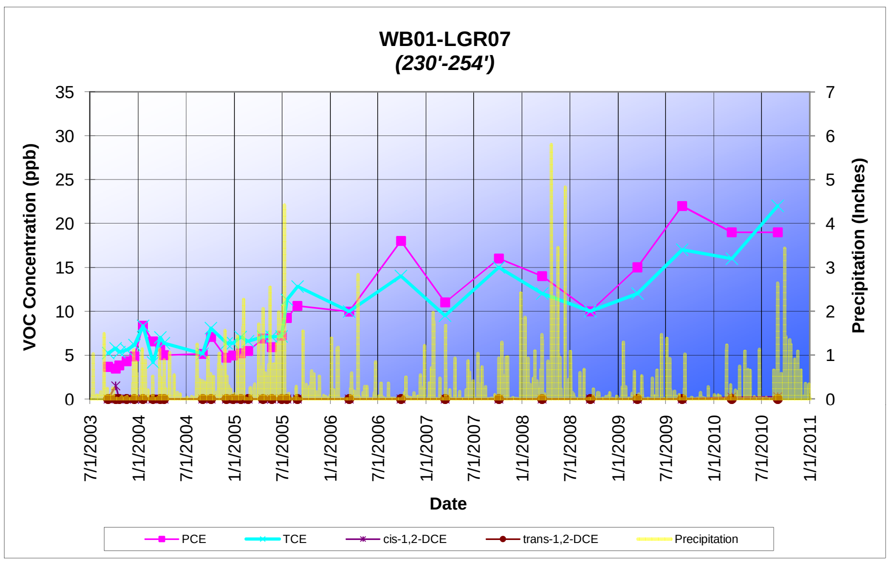


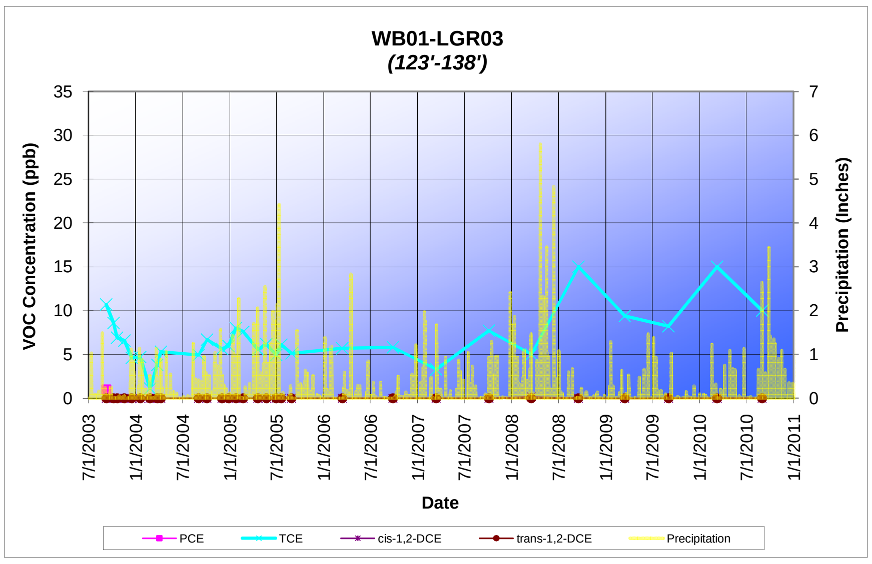


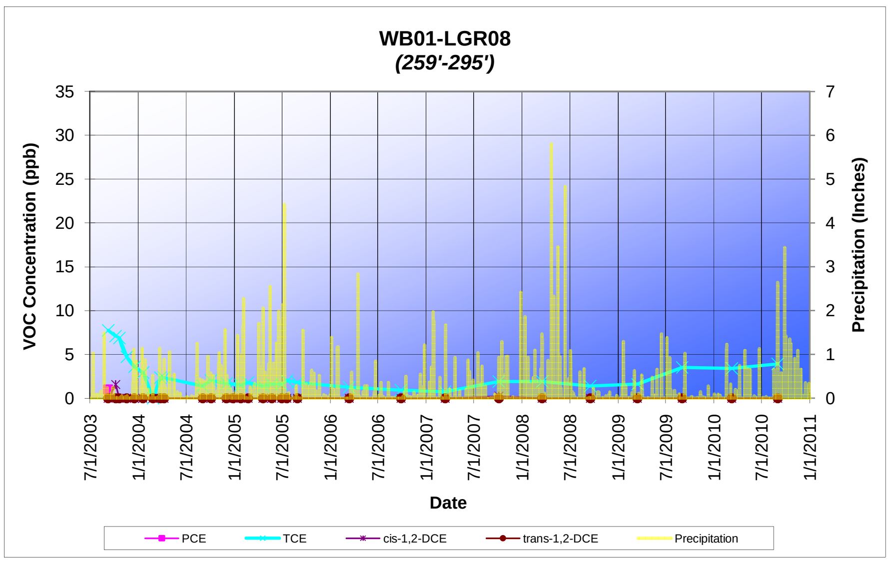


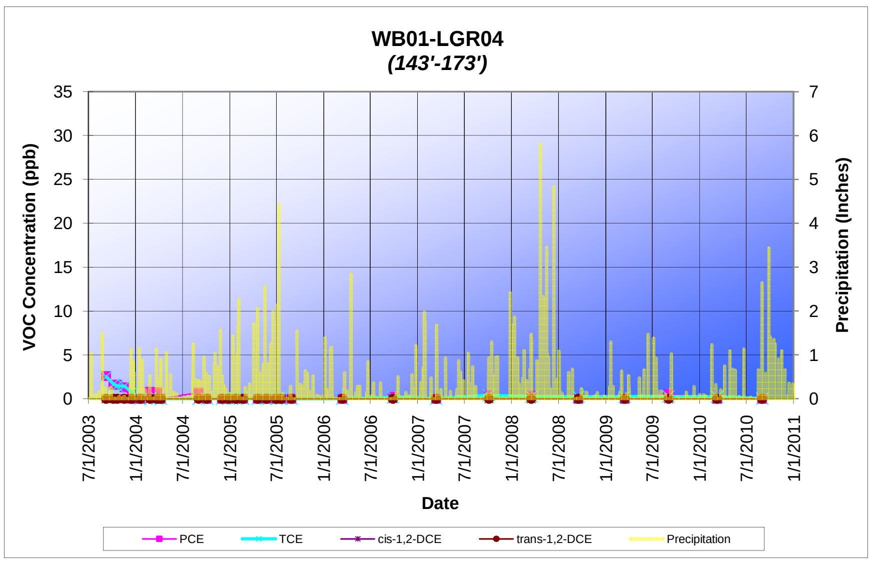


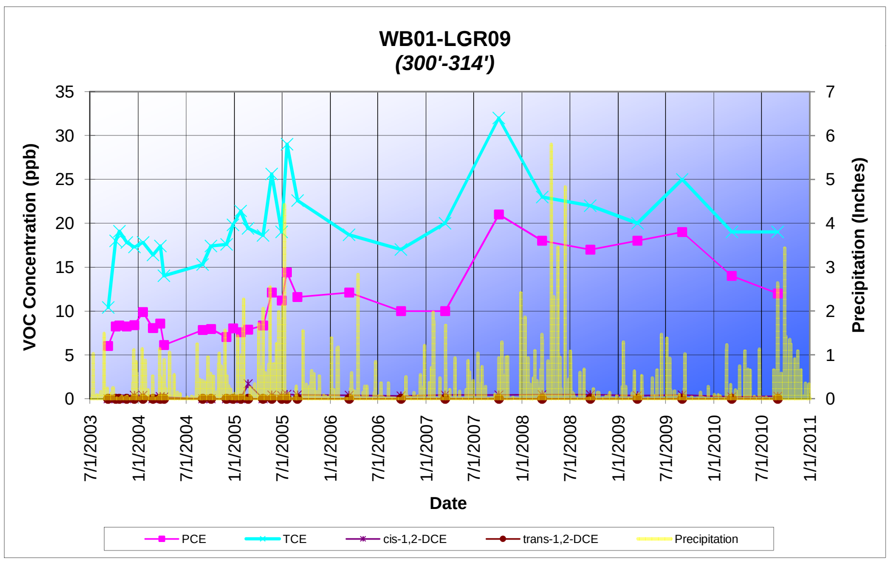












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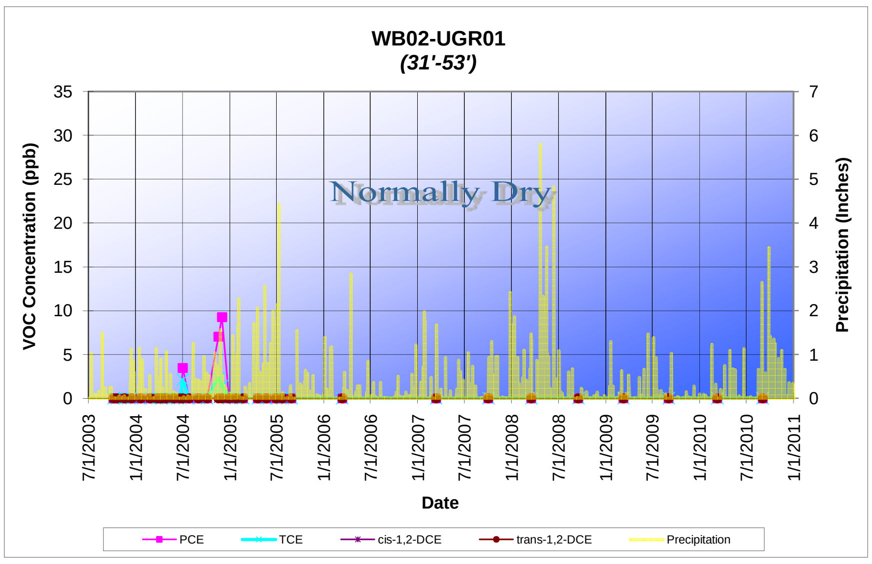
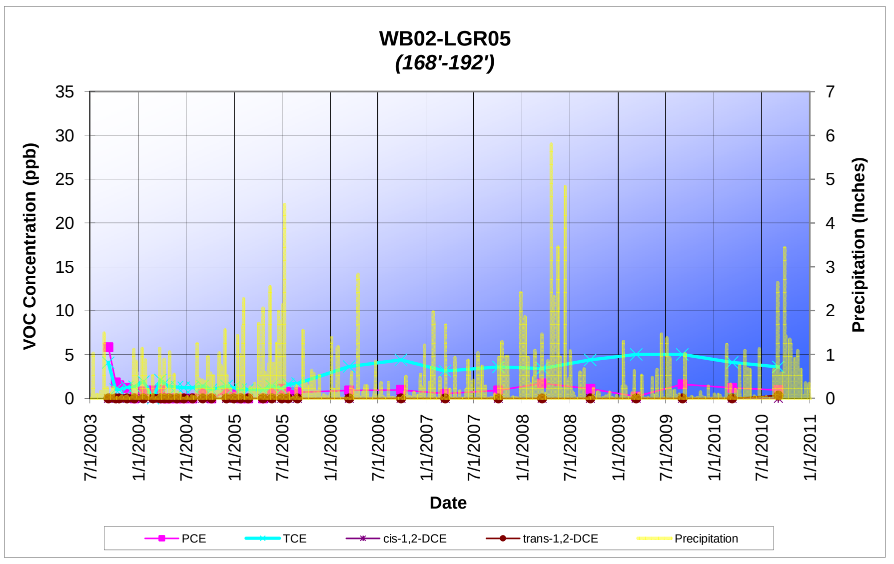
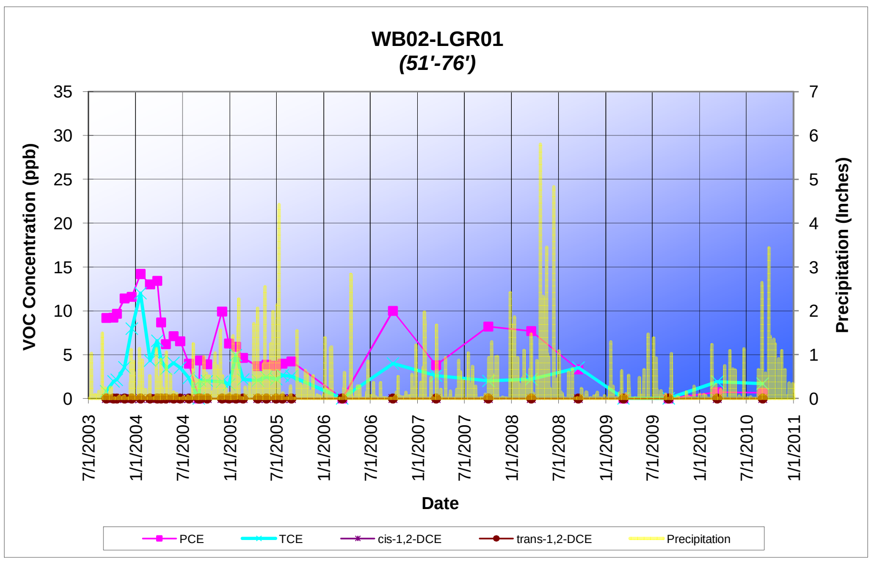
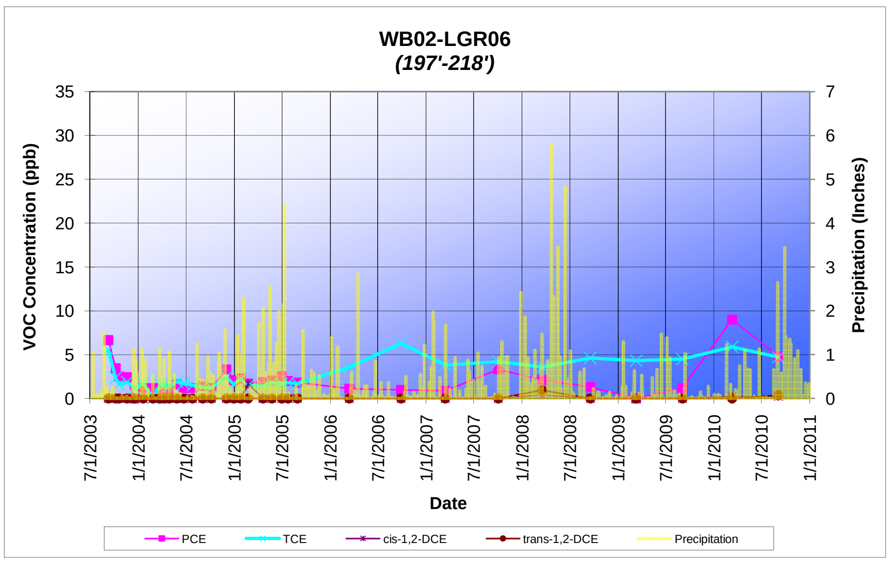
Appendix D.2

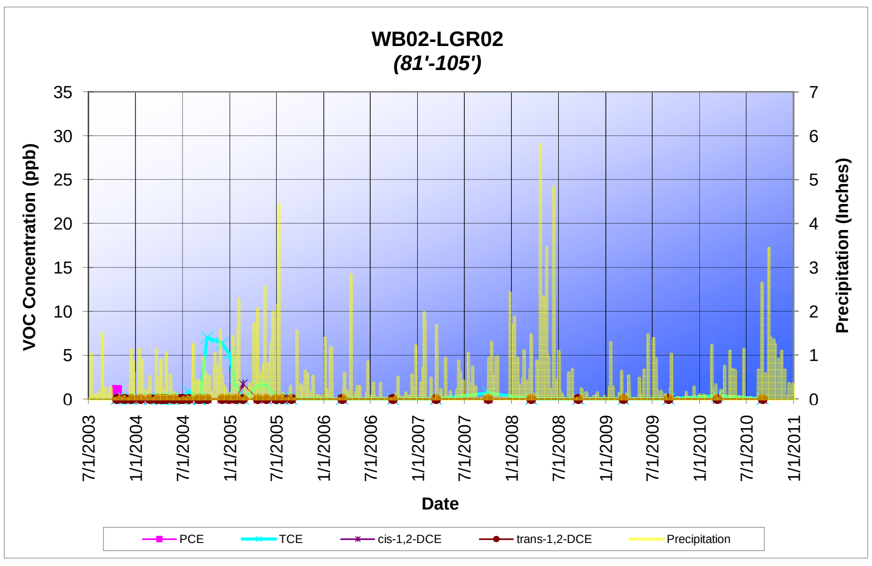
CS-WB02
Combined Concentration Data
Camp Stanley Storage Activity

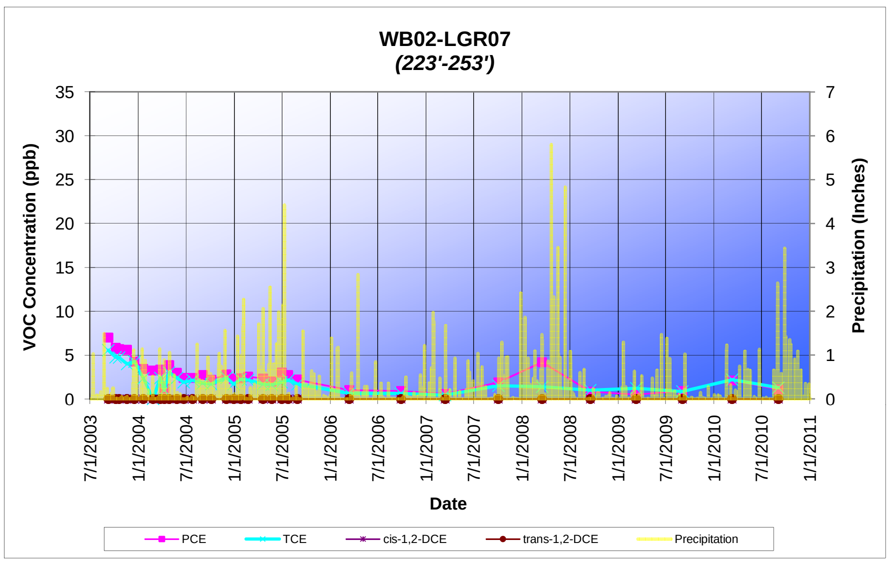


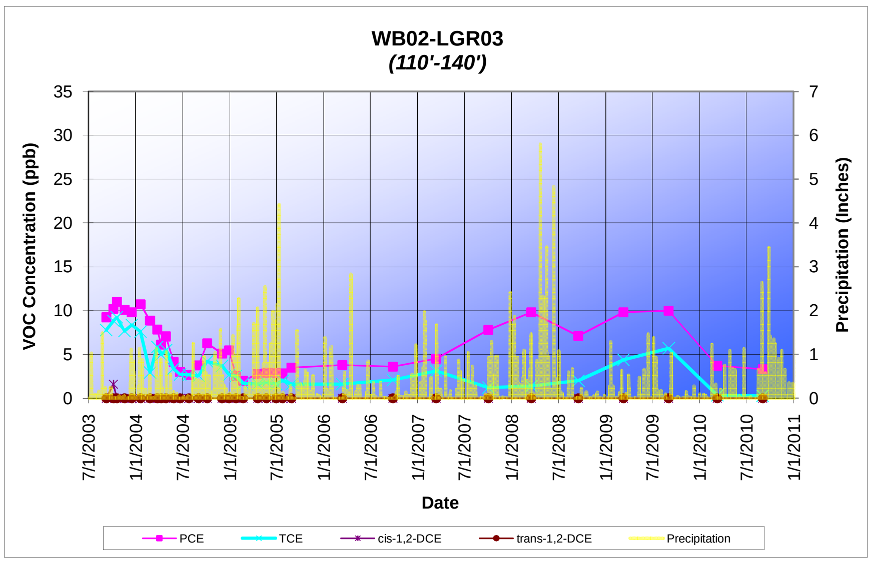


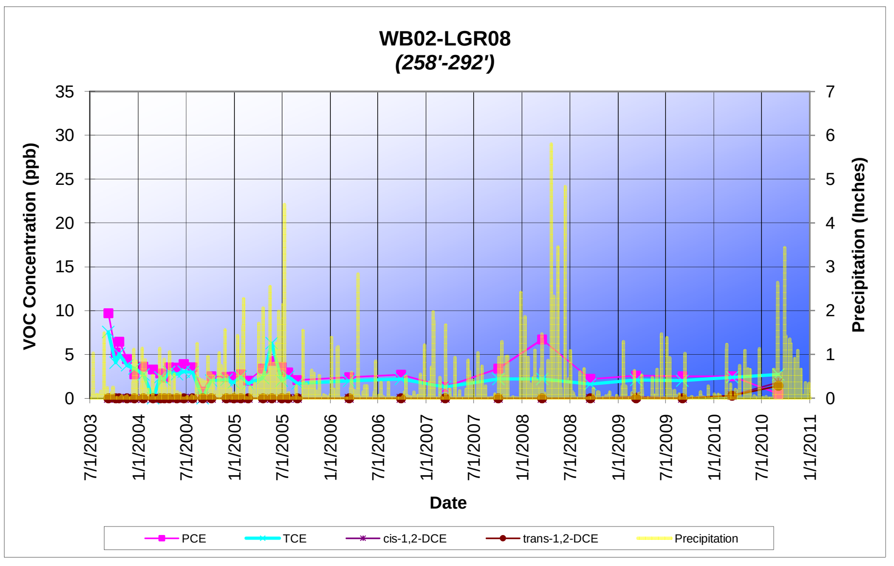


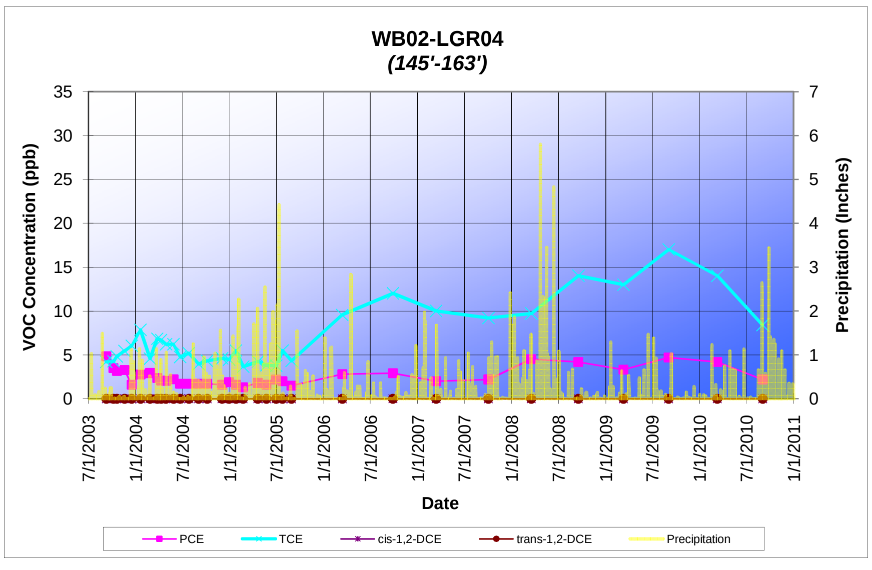


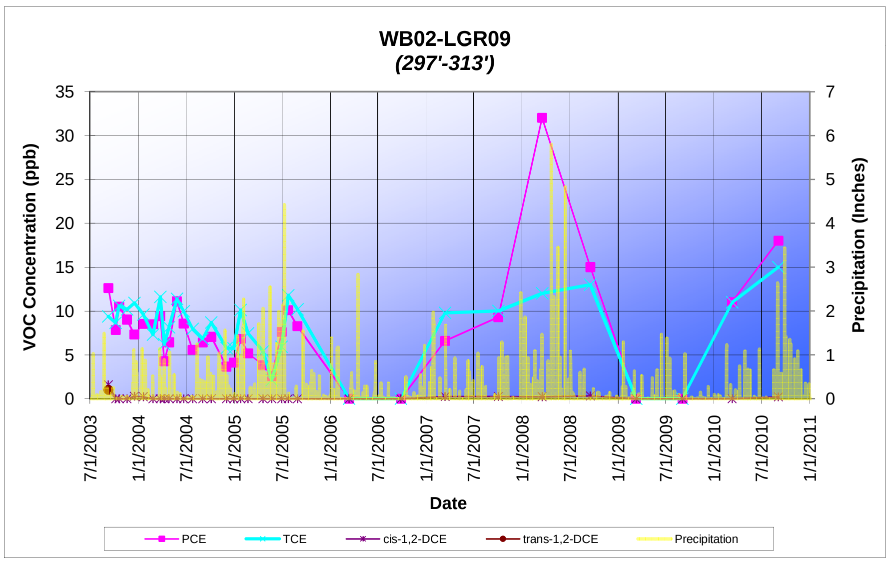












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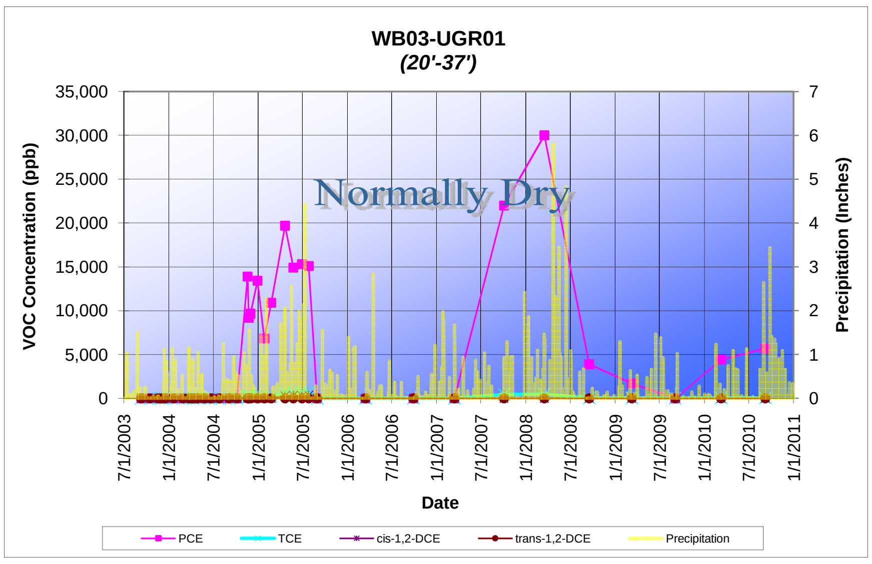
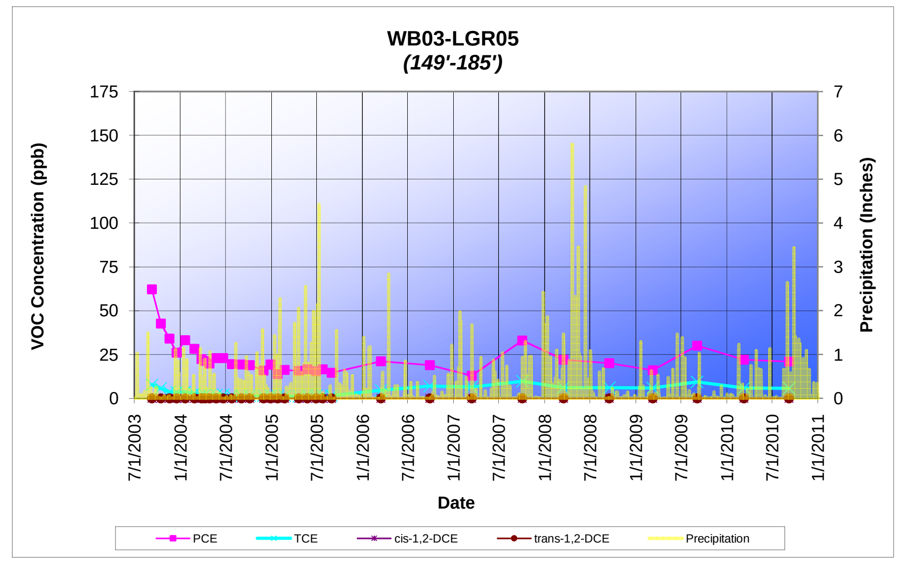
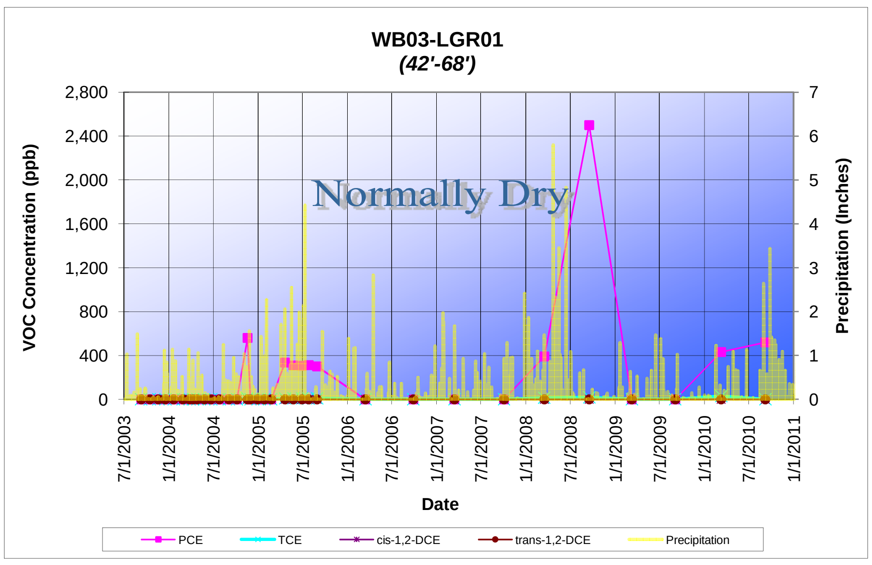
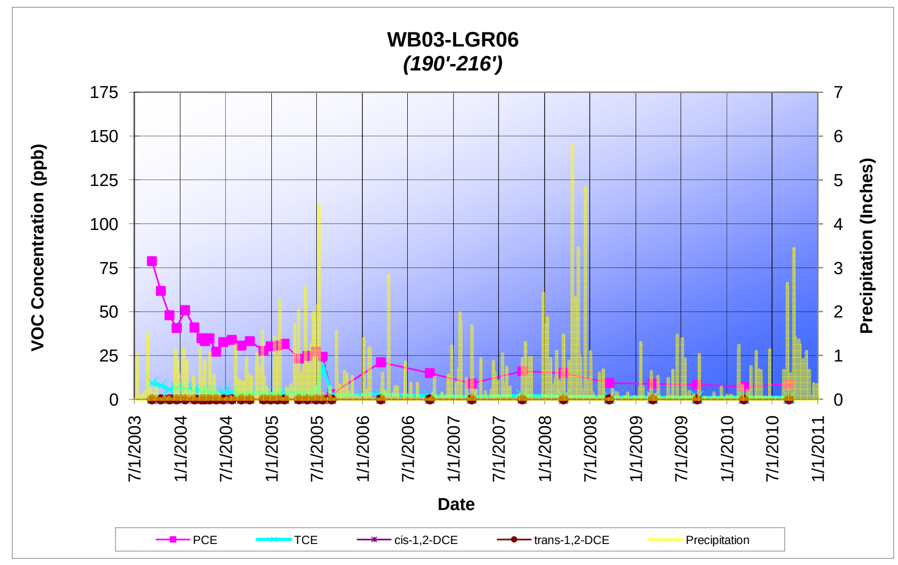
Appendix D.3

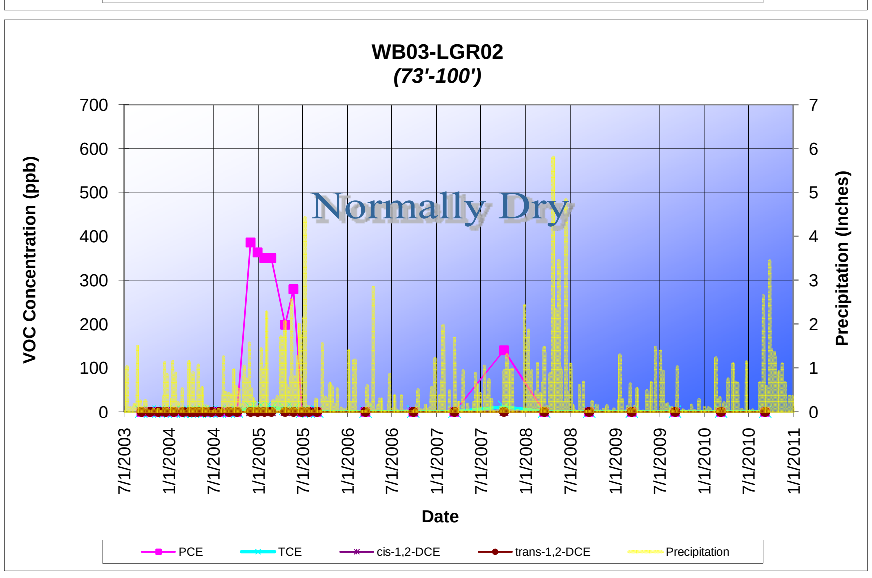
CS-WB03
Combined Concentration Data
Camp Stanley Storage Activity

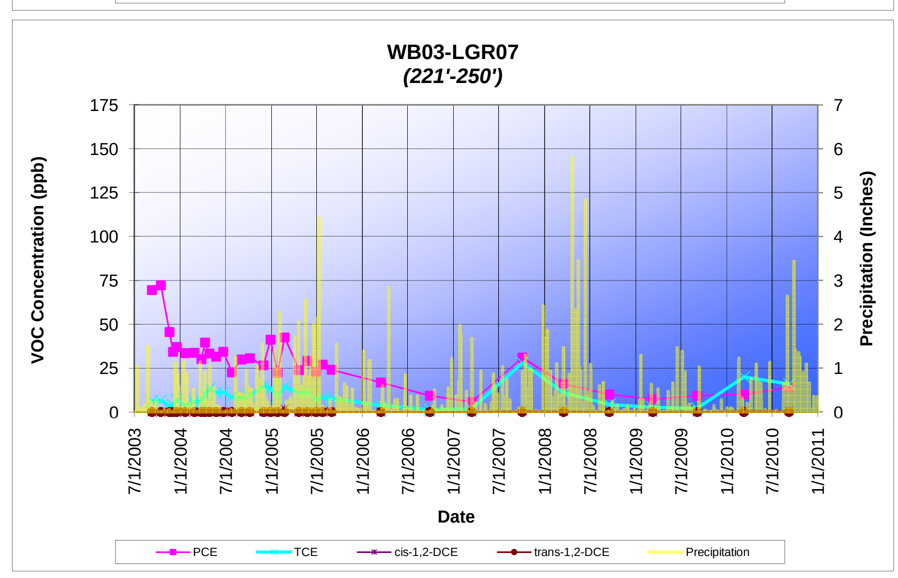


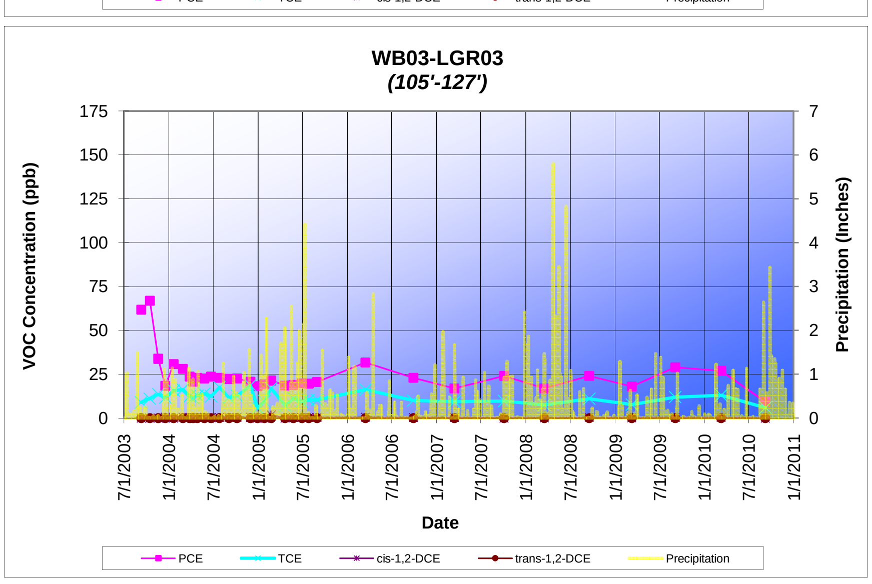


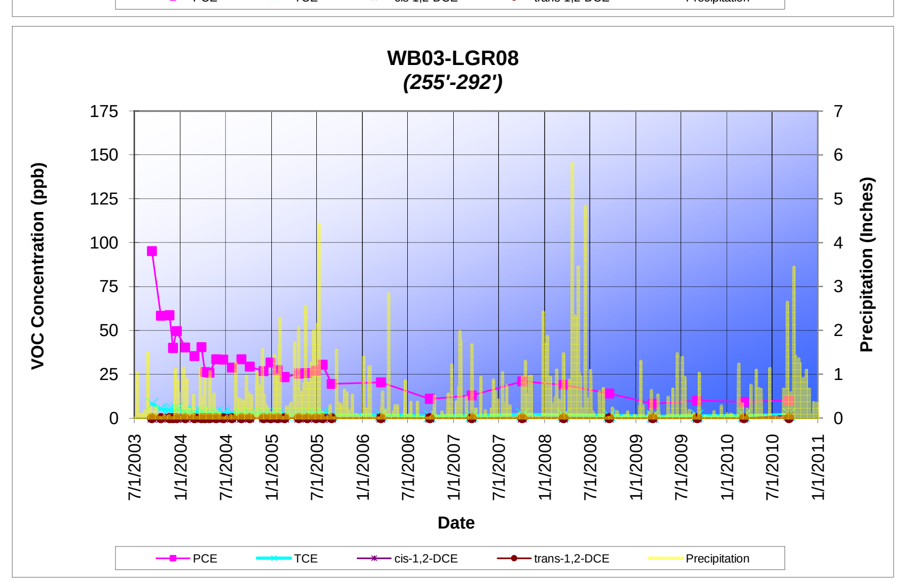


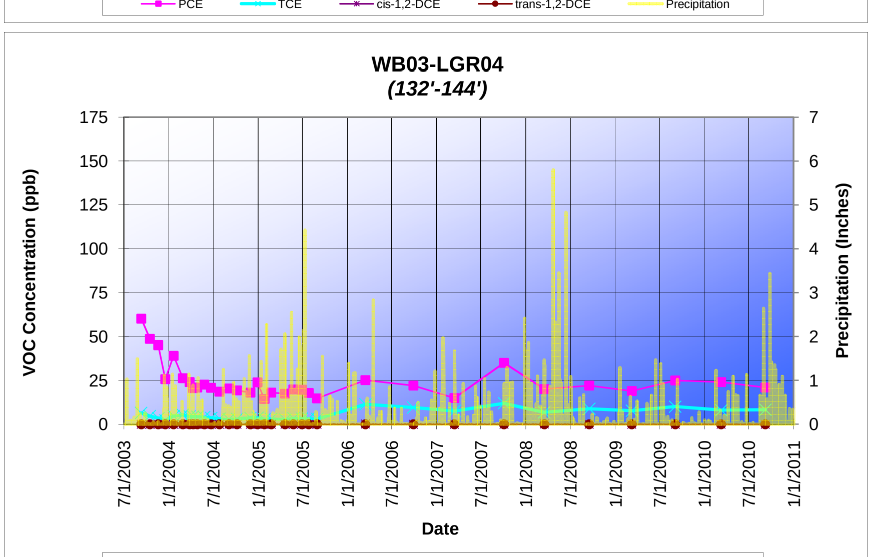


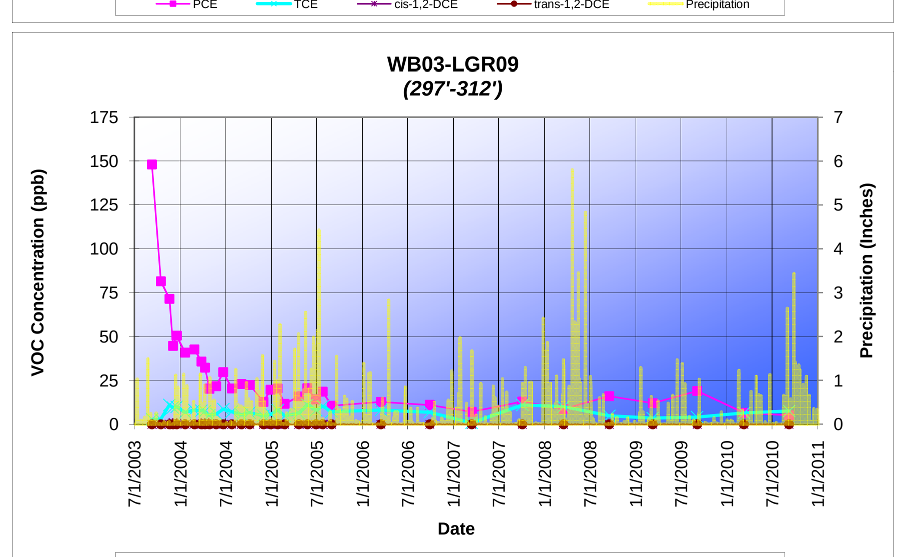












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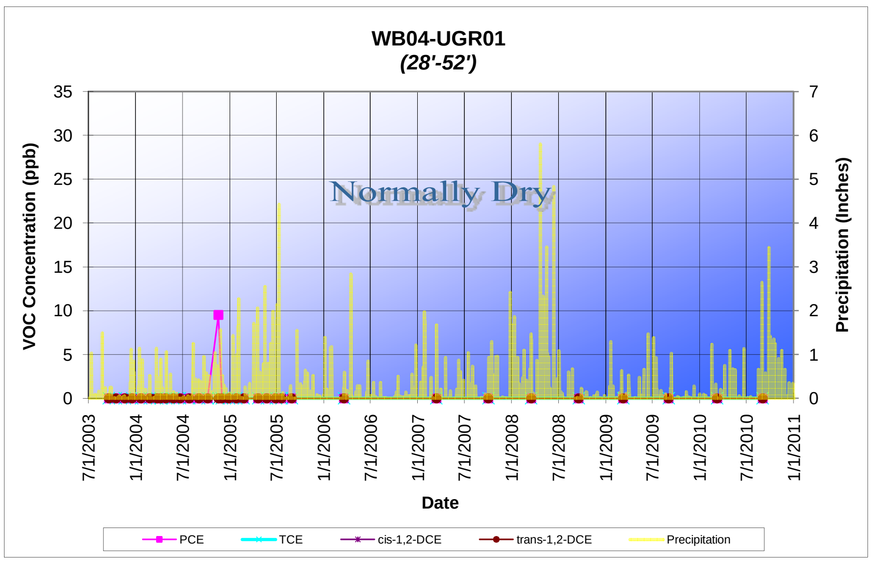
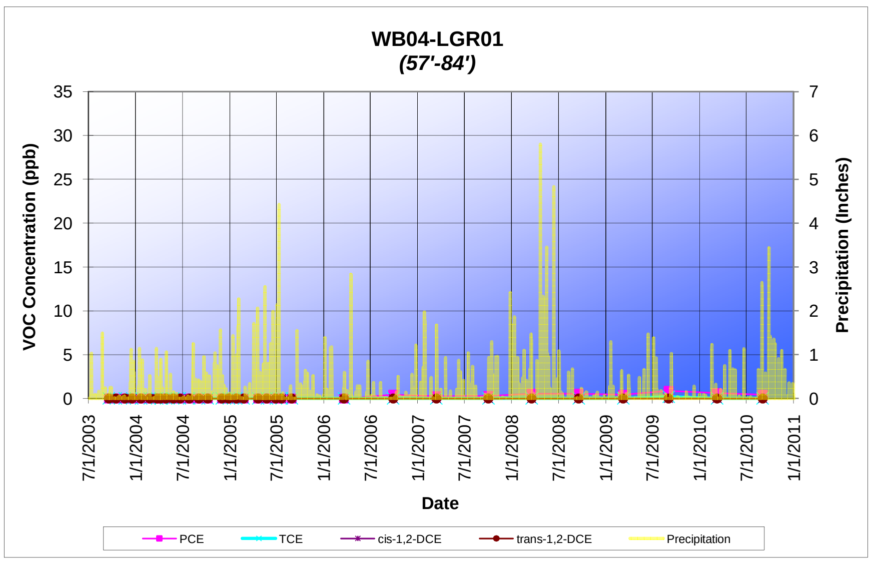
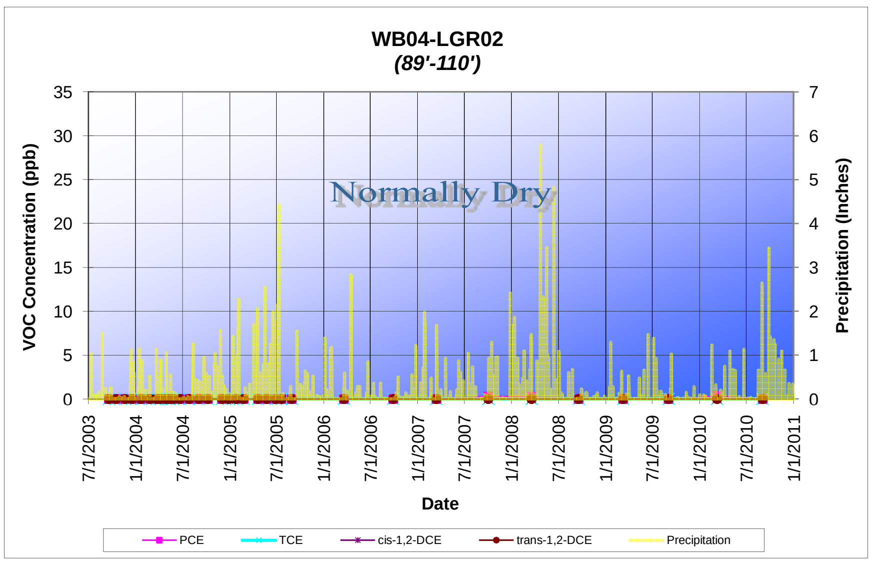
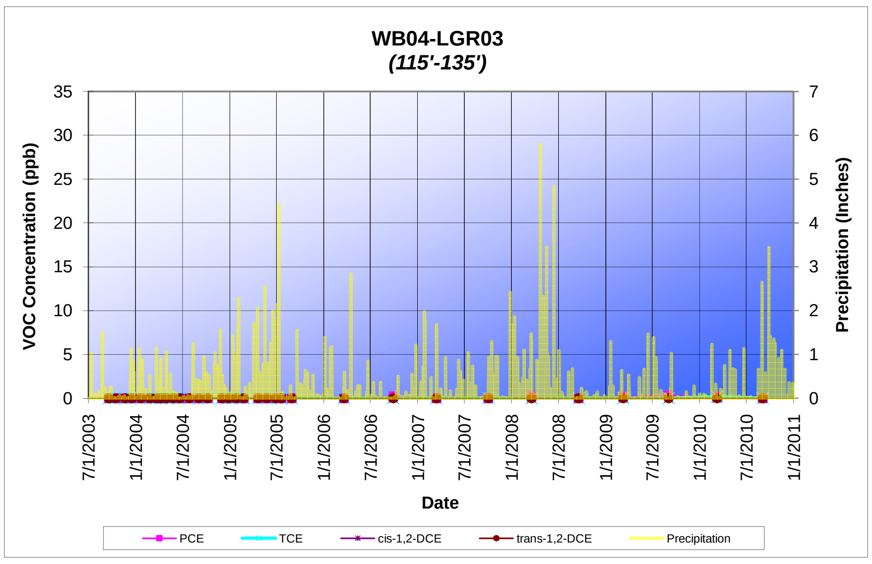
Appendix D.4

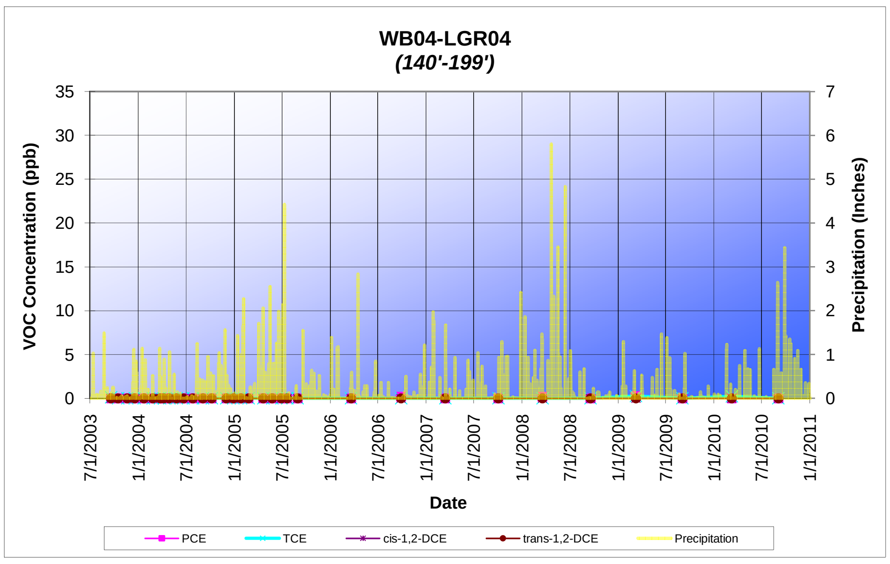
CS-WB04
Combined Concentration Data
Camp Stanley Storage Activity

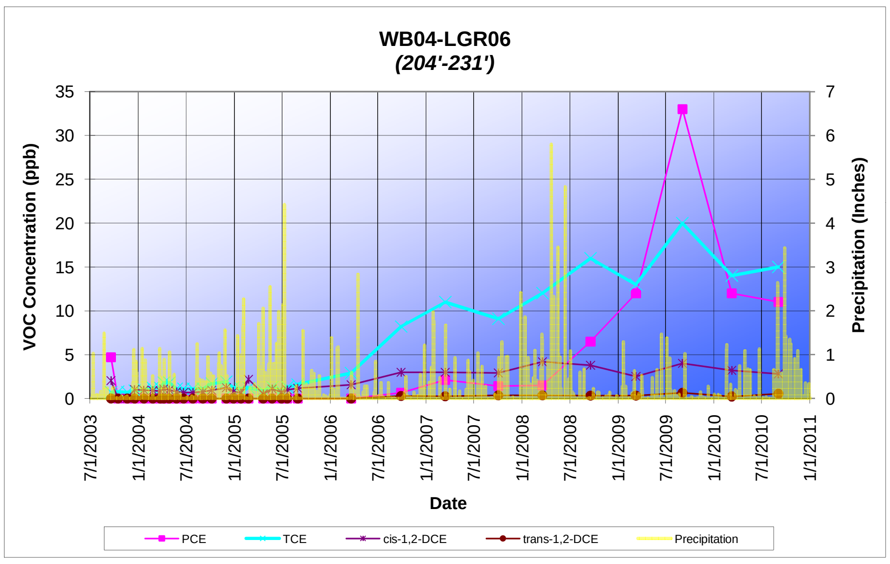


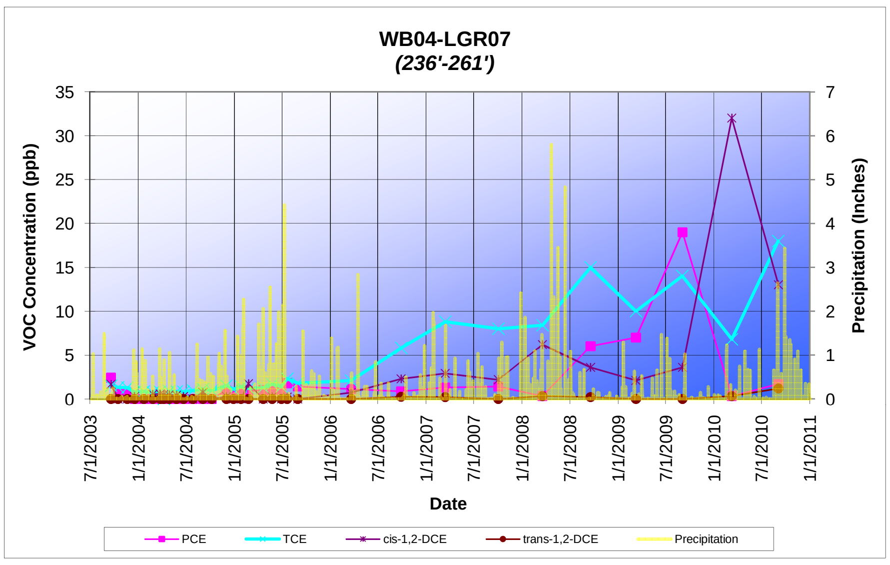


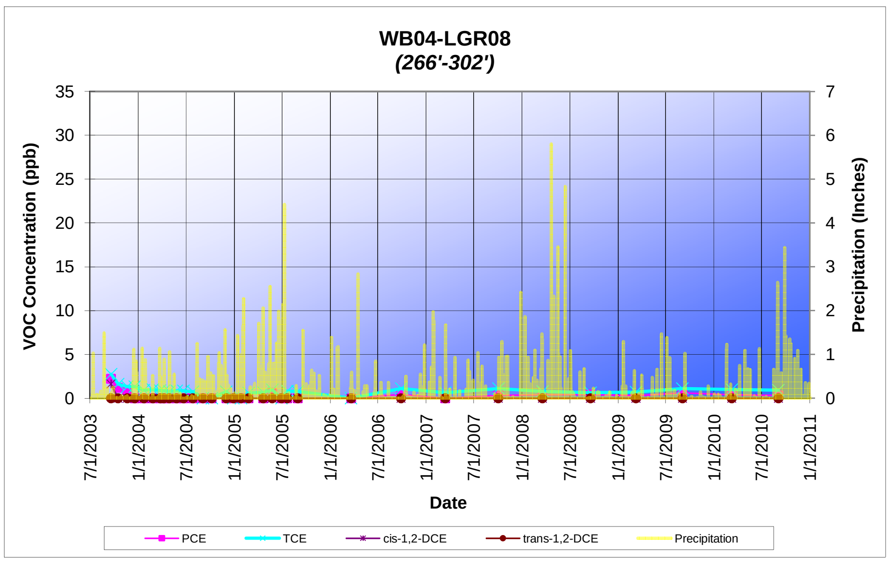






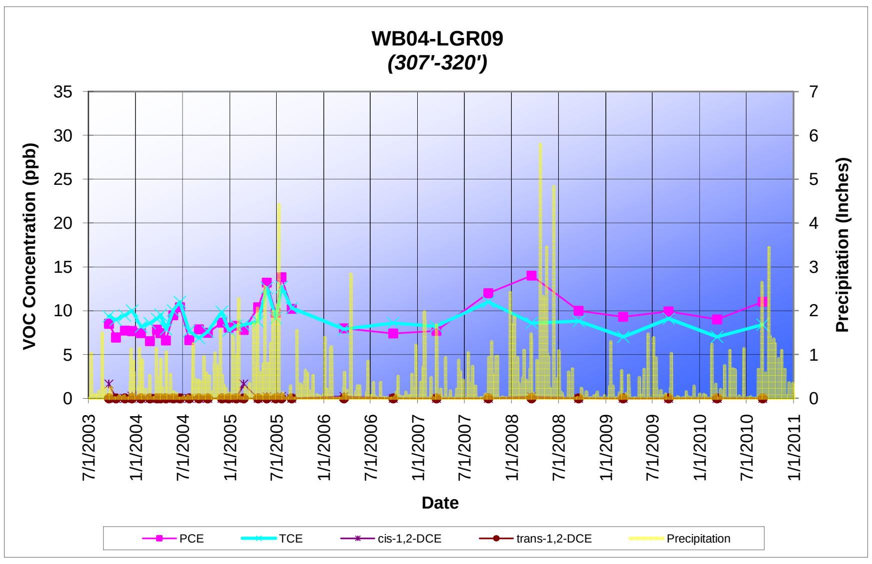


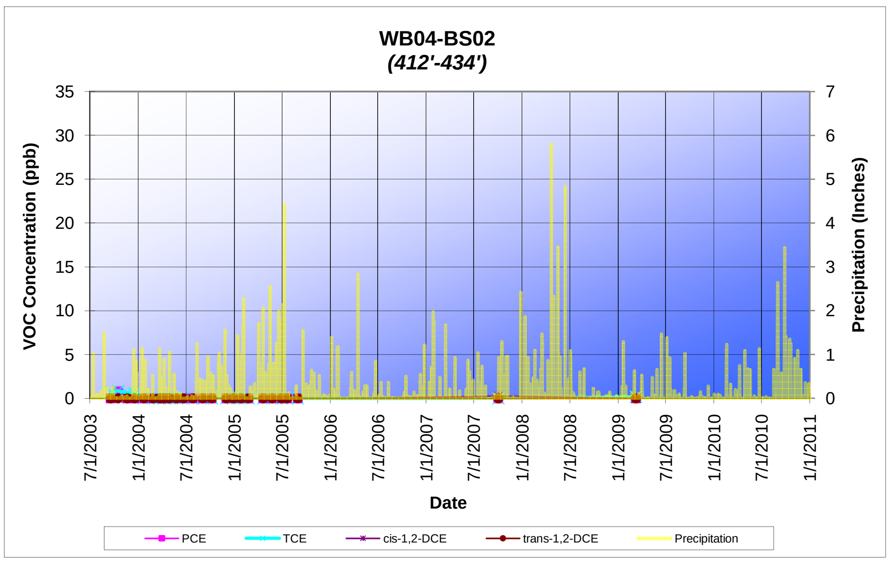


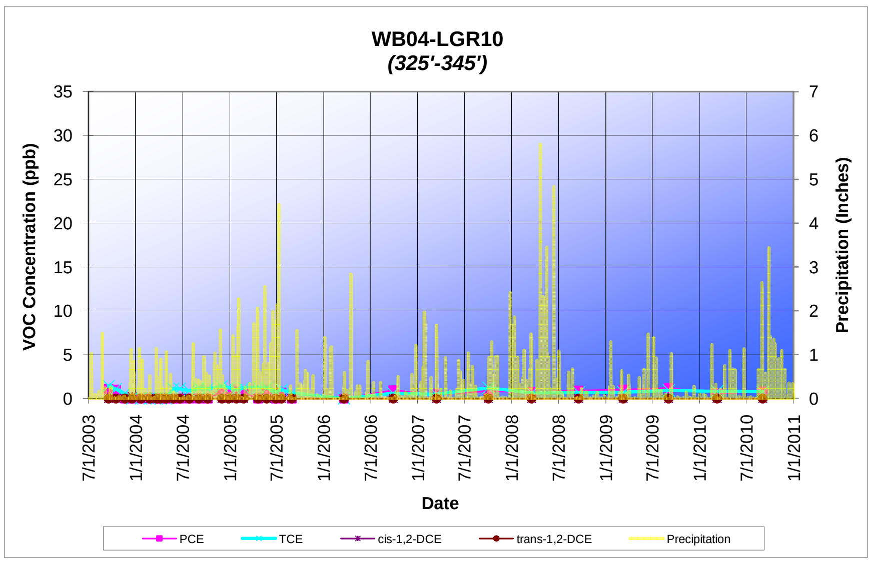


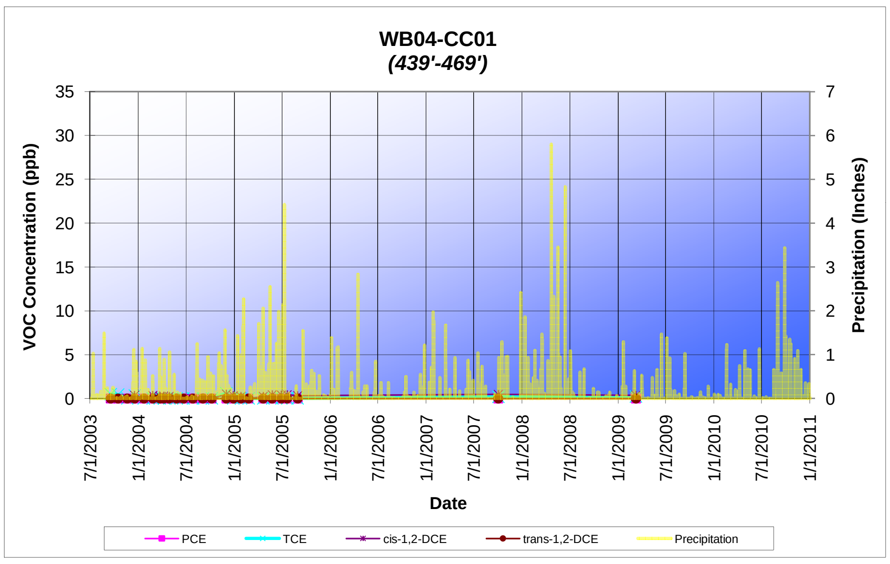
Appendix D.4

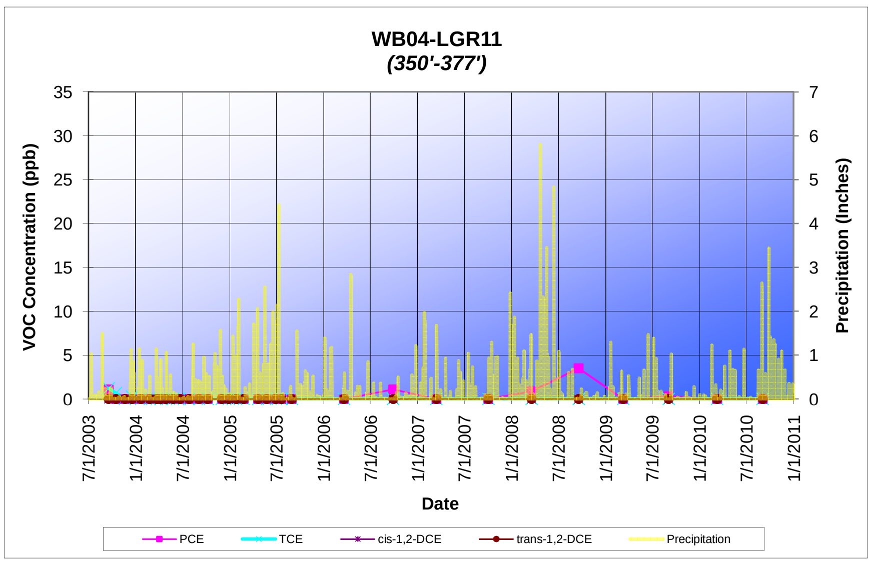
CS-WB04
Combined Concentration Data
Camp Stanley Storage Activity

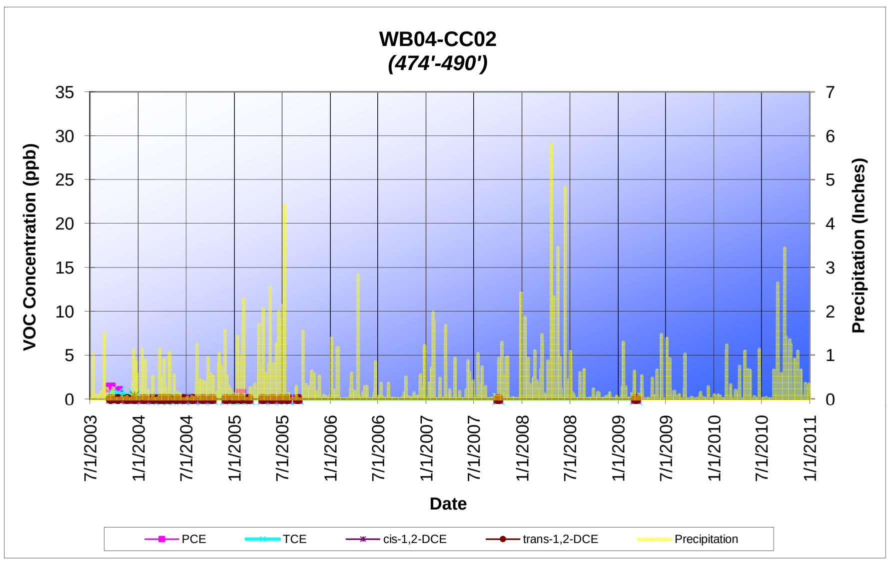


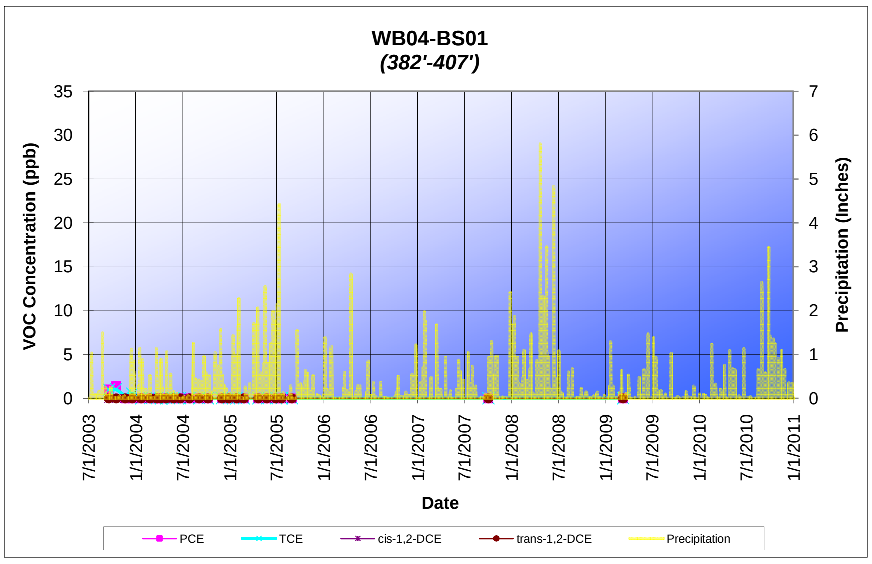


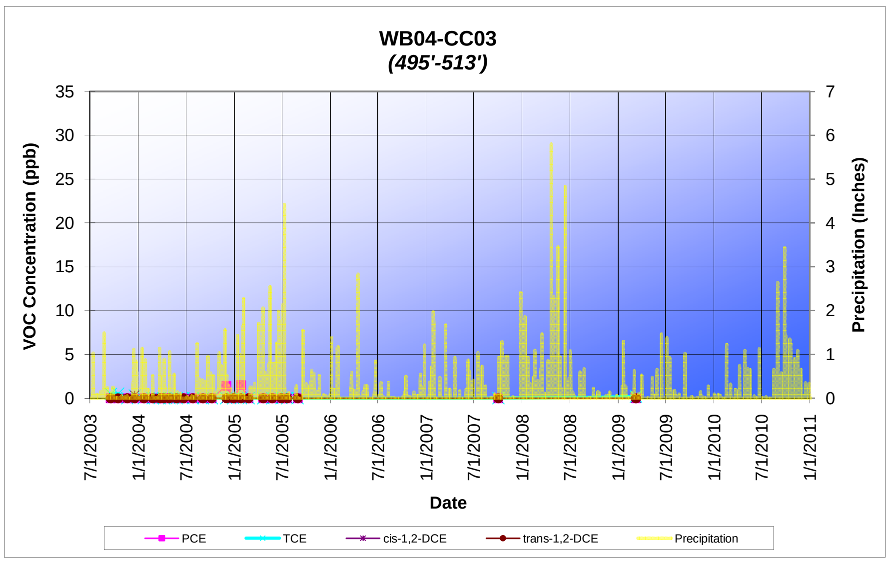












APPENDIX E

DROUGHT CONTINGENCY PLAN TRIGGERS

CSSA Drought Contingency Plan

Triggering Conditions	***Stage***	***Restrictions***
CS-9 water level > 300 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 > 330 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 > 360 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 > 391 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 > 475 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 2010

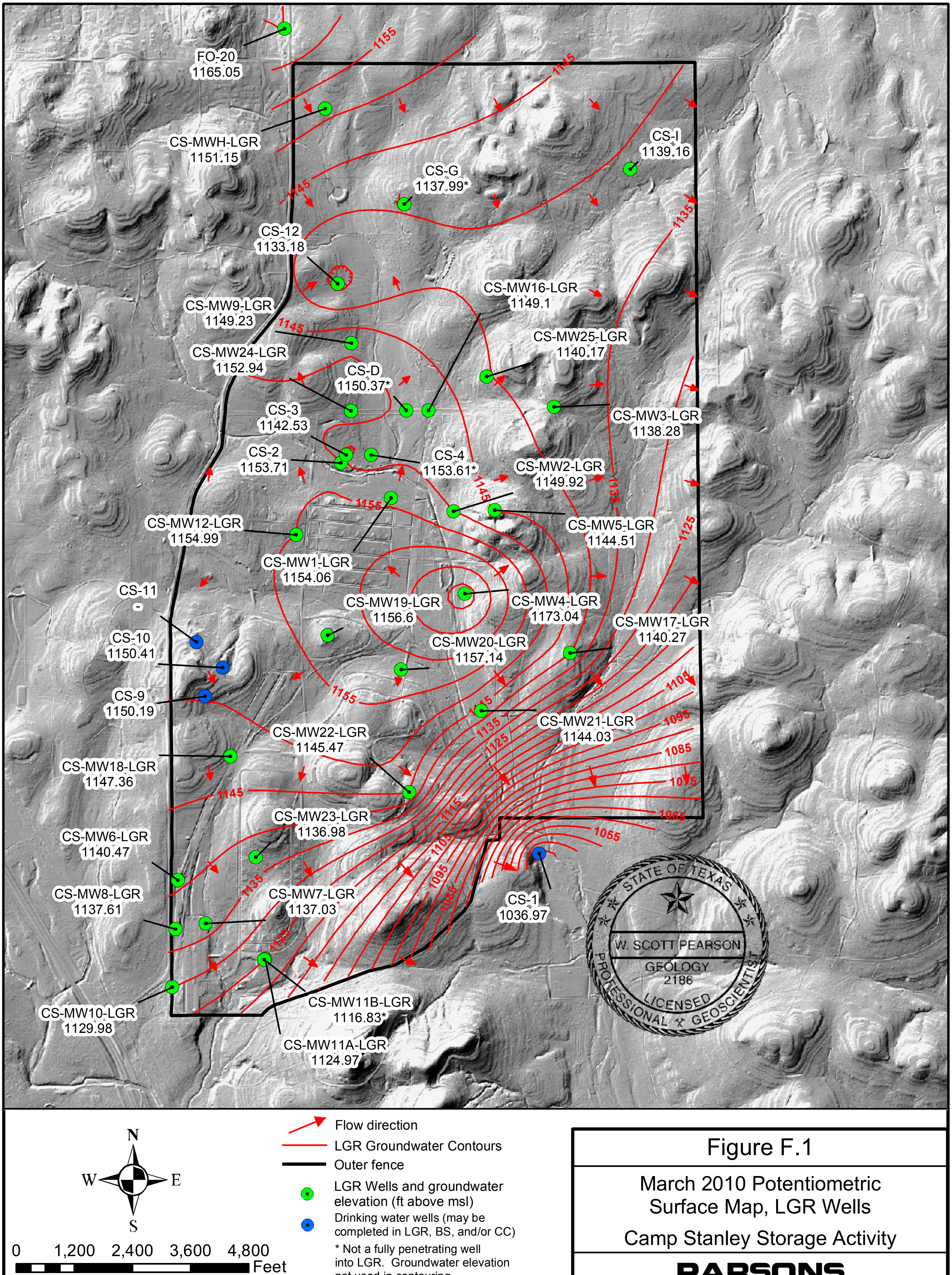


Figure F.1

March 2010 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

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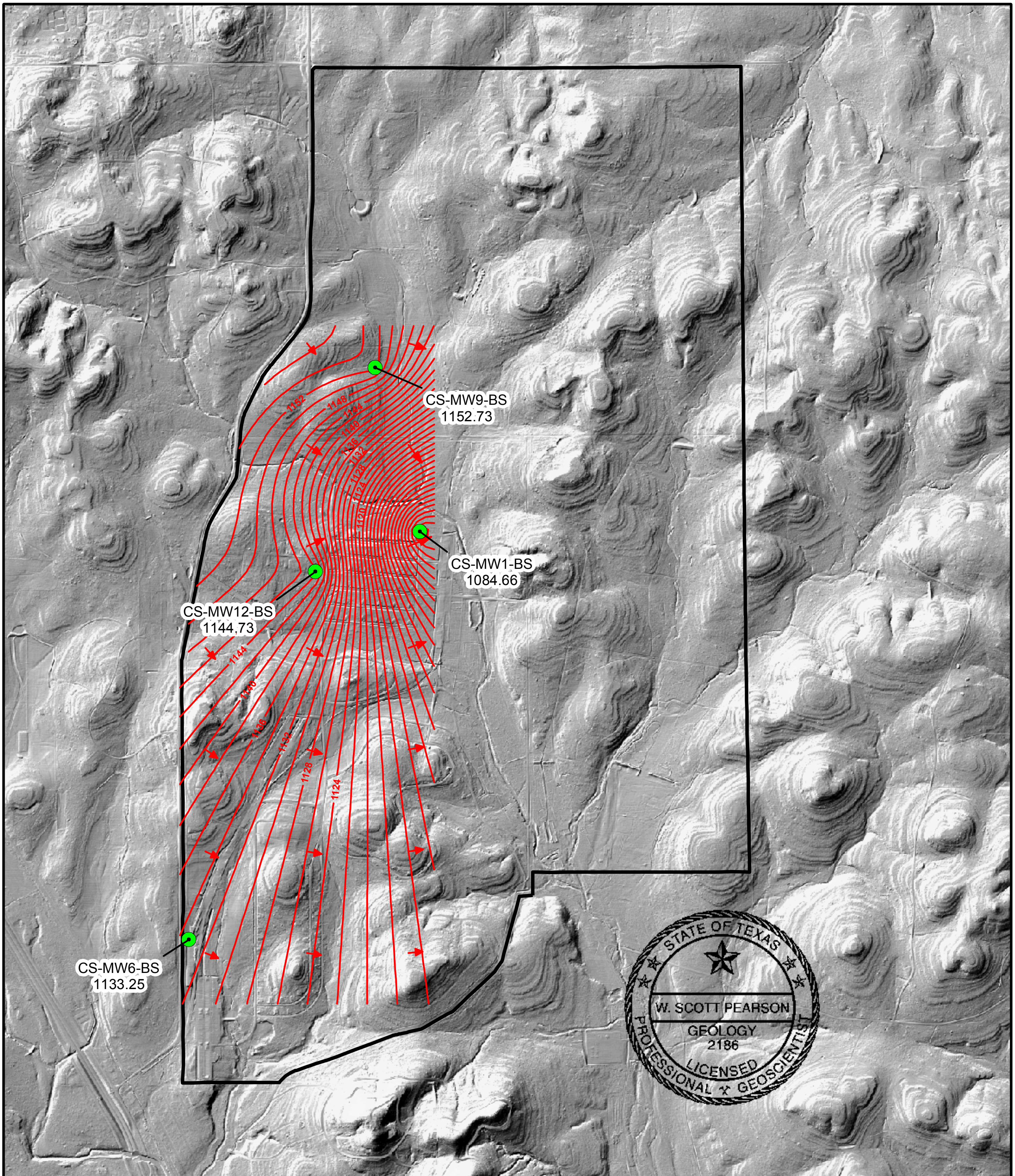

N
W E
S

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.2

March 2010 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

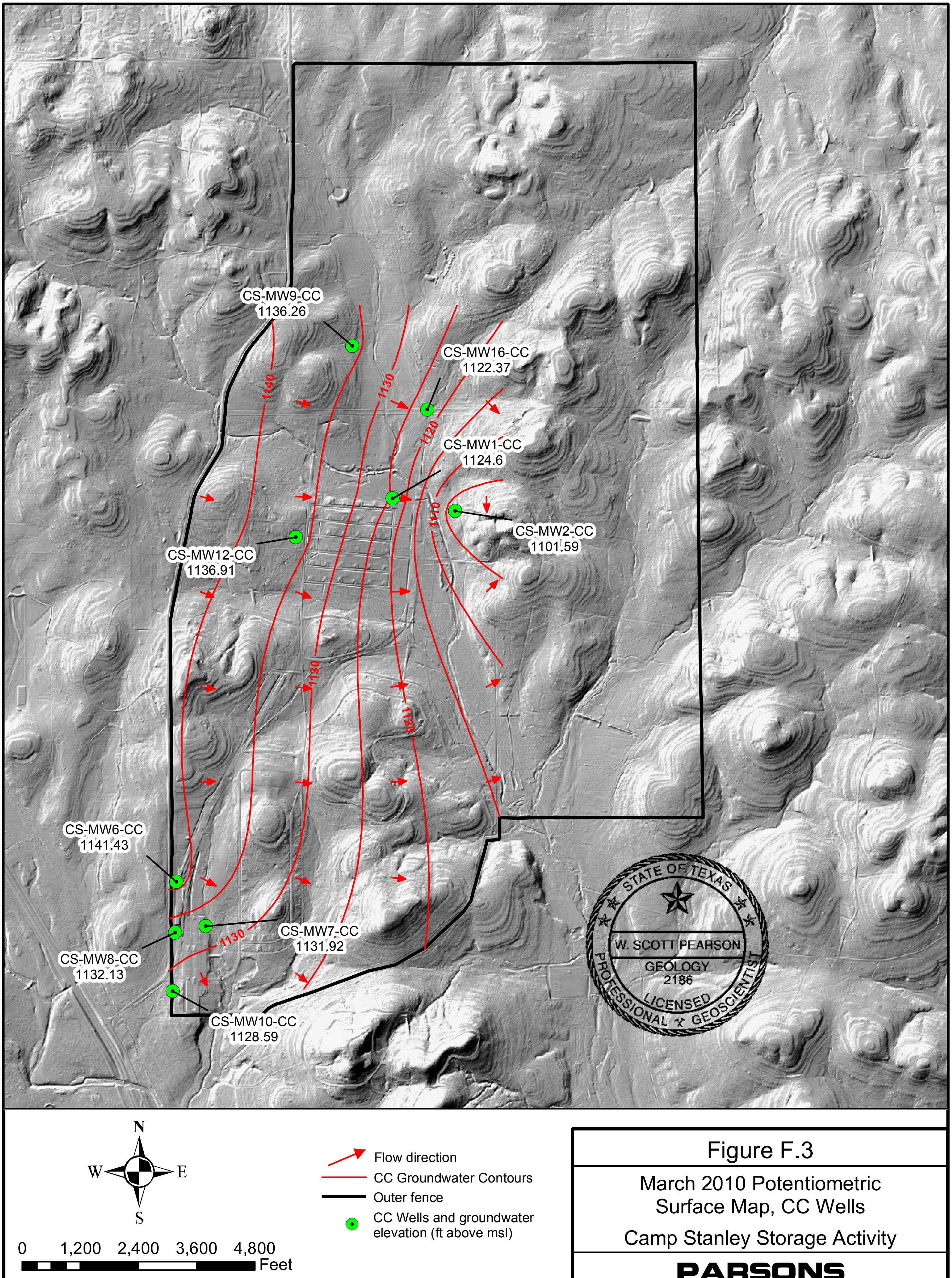

Figure F.3

March 2010 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

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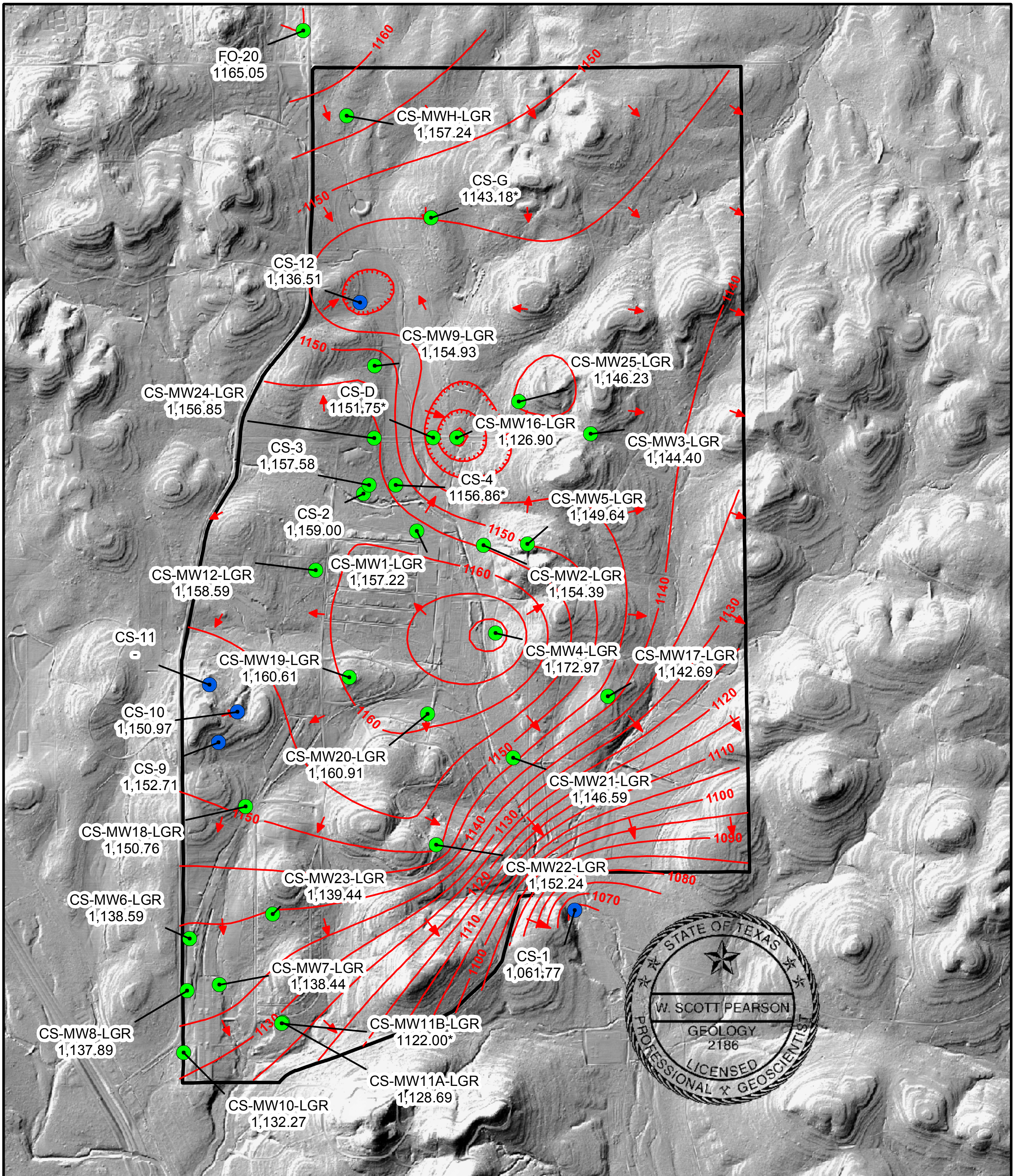

N
W E
S

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

Flow direction
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 2010 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

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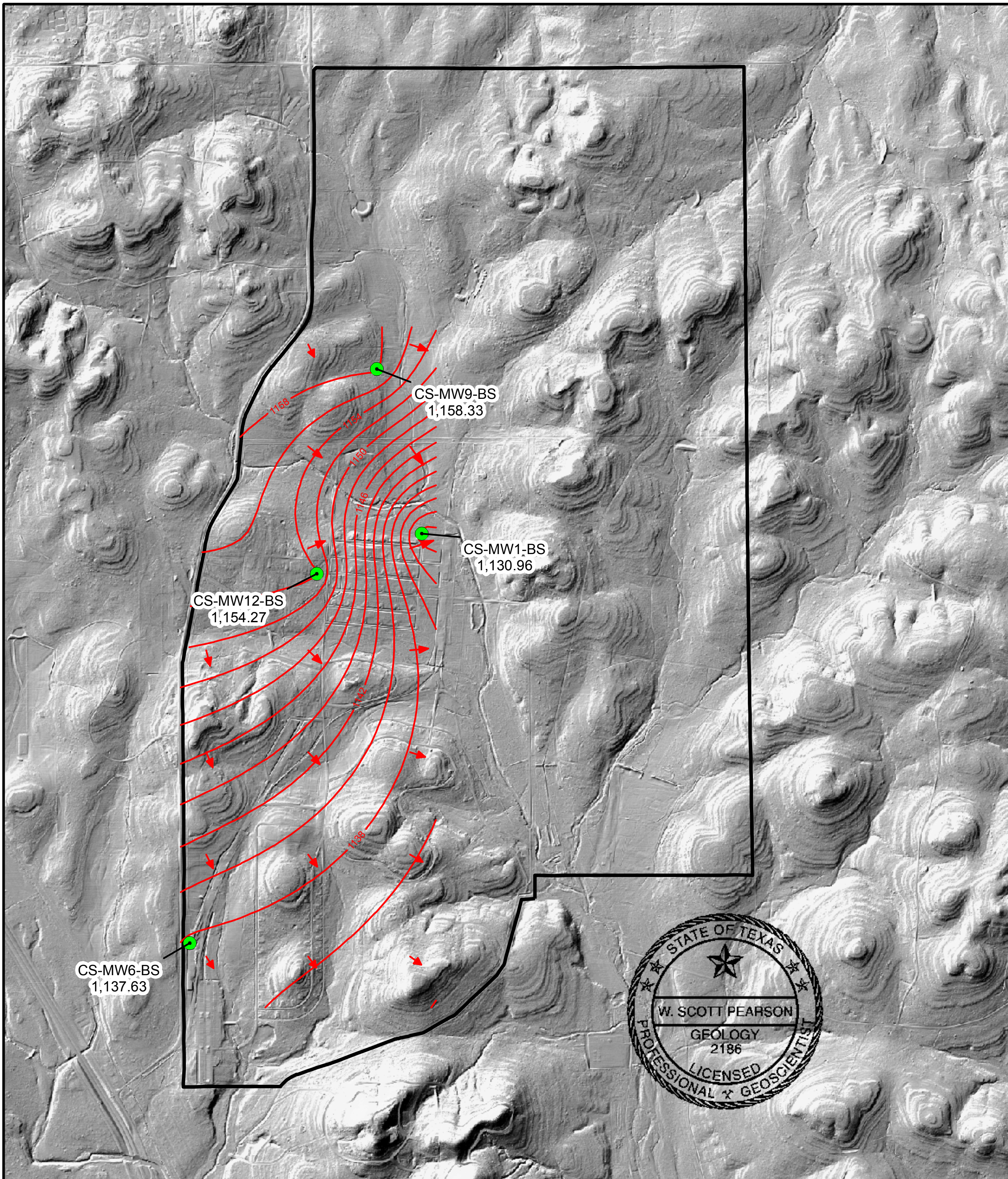

N
W E
S

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 2010 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

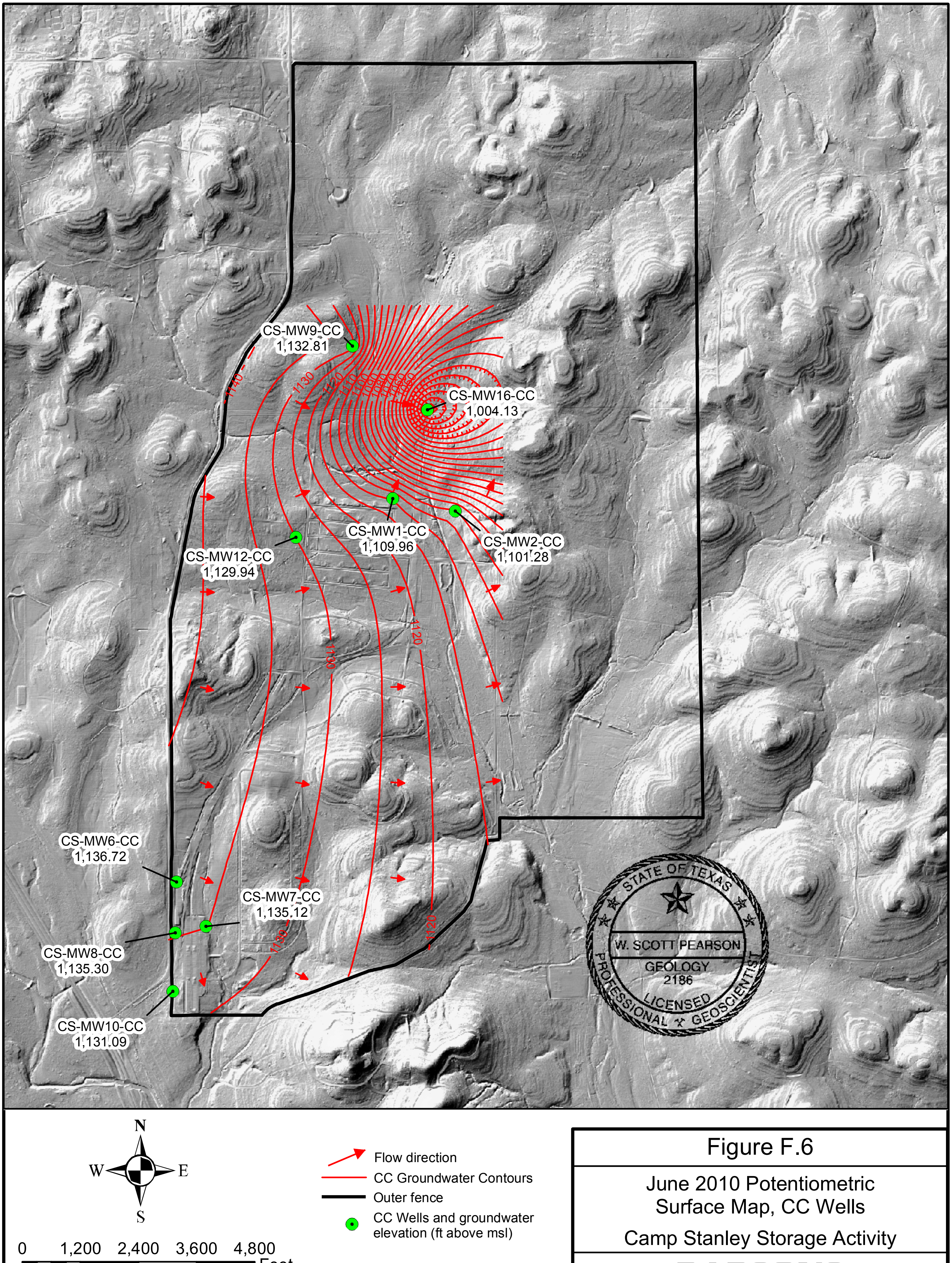

Figure F.6

June 2010 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

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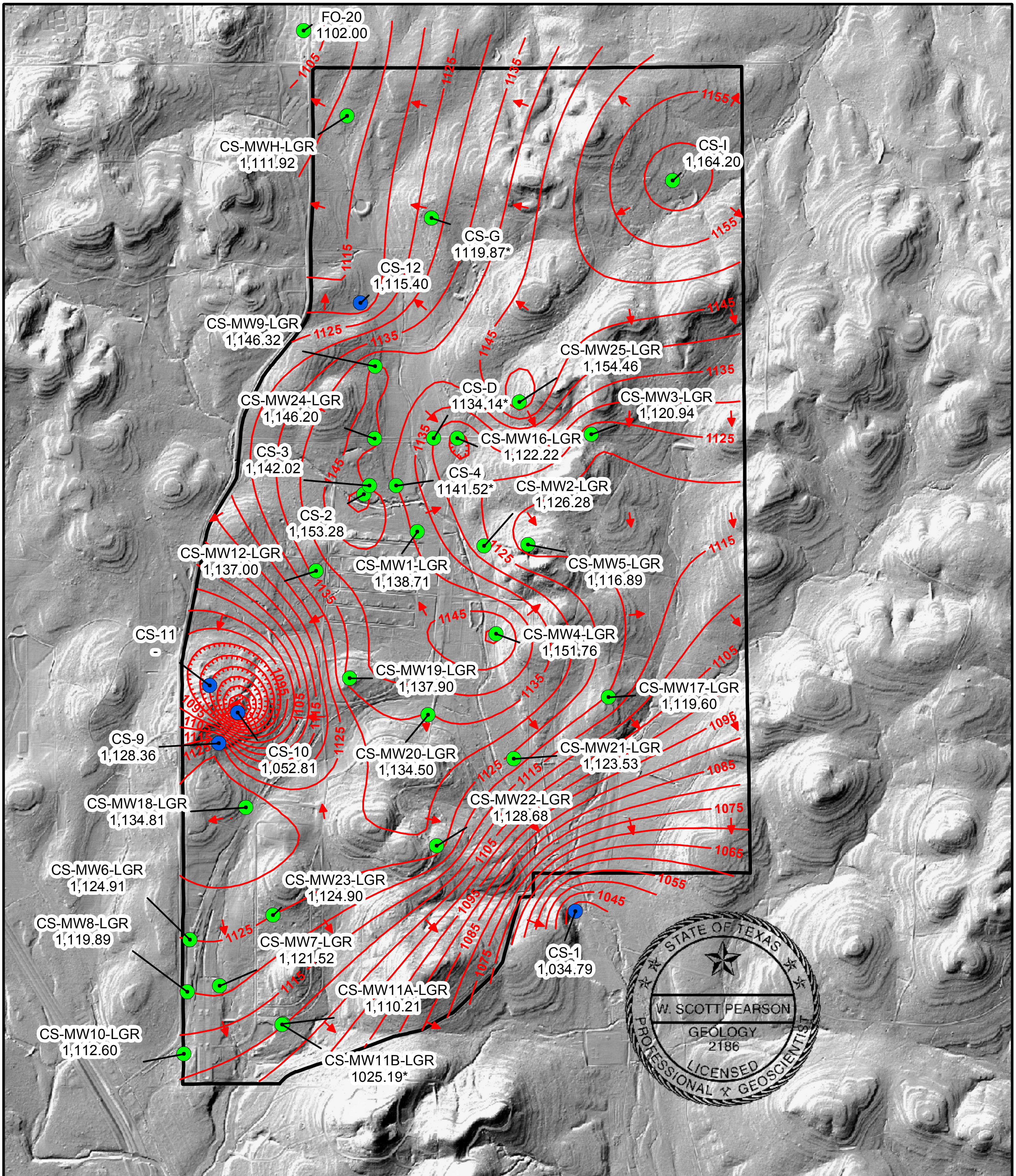


Flow direction

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)

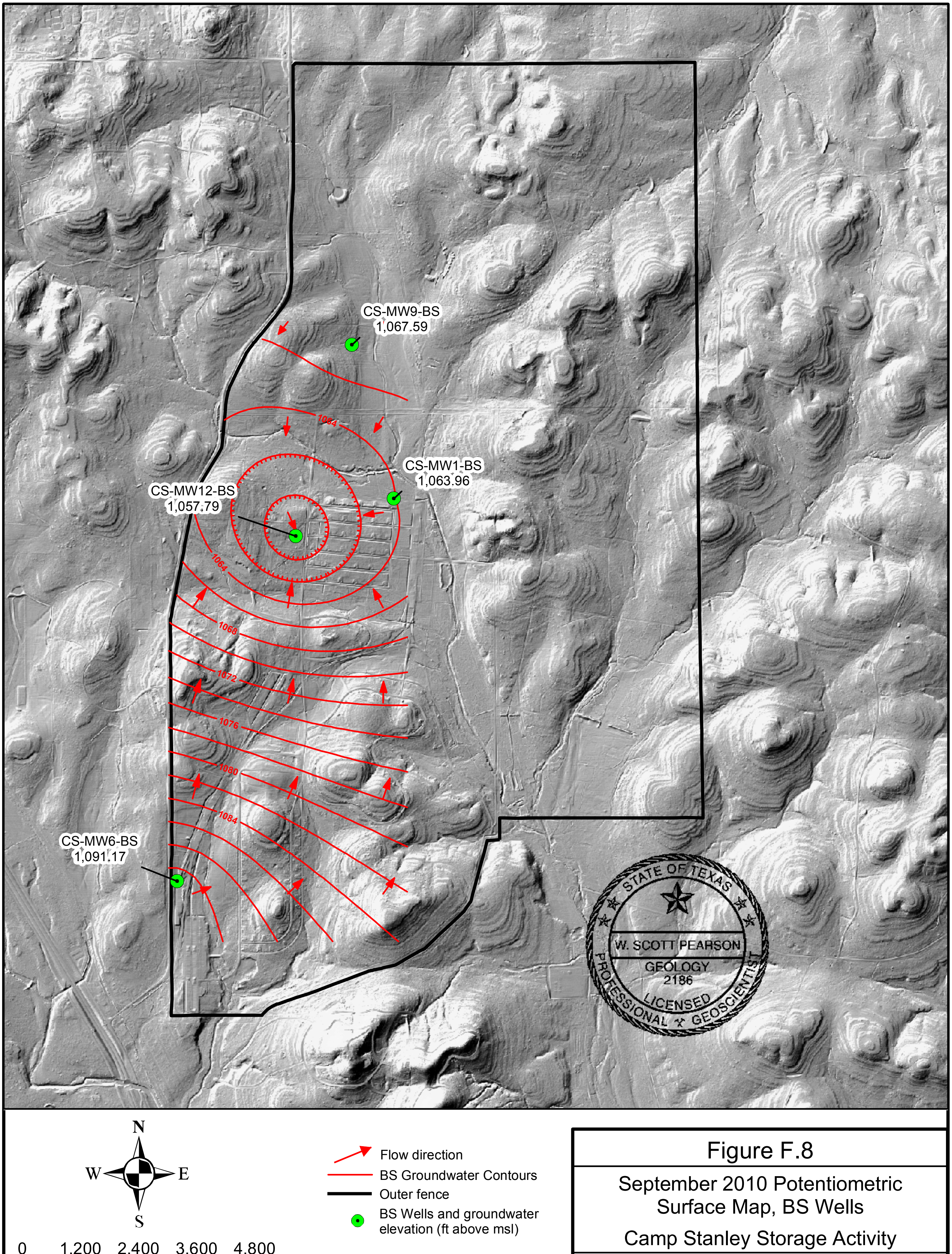
* Not a fully penetrating well into LGR. Groundwater elevation not used in contouring

Figure F.7

September 2010 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS



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

Figure F.8

September 2010 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

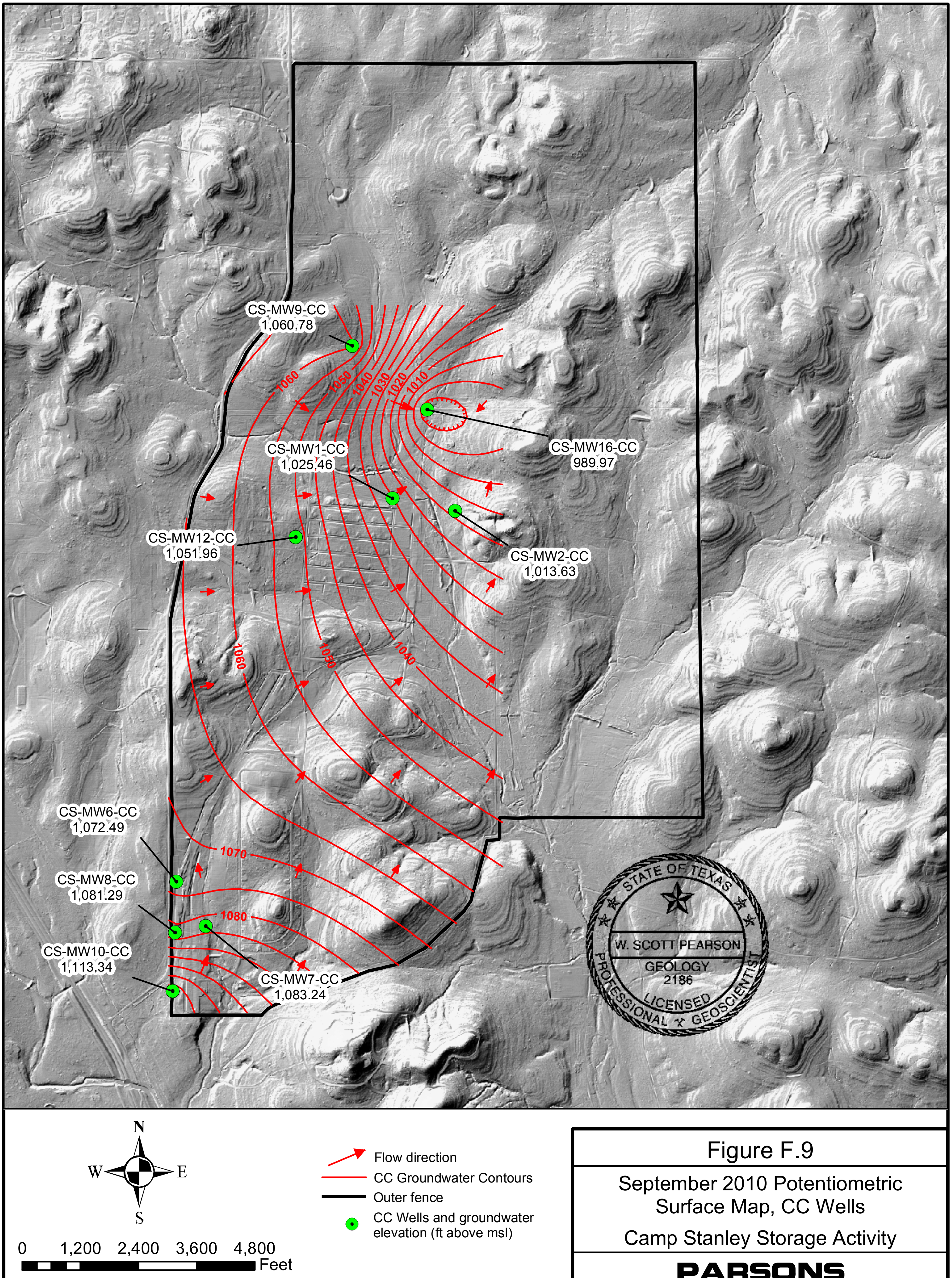


Figure F.9

September 2010 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

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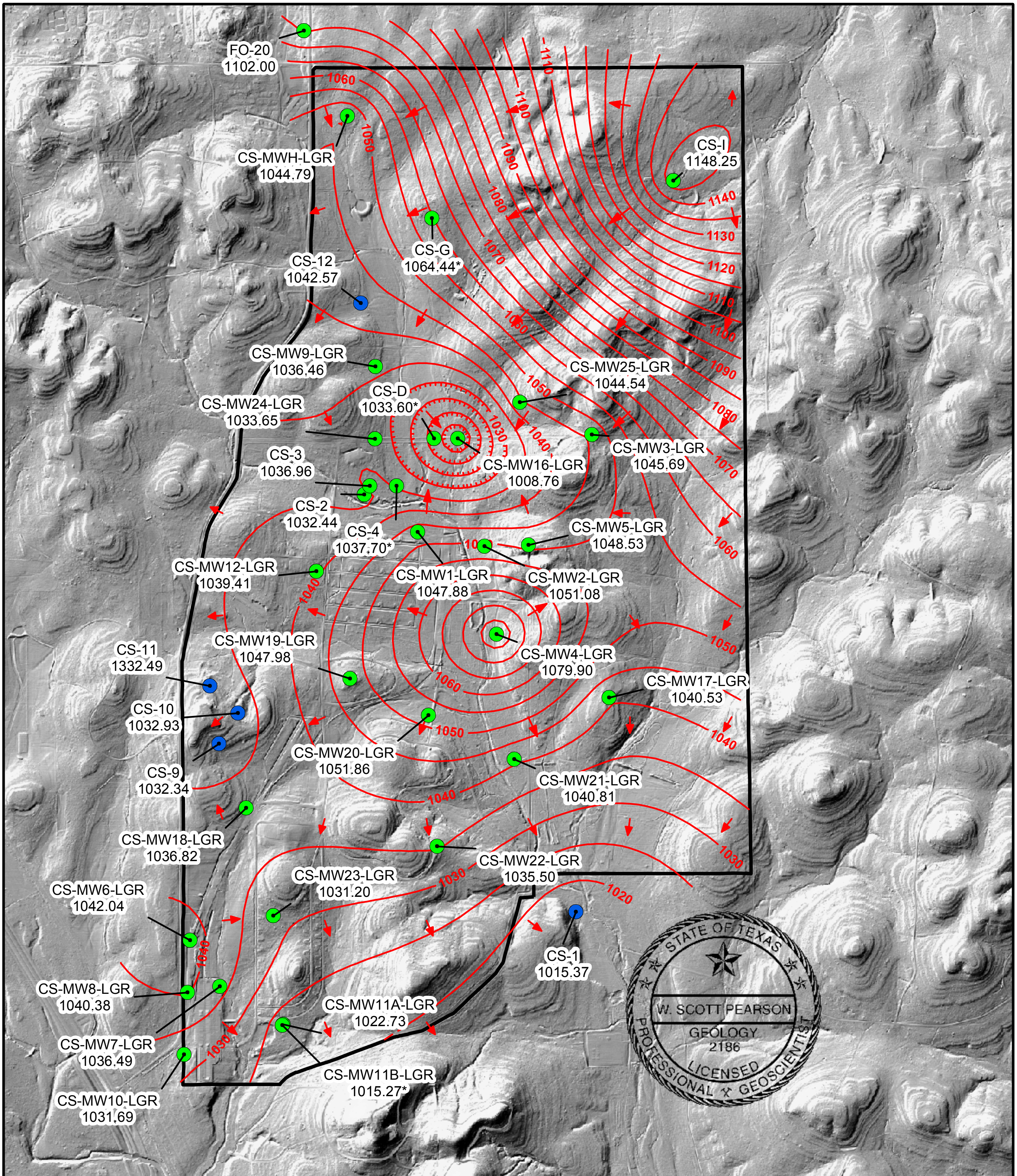

N
W E
S

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

Flow direction

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.10

December 2010 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

PARSONS

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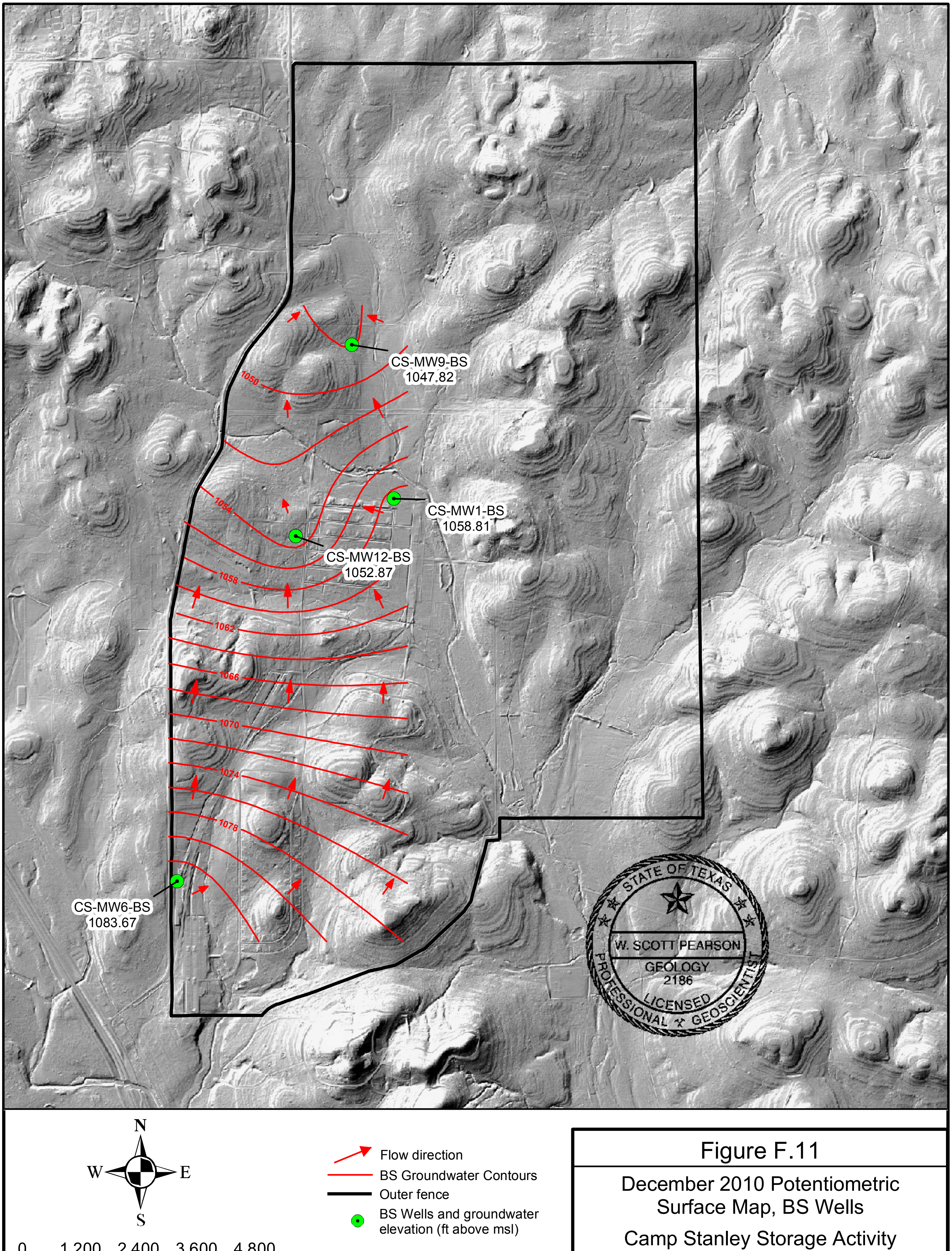

Figure F.11

December 2010 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS

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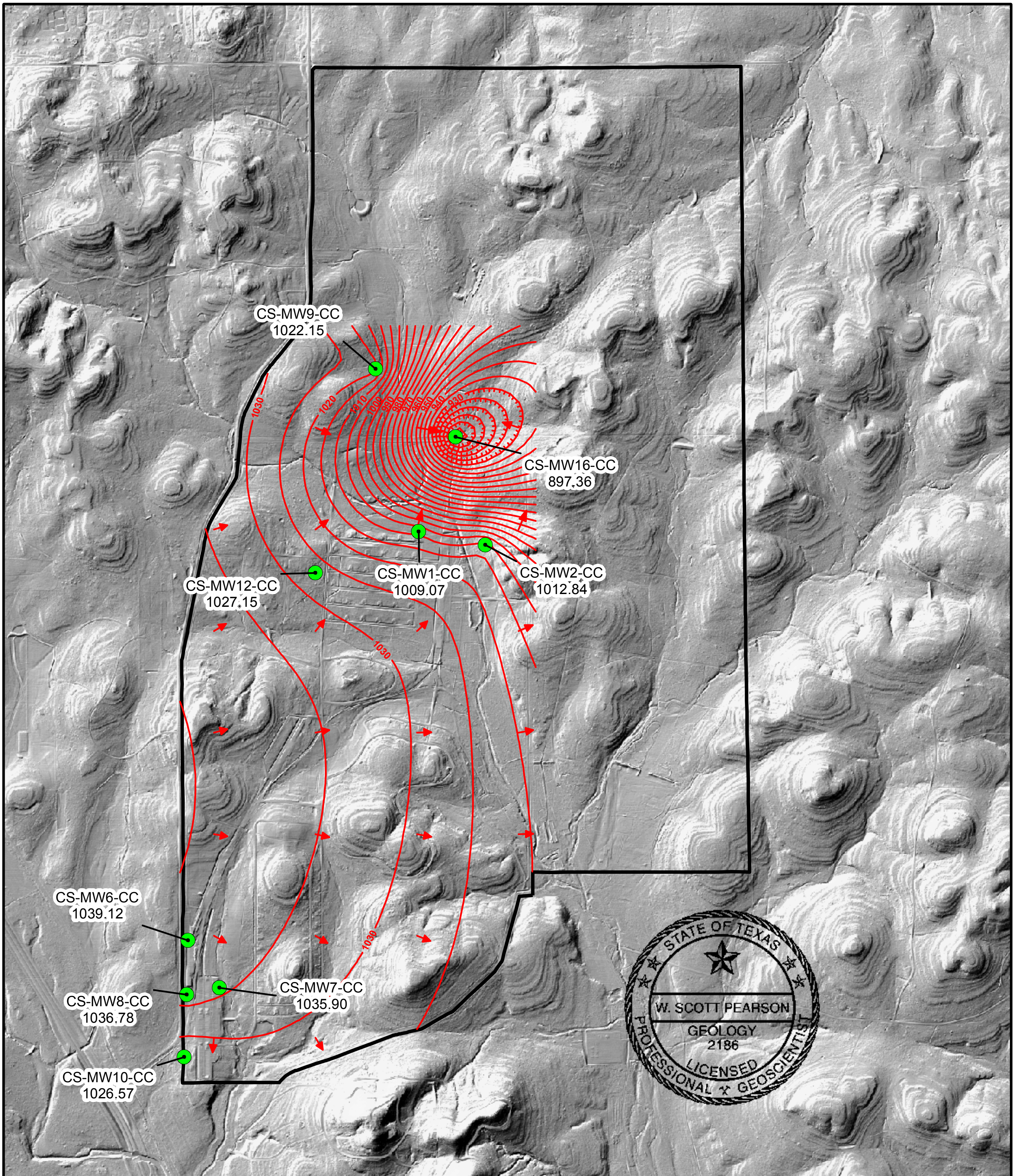

N
W E
S

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.12

December 2010 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

APPENDIX G

2010 QUARTERLY OFF-POST GROUNDWATER ANALYTICAL RESULTS

Appendix G
2010 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/cm)
								Field Measurements		
FO-8	3/3/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.41	22.00	0.569
FO-17	6/1/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.89	22.02	0.574
FO-22	3/3/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.48	20.4	0.528
FO-J1	3/2/2010	0.30U	0.16U	0.19U	**0.21F**	0.16U	0.23U	6.51	18.90	0.595
	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.96	22.15	0.522
	9/1/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.26	21.60	0.603
	12/14/2010	0.12U	0.07U	0.08U	**0.32F**	0.05U	0.08U	7.72	21.9	0.508
HS-1	12/16/2010	0.12U	0.07U	0.08U	**0.24F**	0.05U	0.08U	7.90	23.20	0.508
HS-2	3/3/2010	0.30U	0.16U	0.19U	**0.19F**	0.16U	0.23U	6.64	23.30	0.538
	9/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	22.60	0.827
	12/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.84	22.90	0.674
HS-3	6/4/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.18	24.24	0.560
I10-2	3/3/2010	0.30U	0.16U	0.19U	**0.19F**	0.16U	0.23U	7.03	22.60	0.577
	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.00	22.73	0.549
	8/31/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.00	22.70	0.588
I10-4	3/2/2010	0.30U	0.16U	0.19U	**0.69F**	**0.21F**	0.23U	6.34	20.20	1.229
Duplicate	3/2/2010	0.30U	0.16U	0.19U	**0.59F**	**0.20F**	0.23U	6.34	20.20	1.229
	6/1/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.62	22.60	1.158
	8/31/2010	0.12U	0.07U	0.08U	**7.02**	**3.55**	0.08U	6.76	22.70	0.719
	12/13/2010	0.12U	0.07U	0.08U	**7.86**	**3.15**	0.08U	7.60	22.50	0.570
I10-5	3/3/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.39	22.70	0.545
I10-7	3/2/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.39	21.70	0.570
I10-8	3/3/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.01	21.70	0.579
	6/4/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.92	21.99	0.576
	9/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.96	22.40	0.611
	12/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.95	22.10	0.525
JW-5	3/2/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.70	11.10	0.540
JW-6	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.88	22.38	0.539
JW-7	3/4/2010	0.30U	0.16U	0.19U	**0.46F**	0.16U	0.23U	7.99	21.50	0.583
	6/3/2010	0.12U	0.07U	0.08U	**0.36F**	0.05U	0.08U	6.99	21.27	0.567
	8/31/2010	0.12U	0.07U	0.08U	**0.26F**	0.05U	0.08U	7.03	21.30	0.572
	12/14/2010	0.12U	0.07U	0.08U	**0.47F**	0.05U	0.08U	7.54	20.30	0.494

Appendix G
2010 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/cm)
								Field Measurements		
JW-8	3/4/2010	0.30U	0.16U	0.19U	**0.19F**	0.16U	0.23U	7.50	21.20	0.605
	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	21.63	0.525
	9/1/2010	0.12U	0.07U	0.08U	**0.22F**	0.05U	0.08U	7.14	21.80	0.588
	12/14/2010	0.12U	0.07U	0.08U	**0.30F**	0.05U	0.08U	7.53	22.30	0.502
JW-9	3/4/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.47	21.10	0.630
JW-13	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.96	22.04	0.534
JW-14	3/2/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.37	21.60	0.571
	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.88	21.92	0.536
	9/1/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.05	22.10	0.626
	12/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.58	22.00	0.553
JW-15	3/2/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.21	21.00	0.563
JW-26	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.95	22.20	0.606
JW-27	3/4/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.17	21.30	0.620
Duplicate	3/4/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.17	21.30	0.620
JW-28	3/4/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.41	21.80	0.593
	6/3/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.78	22.02	0.566
	9/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.87	21.80	0.672
	12/28/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.79	21.60	0.576
JW-29	3/4/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.14	21.10	0.612
	6/3/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.81	21.61	0.595
	9/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.98	21.20	0.652
	12/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.76	20.70	0.571
JW-30	3/2/2010	0.30U	**0.21F**	0.19U	**0.15F**	0.16U	0.23U	5.90	19.20	0.600
	6/3/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.88	21.78	0.530
Duplicate	6/3/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.88	21.78	0.530
	8/31/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.94	20.60	0.543
	12/16/2010	0.12U	0.07U	0.08U	**0.17F**	0.05U	0.08U	8.01	21.60	0.513
JW-31	3/2/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	7.18	8.50	0.574
	6/3/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.15	23.18	0.540
	9/1/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.22	30.40	0.598
Duplicate	9/1/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.22	30.40	0.598

Appendix G
2010 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/cm)
								Field Measurements		
LS-1	3/1/2010	0.30U	**0.36F**	0.19U	**0.35F**	0.16U	0.23U	8.16	20.40	0.594
	6/3/2010	0.12U	**0.19F**	0.08U	0.06U	0.05U	0.08U	6.90	21.22	0.510
	8/30/2010	0.12U	0.07U	0.08U	**0.22F**	0.05U	0.08U	6.91	22.70	0.617
Duplicate	8/30/2010	0.12U	0.07U	0.08U	**0.24F**	0.05U	0.08U	6.91	22.70	0.617
	12/16/2010	0.12U	0.07U	0.08U	**0.33F**	0.05U	0.08U	7.21	20.70	0.528
Duplicate	12/16/2010	0.12U	0.07U	0.08U	**0.34F**	0.05U	0.08U	7.21	20.70	0.528
LS-4	3/1/2010	0.30U	0.16U	0.19U	**0.17F**	0.16U	0.23U	8.14	21.10	0.627
	6/3/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.87	21.45	0.590
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.92	24.40	0.693
	12/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.56	18.00	0.607
LS-5	3/1/2010	0.30U	0.16U	0.19U	**1.1F**	**2.70**	0.23U	7.03	22.20	0.673
	6/1/2010	0.12U	0.07U	0.08U	**0.98F**	**2.22**	0.08U	7.01	22.00	0.576
	8/30/2010	0.12U	0.07U	0.08U	**0.82F**	**2.73**	0.08U	6.94	22.00	0.682
	12/13/2010	0.12U	0.07U	0.08U	**1.02F**	**2.17**	0.08U	7.57	21.60	0.593
LS-6	3/1/2010	0.30U	0.16U	0.19U	**1.1F**	**0.23F**	0.23U	6.89	22.00	0.685
	6/1/2010	0.12U	0.07U	0.08U	**0.95F**	**0.23F**	0.08U	6.77	21.89	0.676
	8/30/2010	0.12U	0.07U	0.08U	**0.78F**	**0.27F**	0.08U	6.88	22.40	0.682
	12/13/2010	0.12U	0.07U	0.08U	**0.86F**	**0.48F**	0.08U	7.52	21.80	0.603
LS-6-A2	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U			
LS-7	3/1/2010	0.30U	0.16U	0.19U	**0.99F**	**0.50F**	0.23U	6.82	21.70	0.651
	6/1/2010	0.12U	0.07U	0.08U	**0.47F**	**0.19F**	0.08U	6.99	21.84	0.571
	8/30/2010	0.12U	0.07U	0.08U	**1.68**	**0.24F**	0.08U	6.94	23.10	0.687
	12/13/2010	0.12U	0.07U	0.08U	**1.75**	**0.35F**	0.08U	7.47	22.30	0.605
LS-7-A2	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
Duplicate	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U			
OFR-1	3/3/2010	0.30U	0.16U	0.19U	**0.31F**	0.16U	0.23U	7.39	21.60	0.580
	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.12	21.91	0.560
	8/31/2010	0.12U	0.07U	0.08U	**0.16F**	0.05U	0.08U	7.12	22.30	0.597
	12/14/2010	0.12U	0.07U	0.08U	**0.29F**	0.05U	0.08U	7.62	21.40	0.519
Duplicate	12/14/2010	0.12U	0.07U	0.08U	**0.32F**	0.05U	0.08U	7.62	21.40	0.519

Appendix G
2010 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/cm)
								Field Measurements		
OFR-3	3/1/2010	0.30U	0.16U	0.19U	**2.3**	**2.4**	0.23U	6.92	22.30	0.589
	6/1/2010	0.12U	0.07U	0.08U	**3.23**	**3.04**	0.08U	7.10	22.83	0.557
	8/30/2010	0.12U	0.07U	0.08U	**7.97**	**4.96**	0.08U	6.94	22.80	0.616
OFR-3-A2	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U			
OFR-4	3/5/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.00	22.00	0.607
Duplicate	3/5/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	6.00	22.00	0.607
RFR-3	12/21/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.09	21.80	0.487
RFR-4	12/21/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	6.89	21.20	0.588
RFR-5	12/21/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.15	22.20	0.505
Duplicate	12/21/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.15	22.20	0.505
RFR-8	6/4/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.17	21.94	0.529
RFR-9	3/5/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U	5.91	21.60	0.530
	6/23/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.18	22.57	0.520
	9/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.07	23.60	0.543
RFR-10	3/1/2010	0.30U	**0.21F**	0.19U	**13**	**7.5**	0.23U	7.05	22.50	0.643
	6/2/2010	0.12U	**0.21F**	0.08U	**10.56**	**5.05**	0.08U	6.98	22.83	0.628
	8/30/2010	0.12U	0.07U	0.08U	**12.12**	**7.96**	0.08U	6.95	22.40	0.631
	12/13/2010	0.12U	**0.45F**	0.08U	**35.48**	**12.94**	0.08U	7.58	22.60	0.569
RFR-10-A2	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U			
RFR-10-B2	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U			
RFR-11	3/1/2010	0.30U	0.16U	0.19U	**1.4**	0.16U	0.23U	6.66	22.10	0.789
	6/1/2010	0.12U	0.07U	0.08U	**1.13F**	0.05U	0.08U	6.68	22.30	0.702
	8/30/2010	0.12U	0.07U	0.08U	**0.59F**	**1.11**	0.08U	6.98	22.70	0.664
	12/13/2010	0.12U	0.07U	0.08U	**1.07F**	**1.56**	0.08U	7.60	22.50	0.570
RFR-11-A2	3/1/2010	0.30U	0.16U	0.19U	0.15U	0.16U	0.23U			
	8/30/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U			
RFR-12	3/3/2010	0.30U	0.16U	0.19U	**0.26F**	**0.38F**	0.23U	6.94	22.70	0.579
	6/2/2010	0.12U	0.07U	0.08U	0.06U	**0.38F**	0.08U	7.08	23.48	0.553
Duplicate	6/2/2010	0.12U	0.07U	0.08U	0.06U	**0.35F**	0.08U	7.08	23.48	0.553
	8/31/2010	0.12U	0.07U	0.08U	0.06U	**0.25F**	0.08U	6.98	23.40	0.589

Appendix G
2010 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/cm)
								Field Measurements		
RFR-13	6/2/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	7.00	24.20	0.514
RFR-14	3/3/2010	0.30U	0.16U	0.19U	**0.21F**	0.16U	0.23U	8.07	13.10	0.586
	6/4/2010	0.12U	0.07U	0.08U	**0.16F**	0.05U	0.08U	7.08	23.69	0.538
Duplicate	6/4/2010	0.12U	0.07U	0.08U	**0.17F**	0.05U	0.08U	7.08	23.69	0.538
	8/31/2010	0.12U	0.07U	0.08U	**0.18F**	0.05U	0.08U	6.95	24.40	0.568
Duplicate	8/31/2010	0.12U	0.07U	0.08U	**0.15F**	0.05U	0.08U	6.95	24.40	0.568
	12/16/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U	8.35	13.30	0.527

BOLD	Value > or = MCL
BOLD	MCL > Value > or = RL
BOLD	RL > Value > MDL

Notes:
- ug/L = micrograms per liter
- F = The analyte was positively identified but the associated numerical value is below the RL.
- J = The analyte was positively identified below quantitation limits; the quantitation is an estimate.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- All VOCs analyzed by method SW 8260B
- mS/cm = microsiemens /centimeter

APPENDIX H

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

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

LS-6					LS-7				
	PCE (µg/L)		**TCE (µg/L)**			**PCE (µg/L)**		**TCE (µg/L)**	
Date	**Pre**	**Post**	**Pre**	**Post**	**Date**	**Pre**	**Post**	**Pre**	**Post**
3/1/2010	1.1F	ND	0.23F	ND	3/1/2010	0.99F	ND	0.50F	ND
6/1/2010	0.95F	NA	0.23F	NA	6/1/2010	0.47F	NA	0.19F	NA
8/30/2010	0.78F	ND	0.27F	ND	8/31/2010	1.68	ND	0.24F	ND
12/13/2010	0.86F	NA	0.48F	NA	12/13/2010	1.75	NA	0.35F	NA

OFR-3					RFR-11				
	PCE (µg/L)		**TCE (µg/L)**			**PCE (µg/L)**		**TCE (µg/L)**	
Date	**Pre**	**Post**	**Pre**	**Post**	**Date**	**Pre**	**Post**	**Pre**	**Post**
3/1/2010	2.30	ND	2.40	ND	3/1/2010	1.4	ND	ND	ND
6/1/2010	3.23	NA	3.04	NA	6/1/2010	1.13F	NA	ND	NA
8/30/2010	7.97	ND	4.96	ND	8/30/2010	0.59F	ND	1.11	ND
12/13/2010	no samples due to expired access agreement				12/13/2010	1.07F	NA	1.56	NA

RFR-10				
	PCE (µg/L)		**TCE (µg/L)**	
Date	**Pre**	**Post**	**Pre**	**Post**
3/1/2010	13.0	ND/ND	7.5	ND/ND
6/2/2010	10.56	NA/NA	5.05	NA/NA
8/30/2010	12.12	ND/ND	7.96	ND/ND
12/13/2010	35.48	NA/NA	12.94	NA/NA

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

APPENDIX I

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