FINAL

2006 ANNUAL GROUNDWATER REPORT

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

May 2008

GEOSCIENTIST CERTIFICATION

2006 Annual Groundwater Monitoring Report

For

Department of the Army

Camp Stanley Storage Activity

Boerne, Texas

I, Julie Burdey, P.G., hereby certify that the 2006 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 STL, and field data obtained during groundwater monitoring conducted at the site in 2006, and is true and accurate to the best of my knowledge and belief.

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Julie Burdey, P.G.
State of Texas
Geology License No. 1913

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Date

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ACRONYMS AND ABBREVIATIONS

µg/L	microgram per liter
1,1-DCE	1,1-dichloroethene
AFCEE	Air Force Center for Environmental Excellence
AOC	Area of Concern
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
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
LGR	Lower Glen Rose
LTMO	Long Term Monitoring Optimization
MCL	Maximum contaminant limits
MDL	method detection limit
MSL	mean sea level
Order	RCRA 2008(h) Administrative Order on Consent
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
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
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 2006 at Camp Stanley Storage Activity (CSSA). Groundwater monitoring was performed on-post and off-post during the months of March, June, September, and December 2006. 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 summarizes the physical and chemical characteristics of the groundwater monitoring results and changes occurring to the program during 2006.

Water level measurements, transducer data, and weather station data were recorded during 2006. Groundwater levels in all three formations, the Lower Glen Rose (LGR), Bexar Shale (BS), and Cow Creek (CC) decreased an average of 9.61 feet in 2006. In 2006 weather station north reported 78 rainfall events with a total precipitation of 18.27 inches, while weather station south reported 74 rainfall events with a total of 21.31 inches of rainfall. Annual rainfall from 2000 to 2005 ranged from 16.54 inches to 46.27 inches, with an average rainfall for the San Antonio, Texas area at 34.86 inches per year. In 2006 the post-wide groundwater gradient at CSSA continued to be generally south-southwest. Water levels were at the lowest levels recorded since the groundwater monitoring program began in 1992, due to the ongoing below normal rainfall conditions present in 2006.

Samples were scheduled to be collected in 2006 at 43 on-post locations. Seventeen of the 43 samples could not be collected due to below average precipitation causing water levels to fall below the dedicated low-flow pump depths. Forty-seven off-post samples were collected in 2006. Maximum contaminant limits (MCL) were exceeded for chemicals of concern (COC) in wells CS-MW16-LGR, CS-MW16-CC, CS-MW1-LGR, and CS-D on-post and for well RFR-10, located off-post in 2006. Based on results for COCs from sampling prior to 2006, CSSA installed granular activated carbon (GAC) filtration systems off-post at wells LS-2/LS-3, LS-6, LS-7, OFR-3, RFR-10, and RFR-11. All post-GAC sample concentrations confirm that the filtration systems are working effectively and that VOCs are reduced to concentrations below the applicable drinking water MCLs.

Thirty-three Westbay® intervals were sampled and 32 intervals contained detectable COCs. Seventeen Westbay intervals had concentrations exceeding the MCLs for tetrachloroethene (PCE) and/or trichloroethene. Well CS-WB03, located off-post due west of the southwest corner of CSSA property contained the highest measured concentration of PCE.

In March 2006, well CS-9 was sampled after being recompleted and rehabilitated and reported detections of lead and mercury above the appropriate drinking water standards. Additional rehabilitation of Well CS-9 was performed and it was re-completed. Post-rehabilitation samples confirmed that no contaminants were present in the well above appropriate drinking water standards. Confirmation samples showed no exceedance of drinking water standards. he well was re-connected to the CSSA system in June 2007. Details are included in Appendix F.

The land owners at wells I10-2, I10-4, OFR-2, RFR-6 and RFR-7, sold the land containing the wells. The new owners opted to plug and abandon these wells, which will no longer be sampled as part of the CSSA groundwater monitoring program. If available, plugging and abandonment reports are included in Appendix G.

The continued sampling of eight off-post wells (HS-1, HS-2, HS-3, HS-4, LS-1, LS-2, LS-3, and LS-4) will potentially be impacted by the sale of Bexar Metropolitan Water District (Bexar Met) to San Antonio Water Systems (SAWS). Representatives of SAWS indicated that after the ownership of wells is transferred, CSSA can request sampling access agreements as needed and request future sampling.

Based on the evaluation of results from the 2006 groundwater monitoring, the sampling to be conducted in the future will continue as described in the Long Term Monitoring Optimization study, the CSSA Off-post Monitoring Program and Response Plan, and the groundwater monitoring data quality objectives. On-post monitoring wells, drinking water wells, Westbay-equipped wells, and off-post drinking water wells will continue to be sampled. The GAC filtration systems installed by CSSA will continue to be maintained and sampled by CSSA. If additional wells are installed to the west and southwest of CSSA, CSSA will attempt to add them to future sampling events. The status of the groundwater monitoring program will be evaluated again in the next annual report.

1.0 INTRODUCTION

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 (the 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 (formerly named "Well 16") 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), 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 only 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 2006 was conducted in compliance with the applicable CSSA QAPP, DQOs, and Work Plans.

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 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. As part of its ongoing groundwater monitoring program, CSSA extended the sampling of off-post wells beyond the ¼-mile boundary required under the Order. Additional background information regarding off-post private and public water supply wells is located in the CSSA Environmental Encyclopedia, Volume 5 Groundwater (CSSA 2007). 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* (the Plan) (CSSA 2002a).

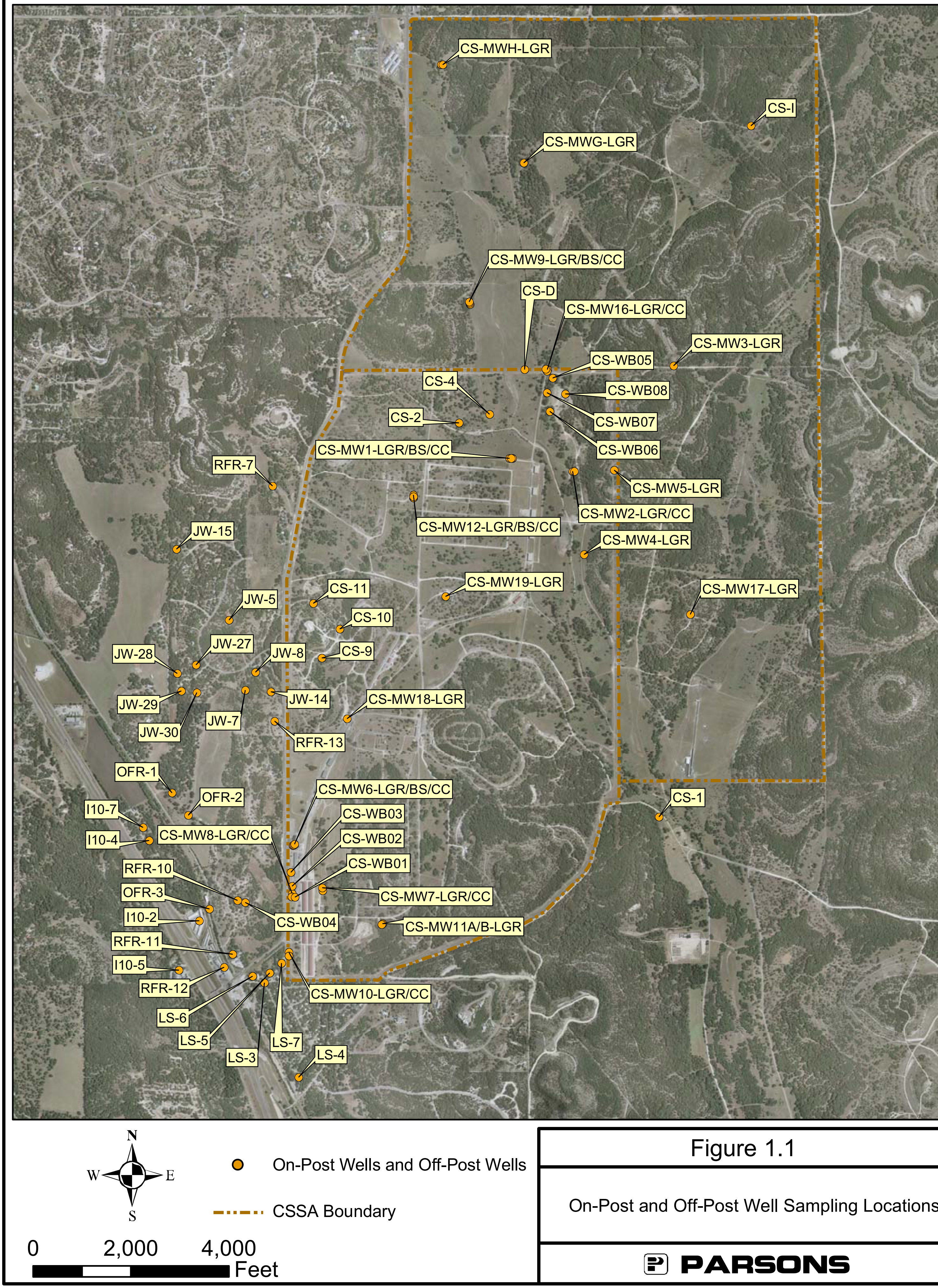
Under the Plan, the following criteria are used to determine the action levels for detected VOCs and to determine which off-post wells are sampled:

- 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 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 2006 on- and off-post groundwater sampling events is presented in **Appendices B and C**, respectively. Abbreviated tables showing only the detected compounds are included in the groundwater results discussions in

Sections 2.2.1 and 2.2.2 of this report. **Appendix D** summarizes pre- and post-granular activated carbon (GAC) filtration system sampling results. The cumulative historical results from 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 (CSSA 2007). The laboratory data packages and associated data validation reports for 2006 were submitted to AFCEE and CSSA separately from this report. All wells considered for sampling in 2006 are shown on **Figure 1.1.**

Groundwater monitoring conducted in 2006 was scoped under the Air Force Center for Engineering and the Environment (AFCEE) 4P/AE Contract 41624-03-D-8613, Task Orders (TO) 0207 and TO0008. Monitoring was performed during the months of March, June, September, and December 2006.



On-Post Wells and Off-Post Wells

CSSA Boundary

Figure 1.1

On-Post and Off-Post Well Sampling Locations

PARSONS

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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 2006 events. Water level measurements were collected from all monitoring wells and drinking water wells as listed in **Table 2.1**. 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) formations are provided in **Table 2.2**. The averages were calculated using groundwater elevations from wells screened in only one of the three formations. Water elevations from wells completed with open boreholes over multiple formations were not used. Typically, water levels measured at CSSA decrease in elevation from the LGR to the BS to the CC. In 2006, the average groundwater elevations did not follow this typical pattern in that elevations measured in the BS wells were higher than the LGR wells for all events. The lack of rainfall evident in the CSSA area in 2006 is indicated by the average groundwater elevation decrease of 24.81 feet shown in March. For each subsequent quarter in 2006, the elevations measured indicate water levels continued to decrease through the December 2006 event.

2.1.2 Weather Station and Transducer Data

The eighteen wells listed on **Table 2.1** are equipped with transducers to continuously log groundwater levels. Two weather stations are in place at CSSA, Weather Station North (WS-N), adjacent to well CS-MW16-LGR in the north-central region of CSSA, and Weather Station South (WS-S), in the southeast corner of CSSA adjacent to AOC-65. Both weather stations record meteorological data, including precipitation, wind speed, wind direction, and temperature. The data are evaluated to evaluate whether trends in rainfall and groundwater recharge are apparent. Transducer data collected from LGR wells from January 2006 through December 31, 2006, are presented on **Figure 2.1.** The groundwater elevations indicate recharge of the LGR formation immediately after precipitation. Rainfall of 1-2 inches within a 24-hour period in April and May 2006 show immediate increase in the groundwater elevations of LGR wells.

Overall, groundwater levels in all three formations decreased an average of 9.61 feet in 2006. During 2006 WS-N reported 78 rainfall events with a total precipitation of 18.27 inches, while WS-S reported 74 rainfall events with a total of 21.31 inches of rainfall. Rainfall events during 2006 were sporadic, with major rainfall events occurring in April and May for an annual total in 2006 of 21.34. From 2000 to 2005, annual precipitation for the San Antonio, Texas area averaged 34.86 inches, as recorded by the weather station operated by the National Weather Service. The minimum annual rainfall occurred in 2005, with an annual total of 16.54 inches. **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.

Figure 2.1 shows groundwater elevations from LGR wells, daily precipitation values from WS-N, groundwater elevations over time, and illustrates groundwater recharge after precipitation. 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. Data gaps are due to transducer battery failure or routine transducer maintenance. Of the 18.27 inches of rain that fell in 2006, 9.07 inches were recorded from mid-March through June. After June, there were larger rain events on a less regular basis. Due to low rainfall conditions some water levels fell below the depth of the transducer (causing a flat line on **Figure 2.1**).

Table 2.1
Summary of Groundwater Elevations and Changes, 2006

		2006 Groundwater Elevations				Groundwater Elevation Change				Formations Screened		
Well ID	**TOC elevation (ft MSL)**	**March**	**June**	**September**	**December**	**From Dec 05 to March 06**	**From Mar 06 to June 06**	**From June 06 to Sept 06**	**From Sept 06 to Dec 06**	**LGR**	**BS**	**CC**
CS-1*	**1169.27**	**949.18**	**910.81**	**893.15**	**813.36**	**NA**	**-38.37**	**-17.66**	**-79.79**	ALL		
CS-2	**1237.59**	**980.07**	**979.84**	**979.90**	**980.24**	**-0.64**	**-0.23**	**0.06**	**0.34**	**?**	**?**	
CS-3	1240.17	978.67	976.86	975.15	976.15	-5.52	**-1.81**	-1.71	1.00	**X**		
CS-4	**1229.28**	**978.05**	**976.07**	**974.75**	**975.49**	**-5.88**	**-1.98**	**-1.32**	**0.74**	**?**	**?**	
CS-9	**1325.31**	**945.39**	**945.58**	**939.26**	**940.94**	**2.90**	**0.19**	**-6.32**	**NA**	ALL		
CS-10*	**1331.51**	**951.26**	**NA**	**939.81**	**861.48**	**-11.19**	**NA**	**NA**	**-78.33**	ALL		
CS-11*	**1332.49**	**963.52**	**964.60**	**946.62**	**949.36**	**-6.33**	**1.08**	**-17.98**	**2.74**	ALL		
CS-D	1236.03	986.41	982.92	982.10	NA	-4.38	-3.49	-0.82	NA	**X**		
CS-MWG-LGR	1328.14	1049.49	1034.57	1027.96	1029.65	-18.03	-14.92	-6.61	1.69	**X**		
CS-MWH-LGR	1319.19	1012.50	1010.28	1009.31	1015.84	-2.97	-2.22	-0.97	6.53	**X**		
CS-I	1315.20	1016.74	1007.94	1011.76	1013.33	-4.76	-8.80	3.82	1.57	**X**		
CS-MW1-LGR	1220.73	978.71	975.71	973.66	973.47	-12.16	-3.00	-2.05	-0.19	**X**		
CS-MW1-BS	1221.09	991.12	984.33	978.27	977.31	-29.67	-6.79	-6.06	-0.96		**X**	
CS-MW1-CC*	1221.39	967.16	960.63	950.09	962.01	-20.26	-6.53	-10.54	11.92			**X**
CS-MW2-LGR	1237.08	980.84	976.29	973.92	972.49	-18.74	-4.55	-2.37	-1.43	**X**		
CS-MW2-CC*	1240.11	973.57	966.00	949.70	960.06	-21.76	-7.57	-16.30	10.36			
CS-MW3-LGR	1334.14	991.00	987.10	985.54	984.46	-10.86	-3.90	-1.56	-1.08	**X**		
CS-MW4-LGR*	1209.71	1004.30	1004.47	971.37	965.99	-12.84	0.17	-33.10	-5.38	**X**		
CS-MW5-LGR	1340.24	978.66	973.44	971.67	969.89	-21.27	-5.22	-1.77	-1.78	**X**		
CS-MW6-LGR	1232.25	944.45	931.06	923.41	924.86	-41.22	-13.39	-7.65	1.45	**X**		
CS-MW6-BS	1232.67	1002.93	978.42	980.30	979.92	-76.32	-24.51	1.88	-0.38		**X**	
CS-MW6-CC	1233.21	943.41	923.71	903.90	NA	-39.96	-19.70	-19.81	NA			**X**
CS-MW7-LGR	1202.27	936.12	919.50	911.15	911.96	-42.03	-16.62	-8.35	0.81	**X**		
CS-MW7-CC	1201.84	936.92	913.61	895.25	898.10	-40.93	-23.31	-18.36	2.85			**X**
CS-MW8-LGR*	1208.35	940.23	923.25	913.28	914.21	-41.18	-16.98	-9.97	0.93	**X**		
CS-MW8-CC*	1206.13	938.68	915.30	896.55	899.59	-40.48	-23.38	-18.75	3.04			**X**
CS-MW9-LGR*	1257.27	992.10	990.81	989.01	990.18	1.84	-1.29	-1.80	1.17	**X**		
CS-MW9-BS*	1256.73	995.45	994.99	991.20	991.17	-4.00	-0.46	-3.79	-0.03		**X**	
CS-MW9-CC*	1255.95	956.93	952.61	953.64	970.62	-23.37	-4.32	1.03	16.98			**X**
CS-MW10-LGR	1189.53	907.59	882.80	874.32	874.68	-43.93	-24.79	-8.48	0.36	**X**		

Table 2.1
Summary of Groundwater Elevations and Changes, 2006

		2006 Groundwater Elevations				Groundwater Elevation Change				Formations Screened		
Well ID	TOC elevation (ft MSL)	March	June	September	December	From Dec 05 to March 06	From Mar 06 to June 06	From June 06 to Sept 06	From Sept 06 to Dec 06	LGR	BS	CC
CS-MW10-CC	1190.04	917.19	887.39	877.28	877.06	-44.07	-29.80	-10.11	-0.22			X
CS-MW11A-LGR*	1204.03	924.29	893.23	881.88	880.76	-45.10	-31.06	-11.35	-1.12	X		
CS-MW11B-LGR*	1203.52	999.75	997.96	994.62	dry	-3.92	-1.79	-3.34	NA	X		
CS-MW12-LGR*	1259.07	977.35	970.31	967.07	968.32	-6.65	-7.04	-3.24	1.25	X		
CS-MW12-BS	1258.37	971.43	976.12	969.36	970.52	-22.87	4.69	-6.76	1.16		X	
CS-MW12-CC*	1257.31	960.78	955.42	949.90	961.96	-22.97	-5.36	-5.52	12.06			X
CS-MW16-LGR*	1244.60	987.80	984.23	982.81	983.56	-7.16	-3.57	-1.42	0.75	X		
CS-MW16-CC*	1244.51	969.34	960.04	952.12	964.26	-19.57	-9.30	-7.92	12.14			X
CS-MW17-LGR	1257.01	943.54	936.59	936.10	936.60	-38.95	-6.95	-0.49	0.50	X		
CS-MW18-LGR*	1283.61	942.85	941.45	936.64	939.66	-33.89	-1.40	-4.81	3.02	X		
CS-MW19-LGR	1255.53	956.88	954.84	950.88	951.25	-29.13	-2.04	-3.96	0.37	X		
Average groundwater elevation change:						**-24.26**	**-9.46**	**-6.66**	**2.48**			
Average groundwater change 2006:						**-9.47**						

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.
*Well equipped with a transducer
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, 2006

		2006 Groundwater Elevations				Formations Screened		
Well ID	TOC elevation (ft MSL)	March	June	September	December	LGR	BS	CC
CS-1	**1169.27**	**949.18**	**910.81**	**893.15**	**813.36**	**ALL**		
CS-2	**1237.59**	**980.07**	**979.84**	**979.90**	**980.24**	**?**	**?**	
CS-3	1240.17	978.67	976.86	975.15	976.15	**X**		
CS-4	**1229.28**	**978.05**	**976.07**	**974.75**	**975.49**	**?**	**?**	
CS-9	**1325.31**	**945.39**	**945.58**	**939.26**	**940.94**	**ALL**		
CS-10	**1331.51**	**951.26**	**NA**	**939.81**	**861.48**	**ALL**		
CS-11	**1332.49**	**963.52**	**964.60**	**946.62**	**949.36**	**ALL**		
CS-MW16-LGR	1244.60	987.80	984.23	982.81	983.56	**X**		
CS-MW16-CC	1244.51	969.34	960.04	952.12	964.26			**X**
CS-D	1236.03	986.41	982.92	982.10	NA	**X**		
CS-MWG-LGR	1328.14	1049.49	1034.57	1027.96	1029.65	**X**		
CS-MWH-LGR	1319.19	1012.50	1010.28	1009.31	1015.84	**X**		
CS-I	1315.20	1016.74	1007.94	1011.76	1013.33	**X**		
CS-MW1-LGR	1220.73	978.71	975.71	973.66	973.47	**X**		
CS-MW1-BS	1221.09	991.12	984.33	978.27	977.31		**X**	
CS-MW1-CC	1221.39	967.16	960.63	950.09	962.01			**X**
CS-MW2-LGR	1237.08	980.84	976.29	973.92	972.49	**X**		
CS-MW2-CC	1240.11	973.57	966.00	949.70	960.06			
CS-MW3-LGR	1334.14	991.00	987.10	985.54	984.46	**X**		
CS-MW4-LGR	1209.71	1004.30	1004.47	971.37	965.99	**X**		
CS-MW5-LGR	1340.24	978.66	973.44	971.67	969.89	**X**		
CS-MW6-LGR	1232.25	944.45	931.06	923.41	924.86	**X**		
CS-MW6-BS	1232.67	1002.93	978.42	980.30	979.92		**X**	
CS-MW6-CC	1233.21	943.41	923.71	903.90	NA			**X**
CS-MW7-LGR	1202.27	936.12	919.50	911.15	911.96	**X**		
CS-MW7-CC	1201.84	936.92	913.61	895.25	898.10			**X**
CS-MW8-LGR	1208.35	940.23	923.25	913.28	914.21	**X**		
CS-MW8-CC	1206.13	938.68	915.30	896.55	899.59			**X**
CS-MW9-LGR	1257.27	992.10	990.81	989.01	990.18	**X**		
CS-MW9-BS	1256.73	995.45	994.99	991.20	991.17		**X**	
CS-MW9-CC	1255.95	956.93	952.61	953.64	970.62			**X**
CS-MW10-LGR	1189.53	907.59	882.80	874.32	874.68	**X**		
CS-MW10-CC	1190.04	917.19	887.39	877.28	877.06			**X**
CS-MW11A-LGR	1204.03	924.29	893.23	881.88	880.76	**X**		
CS-MW11B-LGR	1203.52	999.75	997.96	994.62	dry	**X**		
CS-MW12-LGR	1259.07	977.35	970.31	967.07	968.32	**X**		
CS-MW12-BS	1258.37	971.43	976.12	969.36	970.52		**X**	
CS-MW12-CC	1257.31	960.78	955.42	949.90	961.96			**X**
CS-MW17-LGR	1257.01	943.54	936.59	936.10	936.60	**X**		
CS-MW18-LGR	1283.61	942.85	941.45	936.64	939.66	**X**		
CS-MW19-LGR	1255.53	956.88	954.84	950.88	951.25	**X**		
Average groundwater elevation by formation, each event:	**LGR:**	**974.10**	**966.16**	**961.07**	**958.87**	**Average groundwater elevation by formation all of 2006:**		**965.05**
	BS:	**990.23**	**983.47**	**979.78**	**979.73**			**983.30**
	CC:	**948.80**	**933.59**	**922.34**	**933.37**			**934.53**

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.
NA = Data not available
?=Exact screening information unknown for this well.
All measurements given in feet.

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

* Change since previous quarter.

GW = groundwater, ft MSL = feet above mean sea level, ft/ft = feet per foot

2.1.3 Potentiometric Data

The groundwater gradient/potentiometric surface figures presented on **Figures 2.2 and 2.3** incorporate measured groundwater elevations from the LGR screened wells only. Due to the sampling frequencies under the LTMO implementation, the LGR wells are sampled every 6 months. Therefore, potentiometric surface maps were created for June and December only. The low rainfall conditions at CSSA are evident in the potentiometric surface measured as low as 813 feet above mean sea level (MSL), at well CS-1 in December 2006. This is the lowest elevation recorded at well CS-1 during the groundwater monitoring program. Average groundwater elevations at well CS-1 since 1992 approximately 1,018 feet MSL. As shown on **Figures 2.2** and **2.3**, water levels at CSSA can vary greatly. This variability is associated with several factors:

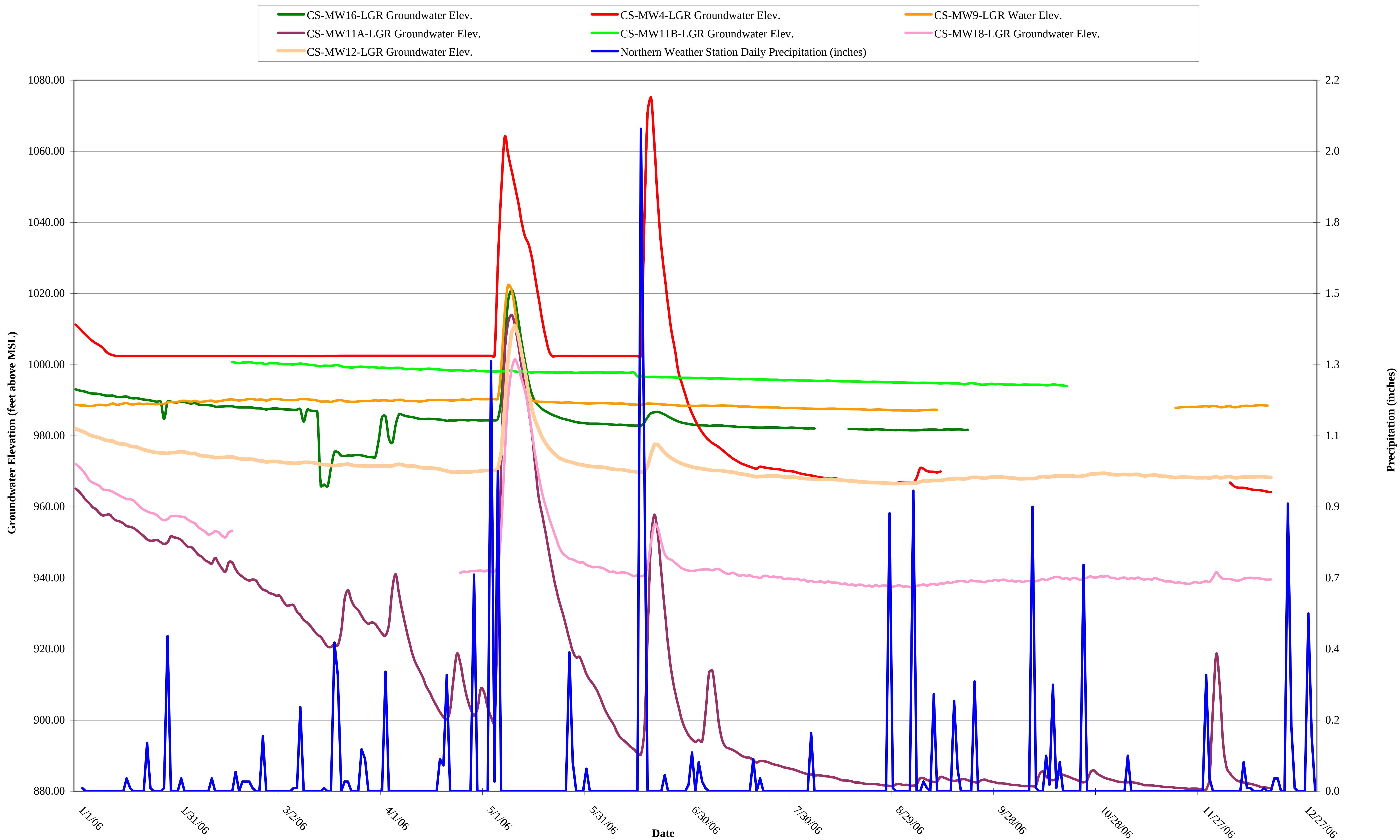
- Differences in well completion depths and formations screened;
- Differences in recharge rates due to increased secondary porosity associated with the Salado Creek area;
- Differences in recharge rates due to increased secondary porosity associated with local fault zones;
- Pumping from on- and off-post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

2.1.4 Post-wide Flow Direction and Gradient

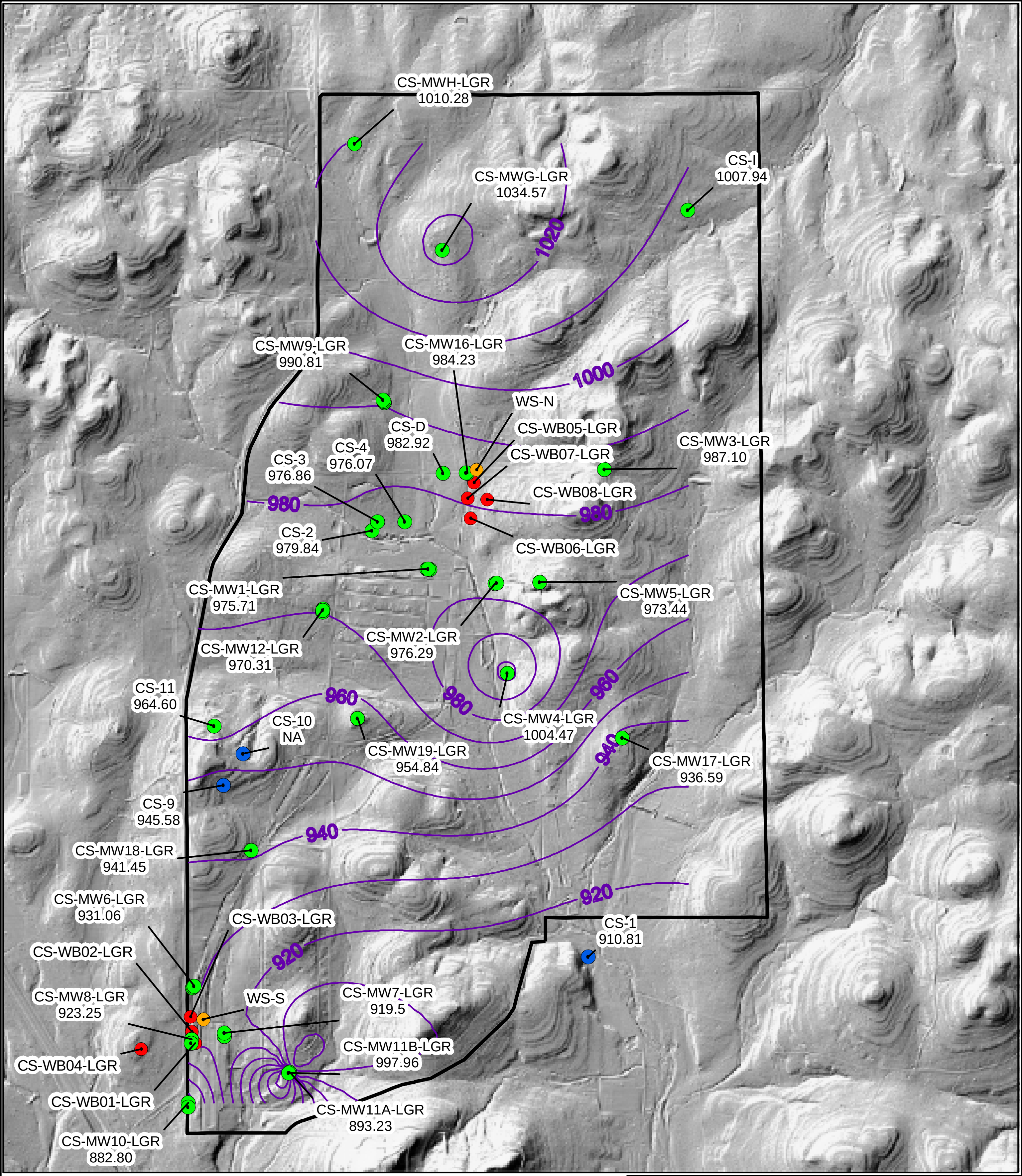
An overall calculated LGR groundwater gradient from the north-central area to the southwest corner of CSSA is to the south-southwest at 0.0099 ft/ft. The groundwater gradient varies in different areas of CSSA ranging from 0.0054 ft/ft to 0.0160 ft/ft. General groundwater flow directions and average gradients calculated during past monitoring events are provided in **Table 2.3** for comparison.

The 2006 potentiometric surface map for LGR-screened wells (Figures 2.2 and 2.3) exhibited a wide range of groundwater elevations. Groundwater elevations are generally higher in the northern and central portions of CSSA, and decrease to the southwest and southeast. 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 20 feet higher than the nearest comparable wells (CS-MW2-LGR and CS-MW5-LGR). Unlike the general trend at CSSA, groundwater flow appears to radiate outward from CS-MW4-LGR. This is evident in the June 2006 potentiometric surface map in Figure 2.2. Groundwater in the west-central portion of the inner cantonment shows a drawdown effect from the pumping of drinking water wells CS-9 and CS-10 which is evident on the December 2006 potentiometric surface map in Figure 2.3.

Figure 2.1, Groundwater Elevations and Precipitation Data for LGR Wells



CS-MW16-LGR elevation is 1243.4 feet MSL at top of casing.



N
W E
S

2,500 1,250 0 2,500 Feet

- Flow direction
- Potentiometric Contours (ft msl)
- Outer fence
- LGR Wells
- Westbay Wells
- Drinking water wells may be completed in LGR, BS, and/or CC
- Weather Station

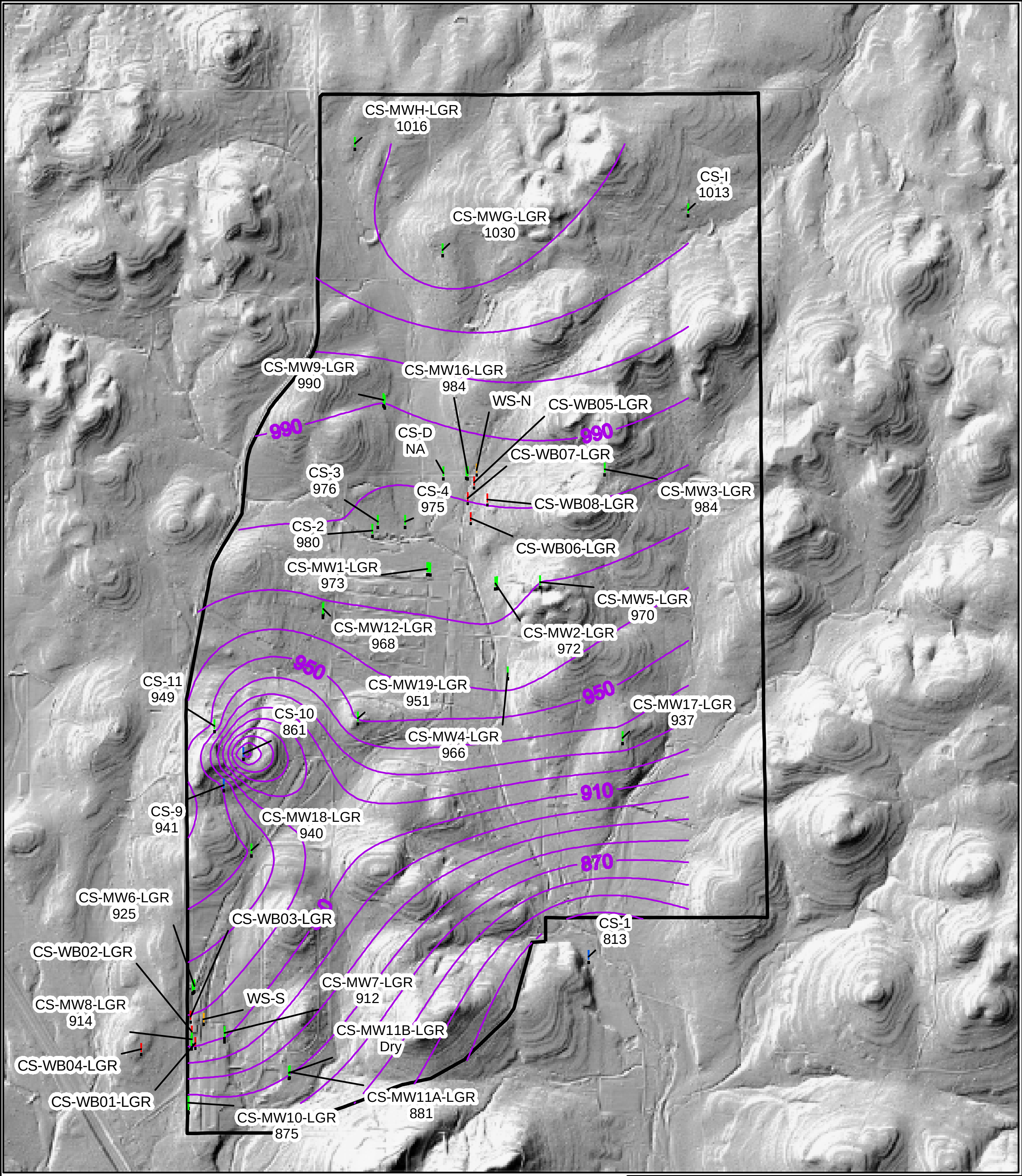
Figure 2.2

June 2006 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

P a r s o n s

J:\745\745251 CSSA TO0207\GIS\mxd\june_06_potentiometric_lgr.mxd - 3/15/2007 @ 5:17:06 PM



Flow direction
Potentiometric Contours (ft msl)
Outer fence
LGR Wells
Westbay Wells
Drinking water wells may be completed in LGR, BS, and/or CC
Weather Station

2,500 1,250 0 2,500 Feet

Figure 2.3

December 2006 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

Parsons

2.2 Chemical Characteristics

2.2.1 On-Post Analytical Results

The LTMO study implemented in December 2005 on-post determines the frequency that wells are sampled. An overview of sampling frequencies for on-post wells only is given in **Table 2.4**. As a result of the LTMO study implementation, certain wells are on a biennial schedule (every 2 years) and were not sampled in 2006. These wells were scheduled for sampling in September 2007. Forty-three on-post samples were scheduled to be collected in 2006, 16 in March, 11 in June, and 16 in September. Due to the LTMO sampling frequencies, no wells were scheduled in December 2006. Seventeen of the 43 samples could not be collected due to low water levels below the dedicated low-flow pump depths. Eleven wells had no water in March and five were dry in September. The wells were sampled using either dedicated low-flow pumps, high capacity submersible pumps or dedicated solar-powered submersible pumps. 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.

All groundwater samples were submitted to Severn Trent Laboratory (STL) in Arvada, Colorado for analysis. The analytical program for on-post monitoring wells includes short-list VOC analysis. The short list of VOC analytes included: bromodichloromethane, bromoform, chloroform, dibromochloromethane, dichlorodifluoromethane, 1,1-dichloroethene (1,1-DCE), *cis*-1,2-dichloroethene (*cis*-1,2-DCE), *trans*-1,2-dichloroethene (*trans*-1,2-DCE), methylene chloride, naphthalene, PCE, TCE, toluene, and vinyl chloride for the March and June events. Under the provisions of the groundwater monitoring LTMO study and DQOs, the analytical list was reduced in September to include only 1,1-DCE, *cis*-1,2,DCE, *trans*-1,2-DCE, PCE, TCE, and vinyl chloride.

Prior to the change in the analytical list under the LTMO study, methylene chloride was sometimes detected. Methylene chloride has been reported periodically in samples from both on- and off-post wells since 1992. When methylene chloride was detected in a sample, it was usually present in the analysis method blank, indicating the likelihood that this analyte was introduced as a laboratory contaminant and was not present in the groundwater. Methylene chloride is considered a common laboratory contaminant and there are no known historical uses of methylene chloride on-post. Toluene was detected above the reporting limit (RL) in well CS-MW16-CC in March 2006. Toluene was previously detected in this well; however, all detections were below the RL. The installation of a new pump may have contributed to the toluene level detected. Toluene is not considered to be a contaminant at CSSA based on the groundwater monitoring DQOs.

On-post monitoring wells are analyzed for metals once annually. In June 2006 sampling for metals included arsenic, cadmium, lead, barium, chromium, copper, nickel, zinc, and mercury. These nine metals were chosen based on CSSA's waste disposal records and process knowledge. Future monitoring on-post will include only those metals recommended for sampling under CSSA's LTMO study (cadmium, lead, and nickel).

Table 2.4
Overview of On-Post Sampling, 2006

Well Count	Well ID	*Mar-06*	*Jun-06*	*Sep-06*	*Dec-06*	*Frequency*
Wells To Be Sampled		**under TO 0008**	**under TO 0008**	**under TO 0207**	**under TO 0207**	**under TO 0207**
1	CS-MW1-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
2	CS-MW1-BS	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
3	CS-MW1-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
4	CS-MW2-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
5	CS-MW2-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
6	CS-MW3-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
7	CS-MW4-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
8	CS-MW5-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
9	CS-MW6-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
10	CS-MW6-BS	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
11	CS-MW6-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
12	CS-MW7-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
13	CS-MW7-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
14	CS-MW8-LGR	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
15	CS-MW8-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
16	CS-MW9-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
17	CS-MW9-BS	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
18	CS-MW9-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
19	CS-MW10-LGR	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
20	CS-MW10-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
21	CS-MW11A-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
22	CS-MW11B-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
23	CS-MW12-LGR	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
24	CS-MW12-BS	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
25	CS-MW12-CC	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
26	CS-MW16-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
27	CS-MW16-CC	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
28	CW-MW17-LGR	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
29	CS-MW18-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
30	CS-MW19-LGR	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
31	**CS-1**	**Not sampled**	**(VOC on-post short list & metals)**	**Not sampled**	**Not sampled**	**Every 9 months***
32	CS-2	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
33	CS-4	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
34	**CS-9**	**Not sampled**	**(VOC on-post short list & metals)**	**Not sampled**	**Not sampled**	**Every 9 months***
35	**CS-10**	**Not sampled**	**(VOC on-post short list & metals)**	**Not sampled**	**Not sampled**	**Every 9 months***
36	CS-11	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
37	CS-D	(VOC on-post short list)	Not sampled	(VOC on-post short list)	Not sampled	Semi-annual
38	CS-MWG-LGR	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*
39	CS-MWH-LGR	Not sampled	Not sampled	Not sampled	Not sampled	Biennial
40	CS-I	Not sampled	(VOC on-post short list & metals)	Not sampled	Not sampled	Every 9 months*

*Wells recommended for annual sampling frequency in the LTMO are scheduled every nine months (every third quarter) to gather seasonal data.
Metals were last sampled in June 2005, and will be sampled annually for on-post monitoring wells and
quarterly for on-post drinking water wells under the provisions of the DQOs.
biennial = every 2 years
semi annual = twice a year

For the purposes of the CSSA Groundwater Monitoring Program, the COCs include 1,1-DCE, *cis*-1,2,DCE, *trans*-1,2-DCE, PCE, TCE, and vinyl chloride for off-post wells, and 1,1-DCE, *cis*-1,2-DCE, *trans*-1,2-DCE, PCE, TCE, vinyl chloride, cadmium, lead, and nickel for on-post wells.

Parsons data packages containing the analytical results from the 2006 events are described in the quarterly reports for March, June, and September. Data validation was conducted and submitted to AFCEE, and all data packages from the 2006 groundwater sampling events were reviewed and approved. All detected concentrations of VOCs and metals are presented in **Table 2.5**. Full analytical results are presented in **Appendix B**. Cumulative analytical results can be found in the CSSA Environmental Encyclopedia in Tables 6 and 7 of the *Introduction to the On-Post and Off-Post Quarterly Groundwater Monitoring Program*, Volume 5 Groundwater (CSSA 2007).

Wells not sampled due to low water levels during 2006 were: CS-MW4-LGR, CS-MW5-LGR, CS-MW11B-LGR, CS-MW18-LGR, and CS-4 scheduled for March 2006; CS-MW8-LGR, CS-MW10-LGR, CS-MW12-LGR, CS-MW17-LGR, and CS-MWG-LGR scheduled for June 2006; CS-MW4-LGR, CS-MW6-LGR, CS-MW7-LGR, CS-MW11B-LGR, CS-MW18-LGR, CS-4, and CS-D scheduled for September 2006. No wells were scheduled to be sampled in December 2006 (**Table 2.4**).

2.2.1.1 On-post Monitoring Wells with COC Detections Above the MCL

Some wells sampled had concentrations detected that exceeded MCLs. The MCLs for some COCs were exceeded in wells CS-MW16-LGR, CS-MW16-CC, CS-MW1-LGR, and CS-D in 2006. The detected concentrations are summarized as follows:

- CS-D – Concentrations of PCE and TCE exceeded their MCLs in March 2006. *Trans*-1,2-DCE and *cis*-1,2-DCE were detected below MCLs. CS-D was not sampled in September 2006 due to low water levels.
- CS-MW16-LGR – Concentrations of PCE and TCE exceeded their MCLs during the March and September sampling events. *Cis*-1,2-DCE and *trans*-1,2-DCE were detected below MCLs in March and September 2006.
- CS-MW16-CC – Concentrations of TCE and *cis*-1,2-DCE exceeded their respective MCLs in March and September 2006. *Trans*-1,2-DCE, toluene, 1,1-DCE, PCE, and vinyl chloride were also detected, but below their MCLs.
- CS-MW1-LGR – PCE and TCE concentrations were above their MCLs in March and September 2006. *Cis*-1,2-DCE and *trans*-1,2-DCE were detected below their MCLs in March and September 2006.

Table 2.5
2006 On-Post Groundwater COCs and Metals Analytical Results, Detections Only

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)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)
CS-1	06/15/06	--	--	--	--	**0.46F**	--
CS-2	06/13/06	--	--	--	--	--	--
CS-9	06/13/06	--	--	--	--	--	--
	9/13/06	--	--	--	--	--	--
CS-10	06/22/06	--	--	--	--	--	--
CS-11	06/14/06	--	--	--	--	--	--
Duplicate	06/14/06	--	--	--	--	--	--
CS-MW16-LGR	03/14/06	--	**58**	**1.5**	**53**	**59**	--
	9/12/06	--	**68***	**0.39F**	**54**	**64***	--
CS-MW16-CC	03/14/06	**0.37F**	**68**	**23**	**0.86F**	**12**	**0.33F**
	9/12/06	**0.47F**	**100***	**34**	--	**7.8**	**0.57F**
CS-D	03/16/06	0.17M	**52**	**0.88**	**53**	**49**	--
CS-I	06/12/06	--	--	--	--	--	--
CS-MW1-LGR	03/14/06	--	**20**	**0.62**	**12**	**26**	--
	9/12/06	--	**18**	**0.23F**	**10**	**26**	--
CS-MW2-LGR	3/14/06	--	**1.8**	--	**0.32**	**0.22F**	--
	9/13/06	--	**1.6**	--	**0.23F**	**0.24F**	--
Duplicate	9/13/06	--	**1.6**	--	**0.23F**	**0.22F**	--
CS-MW3-LGR	03/17/06	0.17M	--	--	--	--	--
	9/12/06	--	--	--	--	--	--
CS-MW5-LGR	9/13/06	--	**0.81F**	--	**0.54F**	**0.76F**	--
CS-MW6-LGR	03/15/06	--	--	--	--	--	--
CS-MW7-LGR	03/15/06	--	--	--	--	--	--
CS-MW9-LGR	03/17/06	--	--	--	**0.20F**	--	--
	9/12/06	--	--	--	--	--	--
CS-MW11A-LGR	03/17/06	--	--	--	--	--	--
	9/13/06	--	--	--	**1.2F**	--	--
CS-MW19-LGR	03/16/06	0.17M	--	--	**0.37F**	--	--
Duplicate	03/16/06	0.17M	--	--	**0.33F**	--	--
	9/13/06	--	--	--	**0.37F**	--	--
Comparison Criteria	MCL	7	70	100	5	5	2
	RL	1.2	1.2	0.6	1.4	1.0	1.1
	MDL	0.03	0.09	0.04	0.05	0.03	0.03

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

Notes:
ug/L = micrograms per liter
NA = not analyzed for this parameter.
All analyses performed by STL
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.
R = The data are unusable with deficiencies in the ability to analyze the sample and meet QC criteria.
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
M = Indicates a failure of the matrix spike and/or matrix spike duplicate samples.

Table 2.5 (cont'd)
2006 On-Post Groundwater COCs and Metals Analytical Results, Detections Only

Well Number	Sample Date	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Lead (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Zinc (mg/L)
CS-1	06/15/06	**0.0004F**	**0.032**	0.00004U	0.0026U	0.0045U	**0.00098F**	0.000027U	0.0078U	**0.22**
CS-9	06/13/06	**0.0011F**	**0.034**	**0.000072F**	**0.0088F**	**0.028**	**0.018**	**0.0059**	**0.008F**	**3.4**
	9/13/06	**0.00036F**	**0.036**	**0.00011F**	0.0026U	**0.0079F**	**0.028**	**0.00036F**	0.0078U	**1.7**
CS-10	06/22/06	**0.00063F**	**0.046**	0.00004U	0.0026U	0.0045U	**0.00071F**	**0.00058F**	0.0078U	**0.43**
CS-11	06/14/06	**0.00026F**	**0.021**	0.00004U	0.0026U	0.0045U	**0.014**	0.000027U	0.0078U	**0.83**
Duplicate	06/14/06	**0.00028F**	**0.022**	**0.000087F**	0.0026U	0.0045U	**0.013**	0.000027U	0.0078U	**0.92**
CS-I	06/12/06	**0.00041F**	**0.14**	0.00004U	0.0026U	**0.012**	**0.002**	0.000027U	0.0078U	**0.040F**
	MCL/AL	0.01	2	0.005	0.1	1.3	0.015	0.002	--	--
Comparison	RL	0.005	0.005	0.001	0.010	0.010	0.002	0.001	0.010	0.010
Criteria	Mdl	0.00006	0.0018	0.00002	0.00074	0.00076	0.00015	0.00003	0.0017	0.0068

Notes:

mg/L = milligrams per liter

NA = not analyzed for this parameter.

All analyses performed by STL

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.

R = The data are unusable with deficiencies in the ability to analyze the sample and meet QC criteria.

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.

M = Indicates a failure of the matrix spike and/or matrix spike duplicate samples.

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

2.2.1.2 Monitoring Wells with COC Detections below the MCL

Groundwater monitoring results included wells where COCs were detected at levels below the applicable MCLs. These included wells CS-MW2-LGR, CS-MW5-LGR, CS-MW9-LGR, CS-MW11A-LGR, and CS-MW19-LGR. The detections below the MCLs are summarized as follows:

- CS-MW2-LGR – Concentrations of PCE, *cis*-1,2-DCE, TCE and toluene were detected below the MCL in March 2006. In September 2006 *cis*-1,2-DCE, PCE and TCE were detected.
- CS-MW5-LGR – Concentrations of PCE, TCE, and *cis*-1,2-DCE were detected below the MCL in September 2006. This well was not sampled in March 2006 due to low water levels.
- CS-MW9-LGR – Concentrations of PCE below the MCL were detected in March 2006. No COCs were detected in September 2006.
- CS-MW11A-LGR – Concentrations of PCE in September 2006 were detected.
- CS-MW19-LGR – Concentrations of PCE were below the MCL in March and September 2006.

2.2.1.3 Monitoring Wells with No COC Detections

Wells CS-2, CS-I, CS-MW3-LGR, CS-MW6-LGR, and CS-MW7-LGR had no COC detections when sampled in 2006. Details on the reporting limits (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

Current and former CSSA drinking water supply wells CS-1, CS-9, CS-10, and CS-11 were analyzed for VOCs and metals in June 2006. All contaminant concentrations detected in these wells were below MCLs. Under the LTMO study, the drinking water supply wells are sampled every nine months (**Table 2.4**). The detections are summarized as follows:

- CS-1 – Concentrations of TCE were detected.
- CS-9 – Concentrations of toluene and chloroform were detected. CS-9 was sampled again in September 2006 due to the June 2006 concentrations of lead and mercury.
- CS-10 – Concentrations of toluene, dibromochloromethane, bromoform, chloroform, and bromodichloromethane were detected. These trihalomethanes were detected in wells CS-9 and CS-10, below applicable MCLs, possibly due to well rehabilitation activities. No resampling of this well was necessary.
- CS-11 – Concentrations of methylene chloride were detected but below the MCL. Detections of methylene chloride are believed to be related to laboratory practices.

All drinking water wells were analyzed in June 2006 for arsenic, cadmium, lead, barium, chromium, copper, nickel, zinc, and mercury. In March 2006, well CS-9 reported detections of lead and mercury above drinking water standards. Well CS-9 was immediately taken offline from the CSSA drinking water system. Another sample was collected in September 2006 after extensive purging of the well. Lead was once again above the MCL while mercury was below the MCL. Well CS-9 remained offline and the contamination source was identified. Investigation indicated debris (pipe casing) present in the well borehole and the well was grouted to eliminate the debris from coming into contact with the producing zones. Initial sampling shows that metals levels are below MCLs. Approximately 2,800 gallons were pumped after the grouting was completed to a depth of 548 feet bgs, to seal the debris present in the bottom of the borehole. A 24-hour pumping test was conducted on the well prior to the permanent pump installation. After the pump was installed, well CS-9 was reconnected to the CSSA system. A summary of the rehabilitation of Well CS-9 is included in **Appendix F**. No other wells had detections of metals in 2006.

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 one not addressed in this report. Four (CS-WB01, CS-WB02, CS-WB03, and CS-WB04) are included in the groundwater monitoring program and were sampled in 2006. Under the provisions of the groundwater monitoring DQOs and the LTMO study, the schedule for sampling the four Westbay-equipped wells is semi-annual. Samples were collected from all zones with water during the March and September 2006 events. Due to a decrease in groundwater elevations, certain zones (CS-WB01-UGR-01, CS-WB02-UGR-01, CS-WB02-LGR-09, CS-WB03-UGR-01, CS-WB03-LGR-01, CS-WB03-LGR-02, CS-WB04-UGR-01, CS-WB04-LGR-02, and CS-WB04-LGR-05) could not be sampled because they were dry. The remaining 33 zones contained water and were sampled. The Westbay-equipped wells are sampled using Westbay Instruments, Inc., equipment and sampling methods.

The Westbay well zones were sampled in March 2006 for PCE, TCE, *cis*-1,2-DCE, *trans*-1,2-DCE, isopropyl alcohol, acetone, toluene, and 2-butanone and analyzed by DHL Analytical, Inc., in Round Rock, Texas The analytical list was reduced in September 2006 as a result of the LTMO study findings to include: *cis*-1,2-DCE, PCE, *trans*-1,2-DCE, TCE, 1,1-DCE, and vinyl chloride. Per DQOs, the Westbay data are used for screening purposes only. Trip blanks were analyzed, but other quality assurance/quality control samples were not collected. All intervals with detections of COCs are presented in **Table 2.6**. Full analytical results are presented in **Appendix E**.

Table 2.6
2006 Westbay Analytical Results, Detections Only

Well ID	Date Sampled	*cis* -1,2-DCE	PCE	*trans* -1,2-DCE	TCE
CS-WB01-LGR-01	3/14/06	--	4.35	--	--
CS-WB01-LGR-01	9/27/06	--	2.7	--	1.8
CS-WB01-LGR-02	3/14/06	--	8.85	--	3.82
CS-WB01-LGR-02	9/27/06	--	5.7	--	2.5
CS-WB01-LGR-03	3/14/06	--	2.37	--	5.7
CS-WB01-LGR-03	9/27/06	--	2.4	--	5.8
CS-WB01-LGR-04	9/27/06	--	0.2	--	0.2
CS-WB01-LGR-05	9/27/06	--	--	--	0.21
CS-WB01-LGR-06	3/14/06	--	--	--	0.66
CS-WB01-LGR-06	9/27/06	--	0.39	--	0.6
CS-WB01-LGR-07	3/14/06	--	9.95	--	9.97
CS-WB01-LGR-07	9/27/06	--	18	--	14
CS-WB01-LGR-08	3/14/06	--	0.74	--	1.25
CS-WB01-LGR-08	9/27/06	--	0.56	--	0.94
CS-WB01-LGR-09	3/14/06	0.41	12.1	--	18.7
CS-WB01-LGR-09	9/27/06	0.31	10	--	17
CS-WB02-LGR-01	9/27/06	--	10	--	4
CS-WB02-LGR-03	3/14/06	--	3.79	--	1.63
CS-WB02-LGR-03	9/27/06	--	3.6	--	2.1
CS-WB02-LGR-04	3/14/06	--	2.8	--	9.55
CS-WB02-LGR-04	9/27/06	--	2.9	--	12
CS-WB02-LGR-05	3/14/06	--	0.92	--	3.61
CS-WB02-LGR-05	9/27/06	--	0.96	--	4.4
CS-WB02-LGR-06	3/14/06	--	1.13	--	3.55
CS-WB02-LGR-06	9/27/06	--	0.98	--	6.3
CS-WB02-LGR-07	3/14/06	--	1.0	--	0.65
CS-WB02-LGR-07	9/27/06	--	0.9	--	0.63
CS-WB02-LGR-08	3/14/06	--	2.4	--	1.99
CS-WB02-LGR-08	9/27/06	--	2.7	--	2.2
CS-WB03-LGR-03	3/16/06	0.53	31.7	--	16.3
CS-WB03-LGR-03	9/28/06	0.4	23	--	10
CS-WB03-LGR-04	3/16/06	0.2	25.1	--	11.3
CS-WB03-LGR-04	9/28/06	--	22	--	9.5
CS-WB03-LGR-05	3/16/06	--	21.1	--	4.59
CS-WB03-LGR-05	9/28/06	--	19	--	7
CS-WB03-LGR-06	3/16/06	--	21.1	--	2.9
CS-WB03-LGR-06	9/28/06	--	15	--	2.1
CS-WB03-LGR-07	3/16/06	--	16.8	--	3.69

Table 2.6
2006 Westbay Analytical Results, Detections Only

Well ID	Date Sampled	*cis* -1,2-DCE	PCE	*trans* -1,2-DCE	TCE
CS-WB03-LGR-07	9/28/06	--	**9.2**	--	**1.5**
CS-WB03-LGR-08	3/16/06	--	**20.4**	--	**1.95**
CS-WB03-LGR-08	9/28/06	--	**11**	--	**1.1**
CS-WB03-LGR-09	3/16/06	--	**12.7**	--	**8.05**
CS-WB03-LGR-09	9/28/06	--	**11**	--	**6.8**
CS-WB04-LGR-01	9/28/06	--	**0.44**	--	--
CS-WB04-LGR-03	9/28/06	--	**0.2**	--	--
CS-WB04-LGR-04	9/28/06	--	**0.17**	--	--
CS-WB04-LGR-06	3/21/06	**1.57**	--	--	**2.91**
CS-WB04-LGR-06	9/28/06	**3.0**	**0.65**	**0.27**	**8.2**
CS-WB04-LGR-07	3/21/06	**0.71**	**1.14**	--	**2.09**
CS-WB04-LGR-07	9/28/06	**2.3**	**0.87**	**0.24**	**5.8**
CS-WB04-LGR-08	9/28/06	--	**0.43**	--	**1.1**
CS-WB04-LGR-09	3/21/06	**0.21**	**7.99**	--	**7.89**
CS-WB04-LGR-09	9/28/06	--	**7.4**	--	**8.6**
CS-WB04-LGR-10	9/28/06	--	**0.94**	--	**0.6**
CS-WB04-LGR-11	9/28/06	--	**1.1**	--	--
Comparison Criteria					
Maximum Contaminant Level	**MCL**	70	5	100	5
Reporting Limit	**RL**	1.2	1.4	0.6	1
Method Detection Limit	**MDL**	0.098	0.14	0.056	0.1

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

Notes:
-- = indicates the sample was non-detect or below the applicable MDL.
All values are reported in µg/L by DHL Laboratories and are screening level data.
NA = sample was not analyzed for that parameter.

Westbay intervals CS-WB01-LGR-02, CS-WB01-LGR-02, CS-WB01-LGR-07, CS-WB01-LGR-09, CS-WB02-LGR-01, CS-WB02-LGR-04, CS-WB02-LGR-06, CS-WB03-LGR-03 through CS-WB03-LGR-09, CS-WB04-LGR-06, CS-WB04-LGR-07, and CS-WB04-LGR-09 reported detections of PCE and/or TCE above the MCL.

2.2.2 Off-Post Analytical Results

The LTMO study implemented on-post has not been applied to sampling frequencies for off-post monitoring performed by CSSA. The frequencies for sampling an off-post well are determined by compliance with the Plan and project DQOs. An overview of sampling frequencies for off-post wells is given in **Table 2.7**. Forty-seven off-post wells were sampled during the 2006 quarterly monitoring events, and their locations are illustrated on **Figure 2.1**. 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 2006 include (see **Figure 2.1** for well locations):

- One privately owned well in the Dominion (DOM-2);
- Four public supply wells in the Fair Oaks area (FO-8, FO-J1, FO-17 & 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-12, JW-13, JW-14, JW-15, JW-26, JW-27, JW-28, JW-29, and JW-30);
- Six wells in the Leon Springs Villa area (four public wells: LS-2, LS-3, 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-2, OFR-3, & OFR-4); and
- 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).

Table 2.7
2006 Off-Post Groundwater Sampling Rationale

Well ID	2006 Mar	2006 June	2006 Sept	2006 Dec	Sampling Frequency:
DOM-2		NS	NS	NS	As needed, once annually
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	NS				Qtrly, 1 year thru Sept 07
HS-1	NS	NS			Qtrly, well recently put back online
HS-2					Qtrly, 1 year thru June 07
HS-3	NS		NS	NS	As needed, once annually
I10-2		NS	NS	NS	As needed, once annually
I10-4					Qtrly, 1 year thru Sept. 07
I10-5	NS	NS	NS		As needed, once annually
I10-7					Qtrly, for delineation
I10-8	NS	NS	NS		As needed, once annually
JW-5		NS	NS	NS	As needed, once annually
JW-6	NS		NS	NS	As needed, once annually
JW-7					Qtrly, 1 year thru June 07
JW-8					Qtrly, 1 year thru Sept 07
JW-9		NS	NS	NS	As needed, once annually
JW-9-A2*	NS	NS	NS	NS	As needed
JW-12	NS	NS		NS	As needed, once annually
JW-13	NS		NS	NS	As needed, once annually
JW-14	Tol				Qtrly, 1 year thru Mar 07
JW-15		NS	NS	NS	As needed, once annually
JW-26	NS	NS	NS		As needed, once annually
JW-27					Qtrly, 1 year thru June 07
JW-28					Qtrly, 1 year thru June 07
JW-29					Qtrly, due to location
JW-30					Qtrly, 1 year thru June 07
LS-1	NS	NS	NS	NS	Well is offline
LS-2			NS	NS	Well is offline, went dry
LS-2/LS-3-A1		NS		NS	Biannually (Mar & Sept)
LS-3					Qtrly, 1 year thru June 07
LS-2/LS-3-A2		NS		NS	Biannually (Mar & Sept)
LS-4					Qtrly, 1 year thru June 07
LS-5					Qtrly, 1 year thru June 07
LS-6					Qtrly, 1 year thru Sept 07
LS-6-A2		NS		NS	Biannually (Mar & Sept)
LS-7					Qtrly, 1 year thru Sept 07
LS-7-A2		NS		NS	Biannually (Mar & Sept)

Table 2.7
2006 Off-Post Groundwater Sampling Rationale

Well ID	2006 Mar	2006 June	2006 Sept	2006 Dec	Sampling Frequency:
OFR-1					Qtrly, 1 year thru Sept 07
OFR-2		NS	NS	NS	plugged and abandoned
OFR-3					Qtrly, 1 year thru Sept 07
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	NS	NS	NS	NS	plugged and abandoned
RFR-7	NS	NS	NS	NS	plugged and abandoned
RFR-8	NS		NS	NS	As needed, once annually
RFR-9	NS	NS		NS	As needed, once annually
RFR-10					Qtrly, 1 year thru Sept 07
RFR-10-A2		NS		NS	Biannually (Mar & Sept)
RFR-10-B2		NS		NS	Biannually (Mar & Sept)
RFR-11					Qtrly, 1 year thru Sept 07
RFR-11-A2		NS		NS	Biannually (Mar & Sept)
RFR-12		NS	NS	NS	As needed, once annually
RFR-13			NS	NS	As needed, once annually
RFR-14					Qtrly, 1 year thru June 06

	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.
	VOCs detected are less than 80% of the MCL (<4.0 ppb and >0.11 ppb for PCE & <4.0 ppb >0.14 ppb for TCE). After four quarters of stable results the well can be removed from quarterly sampling.
	No VOCs detected. Sample on an as needed basis.
	This well has a GAC filtration unit installed by CSSA. Post GAC samples are collected every six months.
NS	Not sampled for that event.

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. Sampling of LS-2 was discontinued in September 2006 due to low water levels and the well was offline throughout 2006.

All groundwater samples were submitted to Agriculture and Priority Pollutants Laboratory (APPL) in Fresno, California for analysis. Groundwater samples were analyzed for the short list of VOCs using SW-846 Method 8260. The USEPA-approved short list of VOCs included bromo-dichloromethane, bromoform, chloroform, dibromochloromethane, dichlorodifluoromethane, *cis*-1,2-DCE, *trans*-1,2-DCE, 1,1-DCE, methylene chloride, naphthalene, PCE, TCE, toluene, and vinyl chloride in March and June 2006. As a result of the LTMO study findings and revised DQOs, this list was changed to include: *cis*-1,2-DCE, *trans*-1,2-DCE, 1,1-DCE, PCE, TCE, and vinyl chloride. Off-post wells were not analyzed for metals.

The data packages containing the analytical results for the 2006 sampling events were reviewed and verified according to the guidelines outlined in the CSSA QAPP. After the data packages were received by Parsons, data verification reports were submitted to AFCEE chemists and the data packages were approved.

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.

Wells JW-5, JW-9, JW-15, JW-28, and JW-29 had detections of methylene chloride and/or toluene only. As discussed previously, methylene chloride is suspected to be a laboratory contaminant not expected to be present in the groundwater. There are no known historical uses of methylene chloride on-post, and methylene chloride has not been detected in the same wells consistently over time; thereby supporting the conclusion that methylene chloride is present due to laboratory procedures. Methylene chloride and toluene were removed from the analyte list in September 2006 following evaluation in the LTMO study as they do not represent either contaminants on-post or analytes which may result from natural degradation of the detected on-post COCs.

Concentrations of VOCs detected in 2006 are presented in **Table 2.8**. Full analytical results from the 2006 sampling events are presented in **Appendix C**. Concentration trends are illustrated on **Figure 2.4** for wells LS-2, LS-3, LS-6, LS-7, OFR-3, RFR-10, and RFR-11 for PCE, TCE, and *cis*-1,2-DCE. These wells were selected because they have had detections of PCE and TCE that approach and/or exceed MCLs. **Figure 2.4** also includes precipitation data from the weather station located near Building 90, WS-S. **Figure 2.5** shows PCE and

TCE concentrations with monthly water usage at each off-post well. The off-post GAC systems are equipped with flow meters tracking the gallons pumped. The record of gallons processed through the GAC each month helps estimate when the carbon canisters will need replacement.

2.2.2.1 Off-Post Wells with COC Detections Above the MCL

All wells that historically exceeded MCLs off-post were equipped with GAC filtration systems in the past. These wells, and the date the filtration system was installed, are listed in **Table 2.9**. CSSA maintains these GAC filtration systems and will continue to do so. These wells had detections above the MCL in the past.

During 2006, only well RFR-10 had concentrations exceeding the MCL. Well RFR-10 concentrations exceeded the MCLs for PCE during the March and June 2006 events. TCE, *cis*-1,2-DCE and *trans*-1,2-DCE concentrations in RFR-10 were also detected. Post-GAC samples were all below the MCL. An evaluation of concentration trends through 2006 are included in **Figures 2.4 and 2.5**.

Table 2.9 GAC Filtration Systems Installed

Well	Date Installed
LS-2/LS-3	April 2002
LS-6	August 2001
LS-7	August 2001
OFR-3	April 2002
RFR-10	October 2001
RFR-11	October 2001

2.2.2.2 GAC Filtration Systems

Semi-annual post-GAC confirmation samples are collected from all wells equipped with GAC filtration systems (**Appendix D**). 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 post-GAC samples. Methylene chloride, a common laboratory contaminant, was the only VOC detected in the post-GAC samples in 2006. Post-GAC samples were collected during the March and September 2006 events in accordance with project DQOs. See **Appendix D** for pre and post-GAC sample comparisons.

Table 2.8
2006 Off-Post Groundwater COC Analytical Results, Detections Only

Community	Well ID	Sample Date	*cis*-1,2-Dichloro-ethene	*trans*-1,2-Dichloro-ethene	Tetrachloro-ethene	Trichloro-ethene
Fair Oaks Ranch	FO-17	6/19/2006	0.07M	--	--	--
	FO-J1	6/20/2006	0.07M	--	**0.08F**	--
		9/19/06	--	--	**0.36F**	--
		12/11/2006	--	--	**0.40F**	--
Hidden Springs	HS-1	12/12/2006	--	--	**0.13F**	--
	HS-2	3/23/2006	--	--	--	--
		6/21/2006	--	--	**0.07F**	--
IH-10 Area	I10-4	3/22/2006	--	--	--	--
		6/22/2006	--	--	--	--
		9/19/06	--	--	**0.62F**	**0.29F**
		12/12/2006	--	--	**0.84F**	**0.48F**
	Duplicate	12/12/2006	--	--	**0.95F**	**0.49F**
	I10-7	3/20/2006	--	--	--	--
		6/20/2006	0.07M	--	--	--
Jackson Woods Subdivision	JW-5	3/22/2006	--	--	--	--
	JW-7	3/21/2006	--	--	**0.42F**	--
		6/20/2006	0.07M	--	**0.56F**	--
		12/11/2006	--	--	**0.77F**	--
	JW-8	3/23/2006	--	--	**0.32F**	--
	Duplicate	3/23/2006	--	--	**0.25F**	--
		6/22/2006	--	--	**0.40F**	--
		9/19/06	--	--	**0.43F**	--
		12/13/2006	--	--	**0.35F**	--
	JW-9	3/21/2006	--	--	--	--
	JW-13	6/20/2006	0.07M	--	--	--
	Duplicate	6/20/2006	0.07M	--	--	--
	JW-14	3/21/2006	--	--	--	--
		6/20/2006	0.07M	--	--	--
		12/14/2006	--	--	**0.07F**	--
	JW-15	3/21/2006	--	--	--	--
	JW-27	3/21/2006	--	--	--	--
		6/21/2006	--	--	**0.07F**	--
		12/12/2006	--	--	**0.09F**	--
	JW-28	3/22/2006	--	--	--	--
		6/21/2006	--	--	--	--
	Duplicate	6/21/2006	--	--	--	--
	JW-29	3/21/2006	--	--	--	--
		6/20/2006	0.07M	--	--	--
	JW-30	3/22/2006	--	--	**0.16F**	--
		6/22/2006	--	--	**0.22F**	--
Leon Springs Estates	LS-2	3/23/2006	--	--	**1.35F**	**0.36F**
		6/21/2006	--	--	**1.71**	**0.58F**
	LS-2/LS-3-A2	3/23/2006	--	--	--	--
	LS-3	3/23/2006	--	--	**0.92F**	**0.20F**
		6/21/2006	--	--	**0.92F**	**0.34F**
		9/19/06	--	--	**0.99J**	**0.54J**
		12/12/2006	--	--	**0.93F**	**0.61F**
Comparison Criteria	Method Detection Limit	MDL	0.07	0.08	0.06	0.05
	Reporting Limit	RL	1.2	0.6	1.4	1.0
	Max. Contaminant Level	MCL	70	100	5	5

Notes:

All VOCs analyzed by method SW 8260B by APPL Laboratory.

All results given in micrograms per liter (ug/L)

M = failure of the matrix spike and/or matrix spike duplicate samples.

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.

R = The data are unusable with deficiencies in the ability to analyze the sample and meet QC criteria.

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below The method detection.

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

Table 2.8 (continued)
2006 Off-Post Groundwater COC Analytical Results, Detections Only

Community	Well ID		Sample Date	*cis*-1,2-Dichloroethene	*trans*-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene
Leon Springs Estates	LS-4		3/23/2006	--	--	--	--
			6/21/2006	--	--	**0.09F**	--
			12/12/2006	--	--	**0.09F**	--
	LS-5		3/20/2006	--	--	--	**0.14F**
			6/19/2006	0.07M	--	--	**0.09F**
	LS-6		3/20/2006	--	--	**1.22F**	**0.69F**
			6/19/2006	--	--	**0.95F**	**0.95F**
			9/18/06	--	--	--	1.8
			12/11/2006	--	--	**0.69F**	1.6
	LS-6-A2		3/20/2006	--	--	--	--
	LS-7		3/20/2006	--	--	2.74	**0.29F**
			6/19/2006	0.07M	--	3.38	**0.21F**
			9/18/06	--	--	2.98	--
			12/11/2006	--	--	2.59	**0.34F**
	LS-7-A2		3/20/2006	--	--	--	--
Old Fredericksburg Road	OFR-1		3/21/2006	--	--	**0.35F**	--
			6/22/2006	--	--	**0.44F**	--
		Duplicate	6/22/2006	--	--	**0.37F**	--
			9/19/06	--	--	**0.28F**	--
		Duplicate	9/19/06	--	--	**0.28F**	--
			12/14/2006	--	--	**0.33F**	--
	OFR-2		3/20/2006	--	--	**0.28F**	--
	OFR-3		3/22/2006	--	--	**0.35F**	**0.46F**
		Duplicate	3/22/2006	--	--	**0.41F**	**0.52F**
			6/19/2006	0.07M	--	**0.57F**	**0.60F**
			9/18/06	--	--	2.41	2
			12/11/2006	--	--	4.32	3.28
	OFR-4		3/21/2006	--	--	--	--
		Duplicate	3/21/2006	--	--	--	--
Ralph Fair Road	RFR-4		3/21/2006	--	--	--	--
	RFR-5		3/21/2006	--	--	--	--
	RFR-8		6/22/2006	--	--	--	--
	RFR-10		3/20/2006	**0.64F**	--	6.27	2.76
			6/19/2006	**0.15M**	--	10.85	2.88
			9/18/06	**0.33F**	--	5.23	1.86
		Duplicate	9/18/06	**0.36F**	--	5.4	1.83
			12/11/2006	**0.67F**	--	2.37	1.3
	RFR-10-A2		3/20/2006	--	--	--	--
	RFR-10-B2		3/20/2006	--	--	--	--
	RFR-11		3/20/2006	--	--	**0.33F**	1.39
			6/19/2006	0.07M	--	**0.33F**	1.5
			9/18/06	--	--	--	1.47
			12/11/2006	--	--	**0.34F**	1.72
	RFR-11-A2		3/20/2006	--	--	--	--
		Duplicate	3/20/2006	--	--	--	--
	RFR-12		3/23/2006	--	--	--	--
	RFR-13		3/22/2006	--	--	--	--
			6/22/2006	--	--	--	--
	RFR-14		3/23/2006	--	--	**0.20F**	--
			6/21/2006	--	--	**0.24F**	--
			12/14/2006	--	--	**0.20F**	--
Comparison Criteria	Method Detection Limit		MDL	0.07	0.08	0.06	0.05
	Reporting Limit		RL	1.2	0.6	1.4	1.0
	Max. Contaminant Level		MCL	70	100	5	5

Notes:
All VOCs analyzed by method SW 8260B by APPL Laboratory.
All results given in micrograms per liter (ug/L)
M = failure of the matrix spike and/or matrix spike duplicate samples.
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.
R = The data are unusable with deficiencies in the ability to analyze the sample and meet QC criteria.
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below The method detection.

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

Regular maintenance was scheduled in 2006 to change the carbon in the single well GAC filtration systems (LS-6, LS-7, OFR-3, RFR-10, and RFR-11) on January 10, 2006. A CSSA representative inspected each GAC filtration system twice a month to change pre-filters and/or troubleshoot problems occurring with the systems.

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 historical results are included in **Appendix C**. The groundwater monitoring results include wells where COCs were detected at levels below applicable MCLs. These detections occurred in wells LS-2, LS-6, LS-7, OFR-3 and RFR-11. The detections below the MCL are summarized as follows:

- LS-2 – Concentrations of PCE in June 2006. Chloroform was also detected in well LS-2 in June 2006. Chloroform is regulated as a trihalomethane. No detections of chloroform and other trihalomethanes have been above the combined MCL. These compounds are regulated as byproducts related to drinking water disinfection. ;
- LS-6 – Concentrations of TCE in September and December 2006;
- LS-7 – Concentrations of PCE from all samples in 2006;
- OFR-3 – Concentrations of PCE and TCE from September and December 2006; and
- RFR-11 – Concentrations of TCE from all samples in 2006.

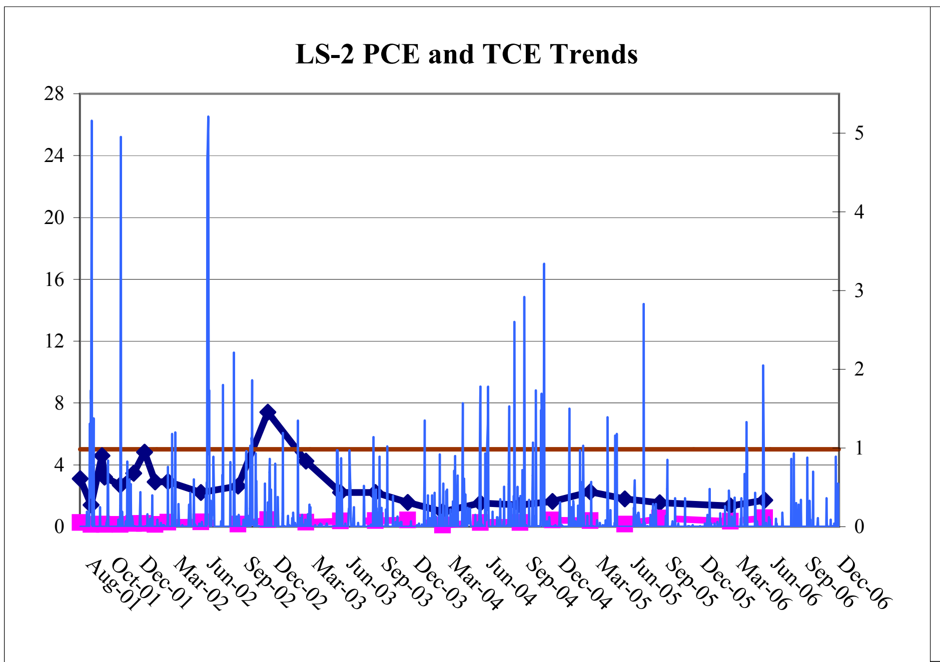
2.2.2.4 Off-Post Wells with COC Detections Below the Reporting Limits

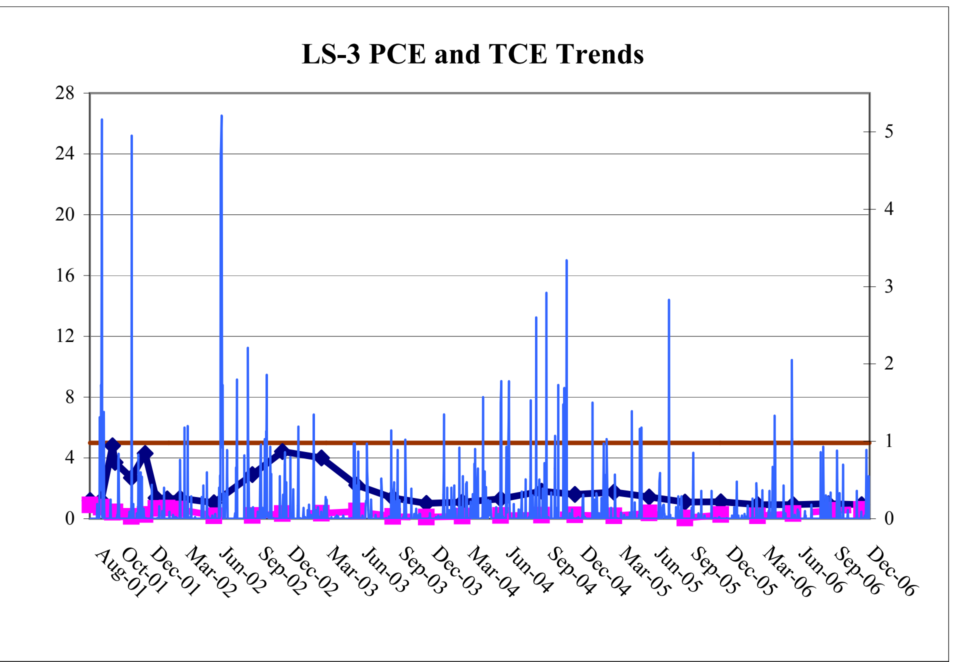
The off-post results include detections in wells for which the analyte is identified, but at a level below the RL. These results are assigned an “F” flag under the CSSA QAPP. In 2006, this included wells FO-J1, HS-1, HS-2, I10-4, JW-7, JW-8, JW-14, JW-27, JW-30, LS-3, LS-4, LS-5, OFR-1, and RFR-14. The detections below the reporting limit are summarized as follows:

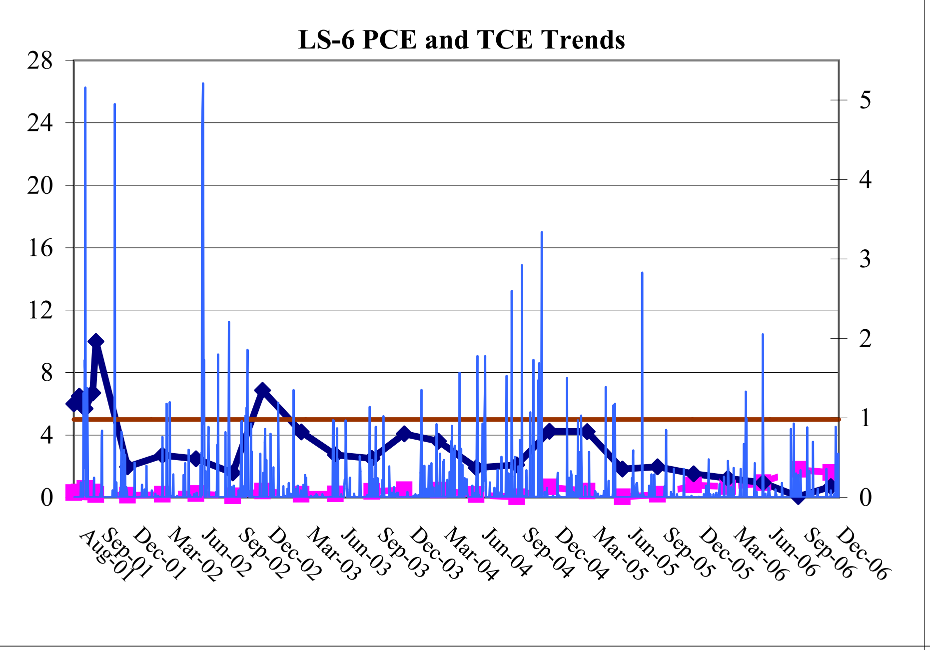
- FO-J1 – Concentrations of PCE detected below the RL;
- HS-1 and HS-2 – Concentrations of PCE detected below the RL;
- I10-4 – Concentrations of PCE and TCE detected below the RL in September and December 2006;
- JW-7 – Concentrations of PCE detected below the RL;
- JW-8 – Concentrations of PCE detected below the RL in all of 2006;
- JW-14 – Concentrations of PCE detected below the RL in December 2006;
- JW-27 – Concentrations of PCE detected below the RL;
- JW-30 – Concentrations of PCE detected below the RL in March and June;

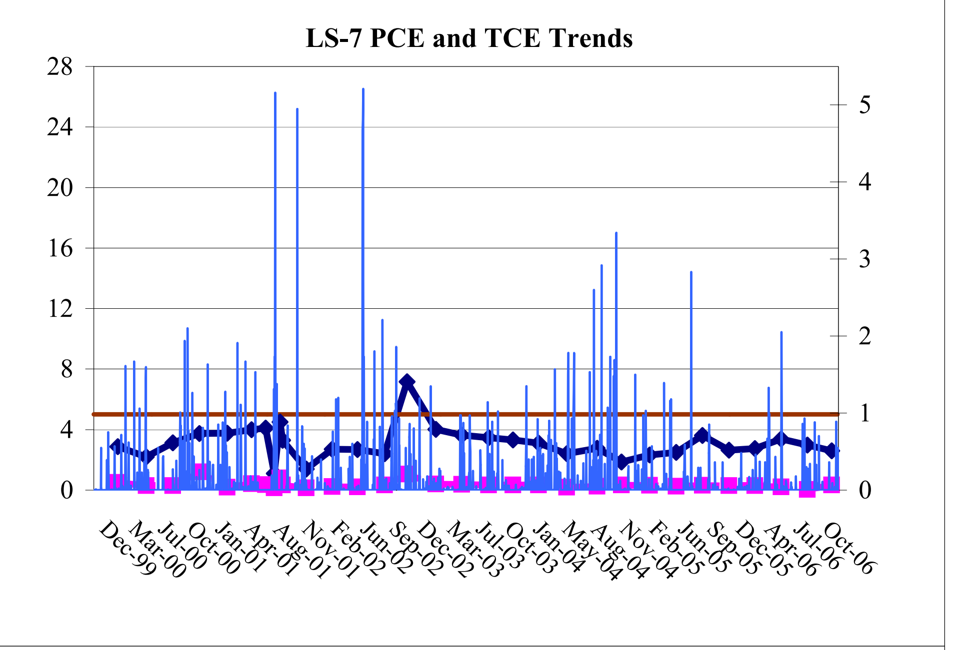
- LS-3 – Concentrations of PCE and TCE detected below the RL in all of 2006;
- LS-4 – Concentrations of PCE detected below the RL in June and December;
- LS-5 – Concentrations of TCE detected below the RL in March and June;
- OFR-1 – Concentrations of PCE detected below the RL in all of 2006;
- OFR-2 – Concentrations of PCE detected below the RL; and
- RFR-14 – Concentrations of PCE detected below the RL.

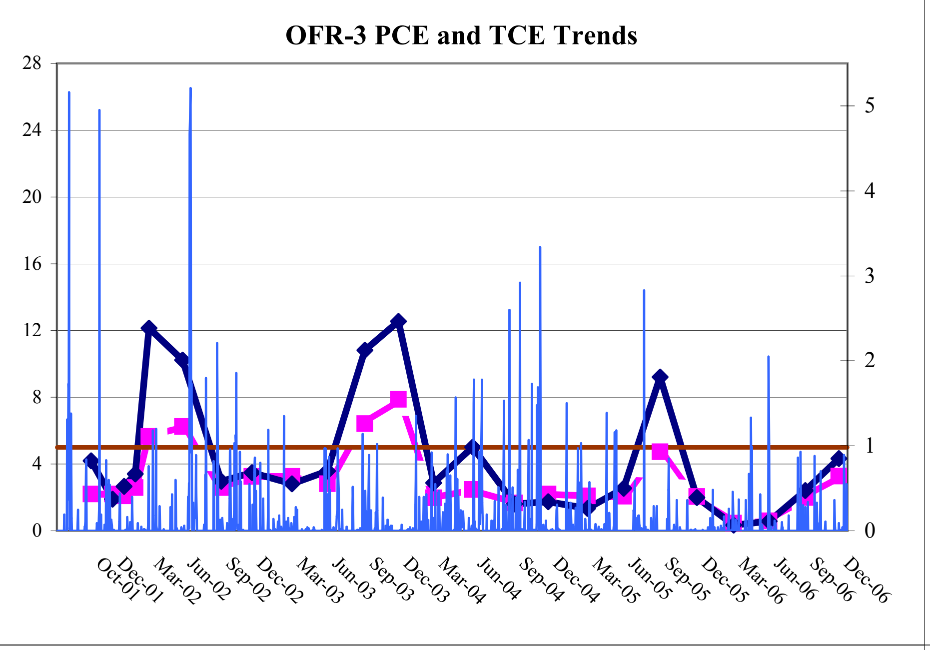
Figure 2.4, PCE and TCE Concentration Trends and Precipitation

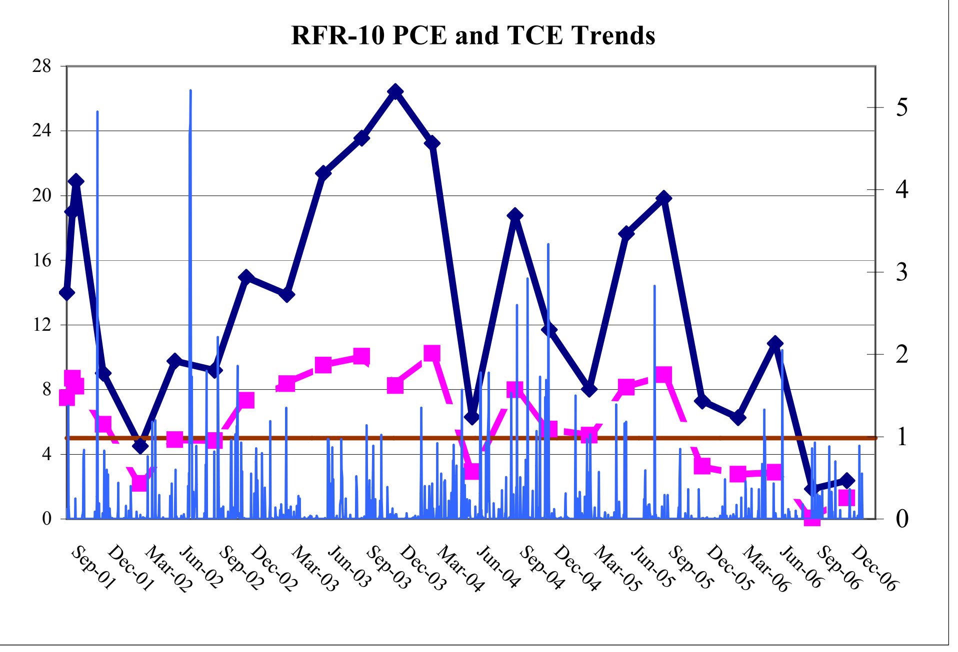


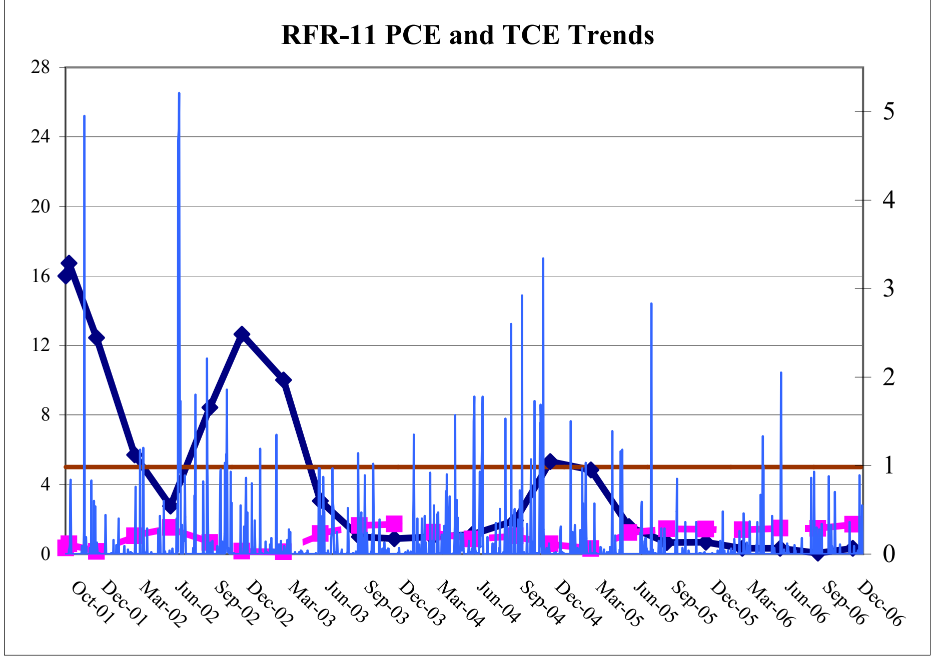












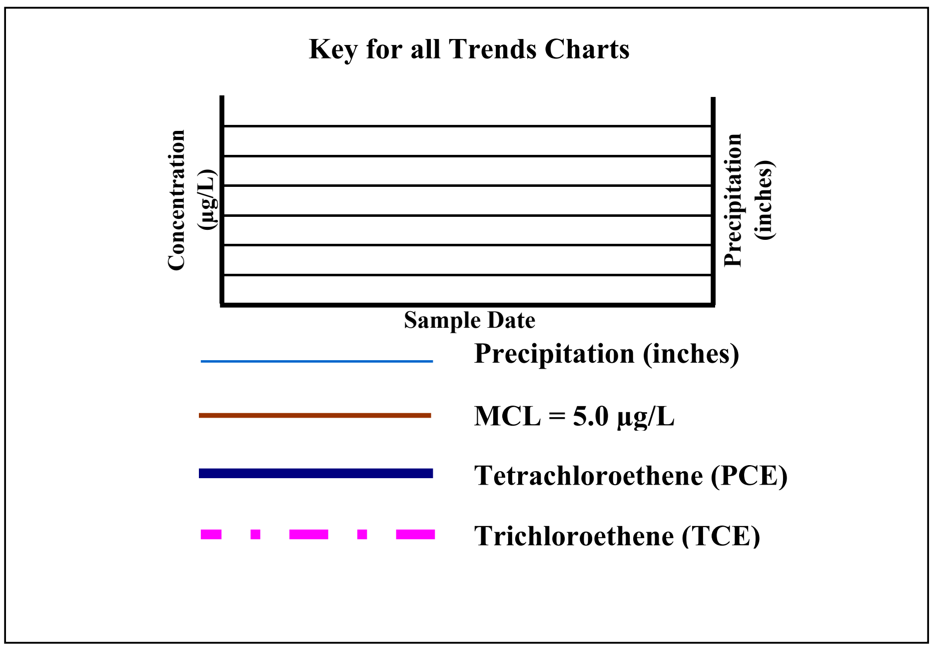
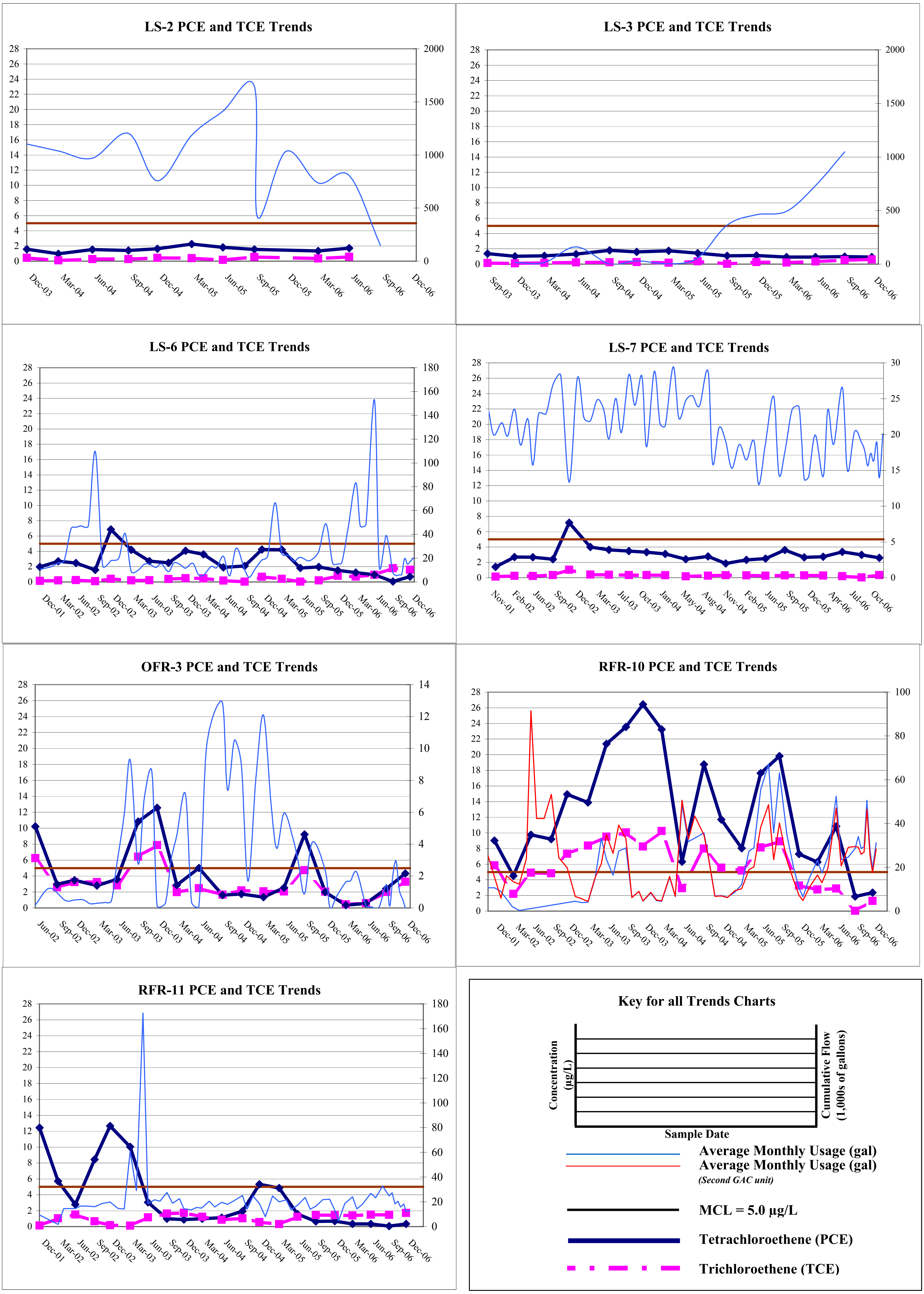


Figure 2.5, PCE and TCE Concentration Trends and Monthly Water Usage

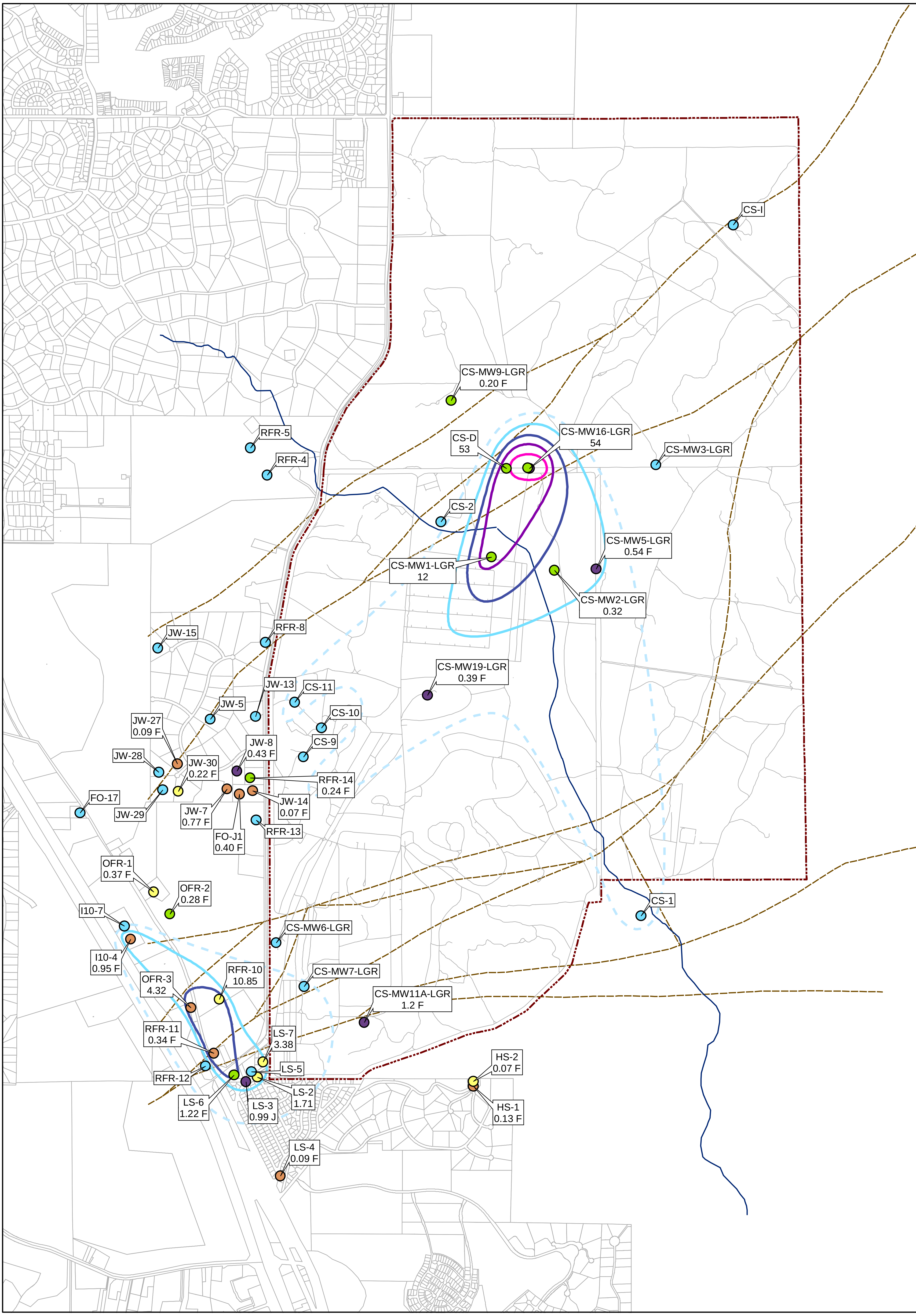


2.2.3 Concentration Contours

The maximum concentration detected during any event from 2006 for each of PCE, TCE, and *cis*-1,2-DCE in the LGR wells on-post and all wells off-post were contoured in three isoconcentration contour maps. These isoconcentration maps are provided in **Figures 2.6, 2.7 and 2.8** to illustrate the extent of contamination as measured from analytical results and inferred from those results.

The 2006 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. For PCE concentrations above 1.0 µg/L are detected on-post is wells CS-D, CS-MW16-LGR, and CS-MW1-LGR (**Figure 2.6**). Off-post detections of PCE above 1.0 µg/L include OFR-3, LS-2, LS-6, LS-7 and RFR-10. TCE has been detected above 1.0 µg/L in the same wells on- and off-post except for wells LS-2 and LS-7 and additionally in well RFR-11 (**Figure 2.7**). *Cis*-1,2-DCE was not detected off-post above 1.0 µg/L, but was detected above 1.0 µg/L in on-post wells CS-D, CS-MW16-LGR, CS-MW1-LGR and CS-MW2-LGR (**Figure 2.8**).

Isoconcentration maps have also been prepared based on analytical data collected in March and September 2005. Those isoconcentration maps are available for review in the CSSA Environmental Encyclopedia, Volume 5 Groundwater, (CSSA 2007) in the reports for March 2005 and September 2005. By comparison of 2006 isoconcentrations to 2005 isoconcentrations, the plume extent appears decreased in 2006. Fewer wells are affected in 2006 both on and off-post, than in 2005. As discussed in Section 2.1.1, the lack of rainfall affected CSSA throughout 2006. The low water levels reduced the documented extent of contaminants and contributed to lower detections in laboratory results. This correlation between decreased groundwater elevations and decreases in COC detections has been observed at CSSA in historical monitoring. Precipitation levels increased in 2007 and groundwater elevations at CSSA are recovering to normal levels. The analytical results for 2007 will be evaluated in future reports to document the plume extent and the correlation to groundwater elevations.



N
W E
S

0 2,000 4,000 Feet

- March Value
- June Value
- September Value
- December Value
- Non-detect
- Parcels
- CSSA Boundary
- Salado Creek
- Faults

PCE Concentrations (µg/L)

- Estimated Plume Boundary Based on Historical Data
- 0.2
- 1.00
- 10.00
- 50.00

Figure 2.6

PCE Concentrations for LGR Wells in 2006

PARSONS

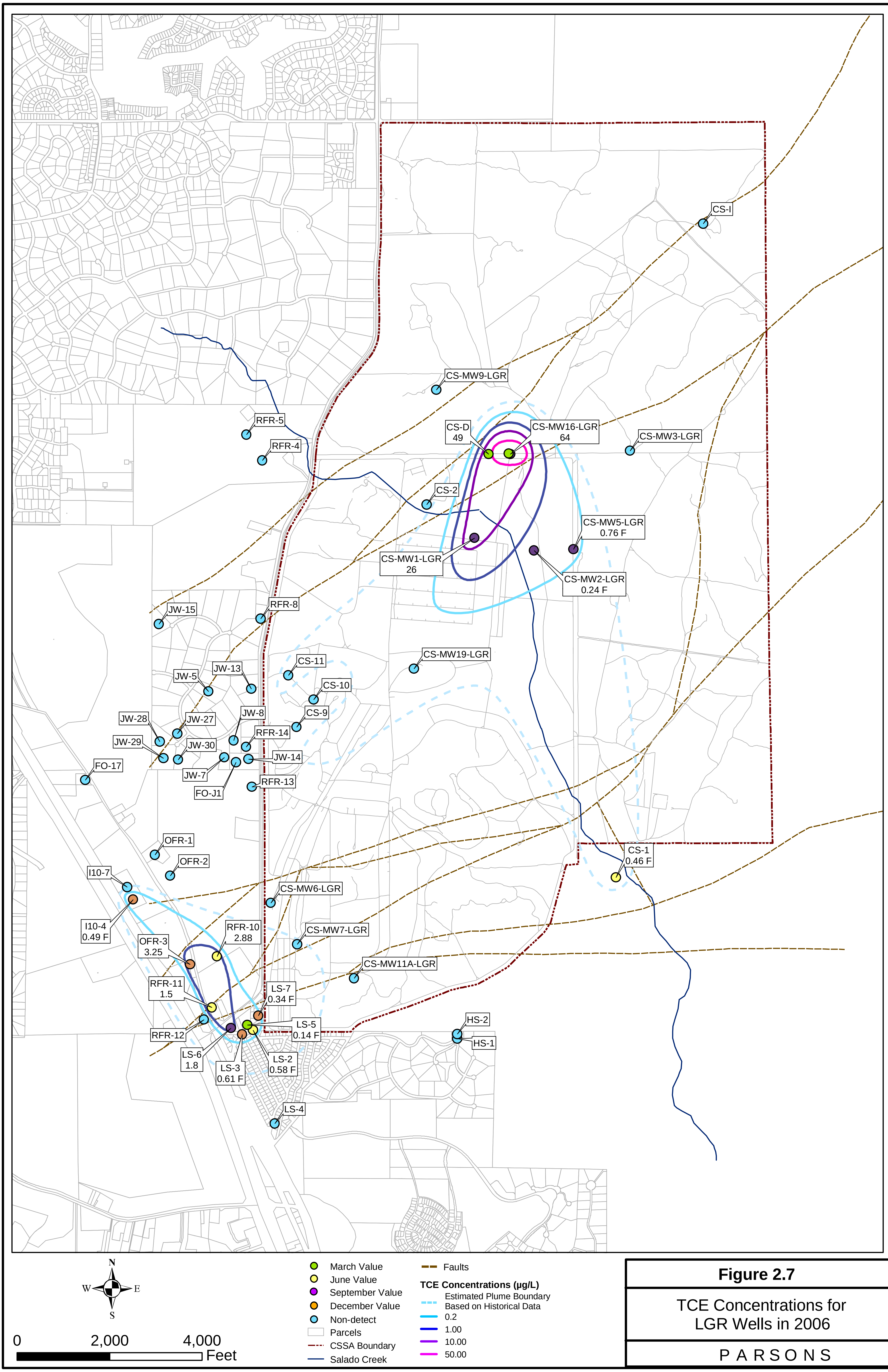


Figure 2.7

TCE Concentrations for LGR Wells in 2006

PARSONS

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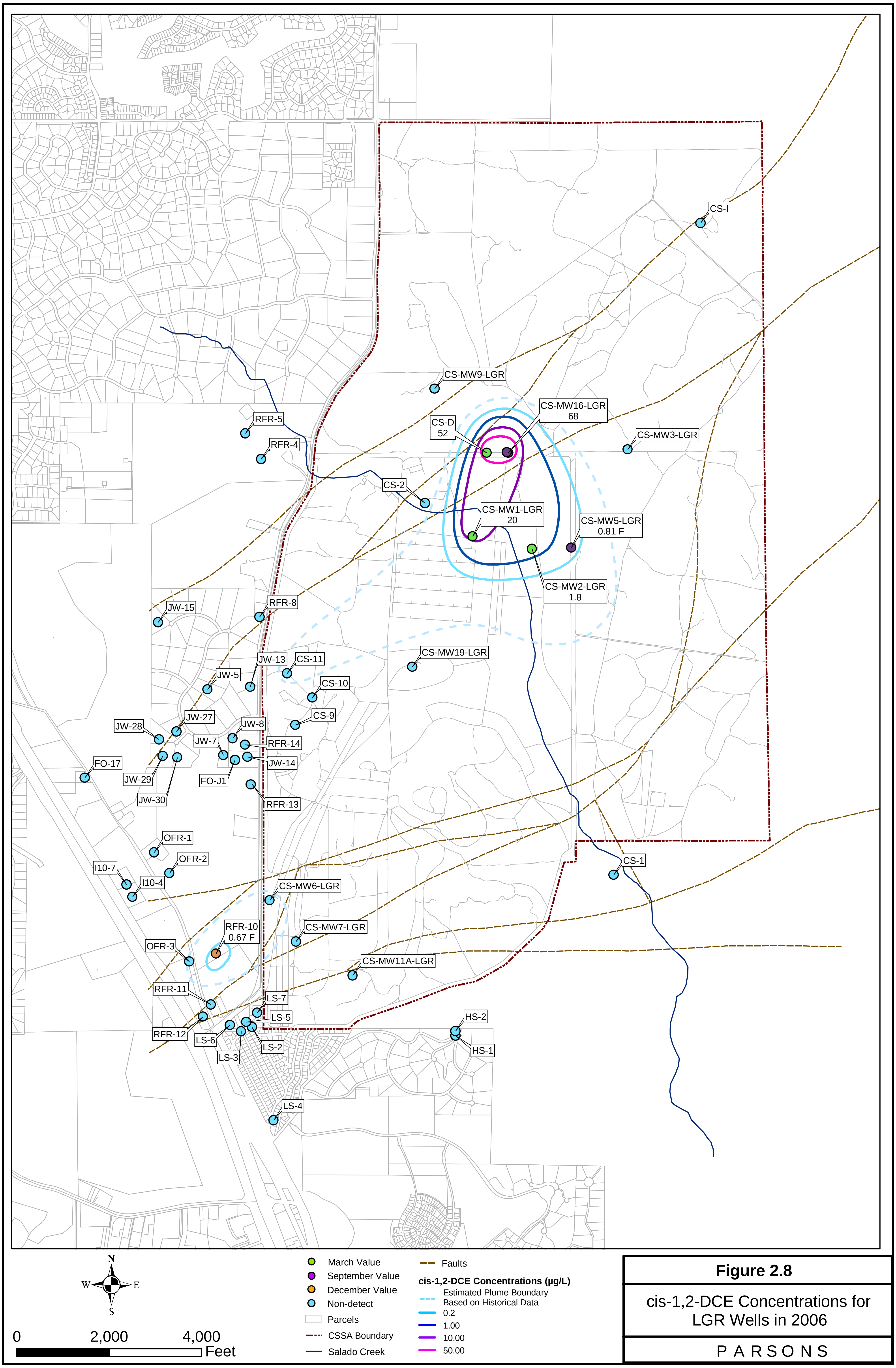

Figure 2.8

cis-1,2-DCE Concentrations for LGR Wells in 2006

PARSONS

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3.0 GROUNDWATER MONITORING PROGRAM CHANGES

3.1 Access Agreements Obtained in 2006

Access agreements are signed by off-post well owners to grant permission to CSSA to collect groundwater samples from each well. Most access agreements were signed for a 3-year term. During 2006, no access agreements for currently sampled wells were expiring. However, ownership of some currently sampled wells transferred to new property owners. CSSA attempted to contact new owners to solicit new access agreements. Of the property owners for wells which transferred ownership, three either executed a new access agreement or the new owner agreed to allow sampling under the previously executed agreement. One well (RFR-14) was added to the sampling program in 2006, and a new access agreement was executed by the owner, as described in Section 3.2.

3.2 Wells Added to or Removed From Program

Well RFR-14, located west of CSSA, was installed at the end of 2005 and first sampled in March 2006. The well owner signed an access agreement to join the CSSA monitoring program. This well has consistently had low level PCE detections below the RL. Well HS-1 was returned to service prior to 2006 to replace well LS-2, taken offline due to low water levels. Low levels of PCE (below the RL) were detected in HS-1 in December 2006. An access agreement with Bexar Metropolitan Water District (Bexar Met) was already in existence for this well.

The well owners of wells I10-2, I10-4, OFR-2, RFR-6, and RFR-7 sold the land containing the wells. The new owners opted to plug and abandon these wells. The landowner at well I10-4 indicated his intention to plug and abandon the well; however, no confirmation has been received. Well I10-4 is the farthest well to the southwest with VOC detections below RLs and constitutes the southwestern extent of the plume. The property associated with well OFR-2 was sold to Centex for development of a residential subdivision, which plugged and abandoned the well. The plugging and abandonment reports for wells I10-2, I10-4, OFR-2, RFR-6 and RFR-7, if available, are included in Appendix G.

3.3 Bexar Metropolitan Water System Sale

Bexar Met has owned and operated eight off-post wells (HS-1, HS-2, HS-3, HS-4, LS-1, LS-2, LS-3, LS-4) currently included in the quarterly groundwater monitoring program. The sale of the Bexar Met wells to San Antonio Water System (SAWS) was finalized in 2007. During 2006, Bexar Met owned the wells and the infrastructure was in place. CSSA will work with SAWS in the future sampling to retain these wells in the quarterly groundwater monitoring program.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the on- and off-post groundwater monitoring program data collected in 2006, the following conclusions and recommendations can be made:

- On-post wells CS-MW16-LGR, CS-MW16-CC, CS-D, and CS-MW1-LGR all exceeded MCLs in 2006 and should remain on the sampling schedule in the future. On-post monitoring wells will be sampled at the frequencies recommended in the LTMO study.
- Due to low water levels, many wells could not be sampled. The water levels are at the lowest levels recorded since the groundwater monitoring program began in 1992. Water levels will be measured in the future until sampling can once again be conducted at these wells.
- Seventeen Westbay intervals had detections above the MCL in 2006. These intervals should remain on the semi-annual sampling schedule in the future as recommended in the LTMO study.
- Well RFR-10 was the only well that exceeded the MCL for PCE in 2006 off-post. This well, along with wells LS-2/LS-3, LS-6, LS-7, OFR-3, and RFR-11, are equipped with a GAC filtration system and these wells should remaining on the quarterly sampling schedule in the future. The GAC filtration systems will continue to be maintained by CSSA.
- If additional wells are installed to the west and southwest of CSSA, CSSA will attempt to add them to future sampling events.
- Off-post wells I10-2, I10-4, OFR-2, RFR-6 and RFR-7, will be removed from future sampling due to plugging and abandonment by the new owners.
- The sampling of eight off-post wells (HS-1, HS-2, HS-3, HS-4, LS-1, LS-2, LS-3, and LS-4) will be impacted by the sale of Bexar Met to SAWS. CSSA verified the sale was finalized in 2007 and future sampling of these wells will depend on SAWS intended usage of the wells in the future.
- Off-post wells with detections of VOCs below the MCL will continue to be sampled on a quarterly basis in accordance with DQO requirements. Depending on concurrence by regulatory agencies, the sampling frequency may be reduced following one year of consistent detection levels.
- For future sampling events, off-post wells where no VOCs were detected will be sampled as needed, depending on historical detections.
- Overall contaminant concentrations are lower than historically measure values. It appears that the lower concentrations are somewhat related to lower rainfall totals during 2006

5.0 REFERENCES

CSSA 2002. *CSSA Quality Assurance Program Plan*

CSSA 2007. *CSSA Environmental Encyclopedia*, www.stanley.army.mil

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

Parsons 2001. *Offsite Well Survey Report*

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

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

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 2006.	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 2006 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 2007 event.	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-MW16-LGR, CS-MW4-LGR, CS-MW9-LGR, CS-MW9-BS, CS-MW9-CC, CS-MW11A-LGR, CS-MW11B-LGR, CS-MW18-LGR, CS-MW1-LGR, CS-MW1-CC, CS-MW2-LGR, CS-MW2-CC, CS-MW12-LGR, CS-MW12-CC, CS-MW17-LGR, CS-MW19-LGR, and CS-MW16-CC. Data was also downloaded from the northern and southern continuous-reading weather stations WS-N and WS-S. Water levels will be graphed at these wells against precipitation through 2006 and included in the annual groundwater report.	Yes.	Continue collection of transducer data and possibly install transducers in other cluster wells.
Contamination Characterization (Ground Water Contamination)	Characterize the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Facility (3.1.2).	Samples for laboratory analysis were collected from 18 of 41 CSSA wells. Of the 43 samples scheduled to be collected in 2006 13 wells or 17 samples (CS-MW4-LGR, CS-MW5-LGR, CS-MW8-LGR, CS-MW10-LGR, CS-MW12-LGR, CS-MW17-LGR, CS-MWG-LGR, CS-MW6-LGR, CS-MW7-LGR, CS-MW11B-LGR, CS-MW18-LGR, CS-4 and CS-D) were not sampled due to the water levels falling below the dedicated low-flow pumps. Well CS-9 was added to the sampling schedule in September 2006.	The horizontal and vertical extent of groundwater contamination is continuously monitored.	Continue groundwater monitoring and construct additional wells as necessary.

Activity	Objectives	Action	Objective Attained?	Recommendations
	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.	Groundwater samples were collected from wells not listed above. Samples were analyzed for the selected VOCs using USEPA method SW8260B. Wells scheduled to be sampled in June 2006 were also sampled for the 9 CSSA metals. Analyses were conducted in accordance with the AFCEE QAPP and approved variances. All RLs were below MCLs, as listed below:	Yes.	Continue sampling.
		ANALYTE / **RL (UG/L)** / **MCL (UG/L)** Chloroform 0.4 100 Chloromethane 1.3 -- Dibromochloromethane 0.5 100 1,1-DCE 1.2 7 *cis*-1,2-DCE 1.2 70 *trans*-1,2-DCE 0.6 100 Methylene Chloride 2 5 PCE 1.4 5 TCE 1.0 5		
		ANALYTE / **RL (UG/L)** / **MCL (UG/L)** Barium 5 2000 Chromium 10 100 Copper 10 1300 Nickel 10 100 Zinc 10 11000 Arsenic 5 50 Cadmium 1 3 Lead 2 15 Mercury 1 2		

Activity	Objectives	Action	Objective Attained?	Recommendations
Contamination Characterization (Ground Water 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 AFCEE approval was obtained.	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
		Previously, 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.
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.

Activity	Objectives	Action	Objective Attained?	Recommendations
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. A chemist verified all data.	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 quarterly groundwater report and will be reported in future quarterly groundwater reports. Additional information covering the CSSA monitoring program is available in Volume 5, CSSA Environmental Encyclopedia.	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, and verification and data review and reports is provided in this quarterly groundwater report and will be reported in future quarterly groundwater reports. Additional information covering the CSSA monitoring program is available in Volume 5, CSSA Environmental Encyclopedia.	Yes	Continue quarterly reporting to include a schedule for sampling, analysis, validation, and verification and 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	Bi-monthly maintenance to the off-post GAC systems to be continued by Parsons' personnel. Quarterly (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

2006 QUARTERLY ON-POST GROUNDWATER ANALYTICAL RESULTS

Appendix B
2006 On-Post Groundwater VOCs and Metals Analytical Results

Well ID	Sample Date	Bromo-dichloro-methane * (ug/L)	Bromoform (ug/L)	Chloroform (ug/L)	Dibromo-chloro-methane * (ug/L)	Dichlorodi fluorometh ane (ug/L)	Dichloro-ethene, 1,1 (ug/L)	Dichloro-ethene, *cis* - 1,2 (ug/L)	Dichloro-ethene, *trans* - 1,2 (ug/L)	Dichloro-methane (methylene chloride) (ug/L)	Naphthalene (ug/L)	Tetra-chloroethene (ug/L)	Toluene (ug/L)	Trichloroeth ene (ug/L)	Vinyl chloride (ug/L)
CS-1	06/15/06	0.21U	0.22U	0.05U	0.05U	0.05U	0.07U	0.098U	0.06U	0.21U	0.25U	0.14U	0.07U	**0.46F**	0.08U
CS-2	06/13/06	0.21U	0.22U	0.05U	0.05U	0.05U	0.07U	0.098U	0.06U	0.21U	0.25U	0.14U	0.07U	0.10U	0.08U
CS-9	06/13/06	0.21U	0.22U	**1.1**	0.05U	0.05U	0.07U	0.098U	0.06U	**1.1F**	0.25U	0.14U	**0.84F**	0.10U	0.08U
	9/13/06	NA	NA	NA	NA	NA	0.074U	0.098U	0.056U	NA	NA	0.014U	NA	0.10U	0.078U
CS-10	06/22/06	**1.5**	**0.30F**	**9.4**	**0.75**	0.05U	0.07U	0.098U	0.06U	0.21U	0.25U	0.14U	**16**	0.10U	0.08U
CS-11	06/14/06	0.21U	0.22U	0.05U	0.05U	0.05U	0.07U	0.098U	0.06U	**0.24F**	0.25U	0.14U	0.07U	0.10U	0.08U
Duplicate	06/14/06	0.21U	0.22U	0.05U	0.05U	0.05U	0.07U	0.098U	0.06U	**0.23F**	0.25U	0.14U	0.07U	0.10U	0.08U
CS-MW16-LGR	03/14/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	**58**	**1.5**	**0.21F**	0.23U	**53**	0.17U	**59**	0.21U
	9/12/06	NA	NA	NA	NA	NA	0.074U	**68***	**0.39F**	NA	NA	**54**	NA	**64***	0.078U
CS-MW16-CC	03/14/06	0.19U	0.2U	0.15U	0.19U	0.19U	**0.37F**	**68**	**23**	0.17U	0.23U	**0.86F**	**160**	**12**	**0.33F**
	9/12/06	NA	NA	NA	NA	NA	**0.47F**	**100**	**34**	NA	NA	0.14U	NA	**7.8**	**0.57F**
CS-D	03/16/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17M	**52**	**0.88**	**0.19F**	0.23U	**53**	0.17U	**49**	0.21U
CS-I	06/12/06	0.21U	0.22U	0.05U	0.05U	0.05U	0.07U	0.098U	0.06U	**0.60F**	0.25U	0.14U	0.07U	0.10U	0.08U
CS-MW1-LGR	03/14/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	**20**	**0.62**	**0.19F**	0.23U	**12**	0.17U	**26**	0.21U
	9/12/06	NA	NA	NA	NA	NA	0.074U	**18**	**0.23F**	NA	NA	**10**	NA	**26**	0.078U
CS-MW2-LGR	3/14/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	**1.8**	0.16U	**0.24F**	0.23U	**0.32**	**2.5**	**0.22F**	0.21U
	9/13/06	NA	NA	NA	NA	NA	0.074U	**1.6**	0.056U	NA	NA	**0.23F**	NA	**0.24F**	0.078U
Duplicate	9/13/06	NA	NA	NA	NA	NA	0.074U	**1.6**	0.056U	NA	NA	**0.23F**	NA	**0.22F**	0.078U
CS-MW3-LGR	03/17/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17M	0.2U	0.16U	**0.25F**	0.23M	0.17U	0.17U	0.16U	0.21U
	9/12/06	NA	NA	NA	NA	NA	0.074U	0.098U	0.056U	NA	NA	0.14U	NA	0.10U	0.078U
CS-MW5-LGR	9/13/06	NA	NA	NA	NA	NA	0.074U	**0.81F**	0.056U	NA	NA	**0.54F**	NA	**0.76F**	0.078U
CS-MW6-LGR	03/15/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	0.2U	0.16U	0.17U	0.23U	0.17U	0.17U	0.16U	0.21U
CS-MW7-LGR	03/15/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	0.2U	0.16U	0.17U	0.23U	0.17U	0.17U	0.16U	0.21U
CS-MW9-LGR	03/17/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	0.2U	0.16U	0.17U	0.23U	**0.20F**	0.17U	0.16U	0.21U
	9/12/06	NA	NA	NA	NA	NA	0.074U	0.098U	0.056U	NA	NA	0.14U	NA	0.10U	0.078U
CS-MW11A-LGR	03/17/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17U	0.2U	0.16U	**0.22F**	0.23U	0.17U	0.17U	0.16U	0.21U
	9/13/06	NA	NA	NA	NA	NA	0.074U	0.098U	0.056U	NA	NA	**1.2F**	NA	0.10U	0.078U
CS-MW19-LGR	03/16/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17M	0.2U	0.16U	**0.35F**	0.23U	**0.37F**	0.17U	0.16U	0.21U
Duplicate	03/16/06	0.19U	0.2U	0.15U	0.19U	0.19U	0.17M	0.2U	0.16U	**0.19F**	0.23U	**0.33F**	0.17U	0.16U	0.21U
	9/13/06	NA	NA	NA	NA	NA	0.074U	0.098U	0.056U	NA	NA	**0.37F**	NA	0.10U	0.078U

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

Appendix B
2006 On-Post Groundwater VOCs and Metals 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)	Nickel (mg/L)	Zinc (mg/L)
CS-1	06/15/06	**0.0004F**	**0.032**	0.00004U	0.0026U	0.0045U	**0.00098F**	0.000027U	0.0078U	**0.22**
CS-9	06/13/06	**0.0011F**	**0.034**	**0.000072F**	**0.0088F**	**0.028**	**0.018**	**0.0059**	**0.008F**	**3.4**
	9/13/06	**0.00036F**	**0.036**	**0.00011F**	0.0026U	**0.0079F**	**0.028**	**0.00036F**	0.0078U	**1.7**
CS-10	06/22/06	**0.00063F**	**0.046**	0.00004U	0.0026U	0.0045U	**0.00071F**	**0.00058F**	0.0078U	**0.43**
CS-11	06/14/06	**0.00026F**	**0.021**	0.00004U	0.0026U	0.0045U	**0.014**	0.000027U	0.0078U	**0.83**
Duplicate	06/14/06	**0.00028F**	**0.022**	**0.000087F**	0.0026U	0.0045U	**0.013**	0.000027U	0.0078U	**0.92**
CS-I	06/12/06	**0.00041F**	**0.14**	0.00004U	0.0026U	**0.012**	**0.002**	0.000027U	0.0078U	**0.040F**

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

Notes:
- ug/L = micrograms per liter
- * Chlorination byproducts in water supply well (referenced in SWDA drinking water regulations as THMs, or trihalomethanes). MCL for total concentration of THMs is 100 ug/L.
- 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.
- R = The data are unusable with deficiencies in the ability to analyze the sample and meet QC criteria.
- U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection.
- M = Indicates a failure on the matrix spike and/or matrix spike duplicate samples.
- NA = Not analyzed for this parameter.

Samples analyzed by Severn Trent Laboratories.

APPENDIX C

2006 QUARTERLY OFF-POST GROUNDWATER ANALYTICAL RESULTS

Appendix C
2006 Off-Post Groundwater VOC Analytical Results

Well ID	Sample Date	Bromo-dichloro-methane * (ug/L)	Bromoform (ug/L)	Chloroform* (ug/L)	Dibromo-chloro-methane * (ug/L)	Dichlorodifluoromethane (ug/L)	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Dichloro-methane (methylene chloride) (ug/L)	Naphthalene (ug/L)	Tetra-chloroethene (ug/L)	Toluene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)
MCL	**--**	**80***	**80***	**80***	**80***	**--**	**7**	**70**	**100**	**5**	**--**	**5**	**1000**	**5**	**2**
DOM-2	3/22/2006	0.06M	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	0.06U	0.06U	0.05U	0.08U
FO-8	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	0.06U	0.06U	0.05U	0.08U
FO-17	6/19/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U
FO-22	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
FO-J1	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	**0.08F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.36F**	NA	0.05U	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.40F**	NA	0.05U	0.08U
HS-1	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.13F**	NA	0.05U	0.08U
HS-2	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.15F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.07F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
HS-3	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	0.06U	0.06U	0.05U	0.08U
I10-2	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	0.06U	0.06U	0.05U	0.08U
I10-4	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.18F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	0.06U	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.62F**	NA	**0.29F**	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.84F**	NA	**0.48F**	0.08U
Duplicate	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.95F**	NA	**0.49F**	0.08U
I10-5	12/14/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
Duplicate	12/14/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
I10-7	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.10F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
I10-8	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
JW-5	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.14F**	0.07U	0.06U	0.06U	0.05U	0.08U
JW-6	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U
JW-7	3/21/2006	0.06U	0.13U	0.06U	0.06U	**0.15F**	0.12U	0.07U	0.08U	**1.20F**	0.07U	**0.42F**	0.06U	0.05U	0.08U
	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	**0.56F**	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.77F**	NA	0.05U	0.08U
JW-8	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.12F**	0.07U	**0.32F**	0.06U	0.05U	0.08U
Duplicate	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.16F**	0.07U	**0.25F**	0.06U	0.05U	0.08U
	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.40F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.43F**	NA	0.05U	0.08U
	12/13/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.35F**	NA	0.05U	0.08U
JW-9	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.13F**	0.07U	0.06U	0.06U	0.05U	0.08U
JW-12	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
JW-13	6/20/2006	0.06M	0.13U	0.06U	0.06U	.011M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U
Duplicate	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U

Appendix C
2006 Off-Post Groundwater VOC Analytical Results

Well ID	Sample Date	Bromo-dichloro-methane * (ug/L)	Bromoform (ug/L)	Chloroform* (ug/L)	Dibromo-chloro-methane * (ug/L)	Dichlorodifluoromethane (ug/L)	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Dichloro-methane (methylene chloride) (ug/L)	Naphthalene (ug/L)	Tetra-chloroethene (ug/L)	Toluene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)
MCL	**--**	**80***	**80***	**80***	**80***	**--**	**7**	**70**	**100**	**5**	**--**	**5**	**1000**	**5**	**2**
JW-14	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.10F**	0.07U	0.06U	**0.14F**	0.05U	0.08U
	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/14/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.07F**	NA	0.05U	0.08U
JW-15	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.13F**	0.07U	0.06U	0.06U	0.05U	0.08U
JW-26	12/13/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
JW-27	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.10F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.07F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.09F**	NA	0.05U	0.08U
JW-28	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.15F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	0.06U	**0.14F**	0.05U	0.08U
Duplicate	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	0.06U	**0.12F**	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
Duplicate	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
JW-29	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.09M**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/20/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
JW-30	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.13F**	0.07U	**0.16F**	0.06U	0.05U	0.08U
	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.22F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
LS-2	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.17F**	0.07U	**1.35F**	0.06U	**0.36F**	0.08U
	6/21/2006	0.06U	0.13U	**0.10F**	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	1.71	0.06U	**0.58F**	0.08U
LS-2/LS-3-A1	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	0.06U	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
LS-2/LS-3-A2	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.11F**	0.07U	0.06U	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
LS-3	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	**0.92F**	0.06U	**0.20F**	0.08U
	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.92F**	0.06U	**0.34F**	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.99J**	NA	**0.54J**	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.93F**	NA	**0.61F**	0.08U
LS-4	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.18F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.09F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/12/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.09F**	NA	0.05U	0.08U
LS-5	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.13F**	0.07U	0.06U	0.06U	**0.14F**	0.08U
	6/19/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	0.06U	0.06U	**0.09F**	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U

Appendix C
2006 Off-Post Groundwater VOC Analytical Results

Well ID	Sample Date	Bromo-dichloro-methane * (ug/L)	Bromoform (ug/L)	Chloroform* (ug/L)	Dibromo-chloro-methane * (ug/L)	Dichlorodifluoromethane (ug/L)	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Dichloro-methane (methylene chloride) (ug/L)	Naphthalene (ug/L)	Tetra-chloroethene (ug/L)	Toluene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)
MCL	--	**80***	**80***	**80***	**80***	--	**7**	**70**	**100**	**5**	--	**5**	**1000**	**5**	**2**
LS-6	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.09F**	0.07U	**1.22F**	0.06U	**0.69F**	0.08U
	6/19/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51M	0.07M	**0.95F**	0.06U	**0.95F**	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	1.8	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.69F**	NA	1.6	0.08U
LS-6-A2	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.12F**	0.07U	0.06U	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
LS-7	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.12F**	0.07U	2.74	0.06U	**0.29F**	0.08U
	6/19/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	3.38	0.06U	**0.21F**	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	2.98	NA	0.05U	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	2.59	NA	**0.34F**	0.08U
LS-7-A2	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.10F**	0.07U	0.06U	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
OFR-1	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	**0.35F**	0.06U	0.05U	0.08U
	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.44F**	0.06U	0.05U	0.08U
Duplicate	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.37F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.28F**	NA	0.05U	0.08U
Duplicate	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.28F**	NA	0.05U	0.08U
	12/14/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.33F**	NA	0.05U	0.08U
OFR-2	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.15F**	0.07U	**0.28F**	0.06U	0.05U	0.08U
OFR-3	3/22/2006	0.06U	0.13U	0.06U	0.06U	**0.61F**	0.12U	0.07U	0.08U	**1.15F**	0.07U	**0.35F**	0.06U	**0.46F**	0.08U
Duplicate	3/22/2006	0.06U	0.13U	0.06U	0.06U	**0.66F**	0.12U	0.07U	0.08U	**1.15F**	0.07U	**0.41F**	0.06U	**0.52F**	0.08U
	6/19/2006	0.06M	0.13U	0.06U	0.06U	**1.54M**	0.12U	0.07M	0.08U	0.51M	0.07M	**0.57F**	0.06U	**0.60F**	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	2.41	NA	2	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	4.32	NA	3.28	0.08U
OFR-3-A2	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	0.06U	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
OFR-4	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	0.51U	0.07U	0.06U	0.06U	0.05U	0.08U
Duplicate	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.14F**	0.07U	0.06U	0.06U	0.05U	0.08U
RFR-3	12/13/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
RFR-4	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.26F**	0.07U	0.06U	0.06U	0.05U	0.08U
RFR-5	3/21/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.27F**	0.07U	0.06U	0.06U	0.05U	0.08U
RFR-8	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	0.06U	0.06U	0.05U	0.08U
RFR-9	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
Duplicate	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
RFR-10	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	**0.64F**	0.08U	**1.12F**	0.07U	6.27	0.06U	2.76	0.08U
	6/19/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	**0.15M**	0.08U	0.51M	0.07M	10.85	0.06U	2.88	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	**0.33F**	0.08U	NA	NA	5.23	NA	1.86	0.08U
Duplicate	9/18/06	NA	NA	NA	NA	NA	0.12U	**0.36F**	0.08U	NA	NA	5.4	NA	1.83	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	**0.67F**	0.08U	NA	NA	2.37	NA	1.3	0.08U
RFR-10-A2	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.14F**	0.07U	0.06U	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U

Appendix C
2006 Off-Post Groundwater VOC Analytical Results

Well ID	Sample Date	Bromo-dichloro-methane * (ug/L)	Bromoform (ug/L)	Chloroform* (ug/L)	Dibromo-chloro-methane * (ug/L)	Dichlorodifluoromethane (ug/L)	1,1-Dichloro-ethene (ug/L)	*cis*-1,2-Dichloro-ethene (ug/L)	*trans*-1,2-Dichloro-ethene (ug/L)	Dichloro-methane (methylene chloride) (ug/L)	Naphthalene (ug/L)	Tetra-chloroethene (ug/L)	Toluene (ug/L)	Trichloroethene (ug/L)	Vinyl chloride (ug/L)
MCL	**--**	**80***	**80***	**80***	**80***	**--**	**7**	**70**	**100**	**5**	**--**	**5**	**1000**	**5**	**2**
RFR-10-B2	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.10F**	0.07U	0.06U	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
RFR-11	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.08F**	0.07U	**0.33F**	0.06U	**1.39**	0.08U
	6/19/2006	0.06M	0.13U	0.06U	0.06U	0.11M	0.12U	0.07M	0.08U	0.51M	0.07M	**0.33F**	0.06U	**1.5**	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	**1.47**	0.08U
	12/11/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.34F**	NA	**1.72**	0.08U
RFR-11-A2	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.12F**	0.07U	0.06U	0.06U	0.05U	0.08U
Duplicate	3/20/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.10F**	0.07U	0.06U	0.06U	0.05U	0.08U
	9/18/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
RFR-12	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.21F**	0.07U	0.06U	0.06U	0.05U	0.08U
RFR-13	3/22/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.15F**	0.07U	0.06U	0.06U	0.05U	0.08U
	6/22/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	0.06U	0.06U	0.05U	0.08U
RFR-14	3/23/2006	0.06U	0.13U	0.06U	0.06U	0.11U	0.12U	0.07U	0.08U	**1.19F**	0.07U	**0.20F**	0.06U	0.05U	0.08U
	6/21/2006	0.06U	0.13U	0.06U	0.06U	0.11M	0.12U	0.07U	0.08U	0.51U	0.07M	**0.24F**	0.06U	0.05U	0.08U
	9/19/06	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	0.06U	NA	0.05U	0.08U
	12/14/2006	NA	NA	NA	NA	NA	0.12U	0.07U	0.08U	NA	NA	**0.20F**	NA	0.05U	0.08U

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

Notes:
- ug/L = micrograms per liter
-B = Analyte was found in sample as well as associated blank.
- 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.
- R = The data are unusable with deficiencies in the ability to analyze the sample and meet QC criteria.
- M = Indicates a failure on the matrix spike and/or matrix spike duplicate samples.
- 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.
- All VOCs analyzed by method SW 8260B
All samples were analyzed by APPL Laboratories.

APPENDIX D
PRE- AND POST-GAC SAMPLE COMPARISONS FOR WELLS LS-6, LS-7, RFR-10, RFR-11, LS-2/LS-3 AND OFR-3

LS-2/LS-3					LS-6				
	PCE (µg/L)		TCE (µg/L)			PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post	Date	Pre	Post	Pre	Post
3/23/06	1.35/0.92	ND/ND	0.36/0.2	ND/ND	3/20/06	1.22	ND	0.69	ND
6/21/06	1.71/0.92	NA	0.58/0.34	NA	6/19/06	0.95	NA	0.95	NA
9/19/06	NA/0.99	ND	NA/0.54	ND	9/18/06	ND	ND	1.8	ND
12/12/06	NA/0.93	NA	NA/0.61	NA	12/11/06	0.69	NA	1.6	NA

LS-7					OFR-3				
	PCE (µg/L)		TCE (µg/L)			PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post	Date	Pre	Post	Pre	Post
3/20/06	2.74	ND	0.29	ND	3/22/06 & FD	0.35/0.41	ND	0.46/0.52	ND
6/19/06	3.38	NA	0.21	NA	6/19/06	0.57	NA	0.60	NA
9/18/06	2.98	ND	ND	ND	9/18/06	2.41	ND	2.0	ND
12/11/06	2.59	NA	0.34	NA	12/11/06	4.32	NA	3.28	NA

RFR-10					RFR-11				
	PCE (µg/L)		TCE (µg/L)			PCE (µg/L)		TCE (µg/L)	
Date	Pre	Post	Pre	Post	Date	Pre	Post	Pre	Post
3/20/06	6.27	ND	2.76	ND	3/20/06 & FD	0.33	ND/ND	1.39	ND/ND
6/19/06	10.85	NA	2.88	NA	6/19/06	0.33	NA	1.5	NA
9/18/06 & FD	5.23/5.4	ND	1.86/1.83	ND	9/18/06	ND	ND	1.47	ND
12/11/06	2.37	NA	1.3	NA	12/11/06	0.34	NA	1.72	ND

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

APPENDIX E

2006 WESTBAY® ANALYTICAL RESULTS

Appendix E
2006 Westbay Analytical Results

Well ID	Date Sampled	2-Butanone	Acetone	*cis*-1,2-DCE	IPA	PCE	Toluene	*trans*-1,2-DCE	TCE	1,1-DCE	Vinyl Chloride
CS-WB01-UGR-01	3/14/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB01-UGR-01	9/27/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB01-LGR-01	3/14/06	<5.0	<5.0	<0.098	<5.0	**4.35**	<0.6	<0.056	<0.1	NA	NA
CS-WB01-LGR-01	9/27/06	NA	NA	<0.098	NA	**2.7**	NA	<0.056	**1.8**	<0.074	<0.078
CS-WB01-LGR-02	3/14/06	<5.0	<5.0	<0.098	<5.0	**8.85**	<0.6	<0.056	**3.82**	NA	NA
CS-WB01-LGR-02	9/27/06	NA	NA	<0.098	NA	**5.7**	NA	<0.056	**2.5**	<0.074	<0.078
CS-WB01-LGR-03	3/14/06	<5.0	**21.2**	<0.098	<5.0	**2.37**	<0.6	<0.056	**5.7**	NA	NA
CS-WB01-LGR-03	9/27/06	NA	NA	<0.098	NA	**2.4**	NA	<0.056	**5.8**	<0.074	<0.078
CS-WB01-LGR-04	3/14/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB01-LGR-04	9/27/06	NA	NA	<0.098	NA	**0.2**	NA	<0.056	**0.2**	<0.074	<0.078
CS-WB01-LGR-05	3/14/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB01-LGR-05	9/27/06	NA	NA	<0.098	NA	<0.14	NA	<0.056	**0.21**	<0.074	<0.078
CS-WB01-LGR-06	3/14/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	**0.66**	NA	NA
CS-WB01-LGR-06	9/27/06	NA	NA	<0.098	NA	**0.39**	NA	<0.056	**0.6**	<0.074	<0.078
CS-WB01-LGR-07	3/14/06	<5.0	**5.62**	<0.098	<5.0	**9.95**	<0.6	<0.056	**9.97**	NA	NA
CS-WB01-LGR-07	9/27/06	NA	NA	<0.098	NA	**18**	NA	<0.056	**14**	<0.074	<0.078
CS-WB01-LGR-08	3/14/06	<5.0	<5.0	<0.098	<5.0	**0.74**	<0.6	<0.056	**1.25**	NA	NA
CS-WB01-LGR-08	9/27/06	NA	NA	<0.098	NA	**0.56**	NA	<0.056	**0.94**	<0.074	<0.078
CS-WB01-LGR-09	3/14/06	<5.0	<5.0	**0.41**	<5.0	**12.1**	<0.6	<0.056	**18.7**	NA	NA
CS-WB01-LGR-09	9/27/06	NA	NA	**0.31**	NA	**10**	NA	<0.056	**17**	<0.074	<0.078
CS-WB02-UGR-01	3/14/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB02-UGR-01	9/27/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB02-LGR-01	3/14/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB02-LGR-01	9/27/06	NA	NA	<0.098	NA	**10**	NA	<0.056	**4**	<0.074	<0.078
CS-WB02-LGR-02	3/14/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB02-LGR-02	9/27/06	NA	NA	dry	NA	dry	NA	dry	dry	dry	dry
CS-WB02-LGR-03	3/14/06	<5.0	<5.0	<0.098	<5.0	**3.79**	<0.6	<0.056	**1.63**	NA	NA
CS-WB02-LGR-03	9/27/06	NA	NA	<0.098	NA	**3.6**	NA	<0.056	**2.1**	<0.074	<0.078
CS-WB02-LGR-04	3/14/06	<5.0	<5.0	<0.098	<5.0	**2.8**	<0.6	<0.056	**9.55**	NA	NA
CS-WB02-LGR-04	9/27/06	NA	NA	<0.098	NA	**2.9**	NA	<0.056	**12**	<0.074	<0.078
CS-WB02-LGR-05	3/14/06	<5.0	<5.0	<0.098	<5.0	**0.92**	<0.6	<0.056	**3.61**	NA	NA
CS-WB02-LGR-05	9/27/06	NA	NA	<0.098	NA	**0.96**	NA	<0.056	**4.4**	<0.074	<0.078
CS-WB02-LGR-06	3/14/06	<5.0	<5.0	<0.098	<5.0	**1.13**	<0.6	<0.056	**3.55**	NA	NA
CS-WB02-LGR-06	9/27/06	NA	NA	<0.098	NA	**0.98**	NA	<0.056	**6.3**	<0.074	<0.078
CS-WB02-LGR-07	3/14/06	<5.0	<5.0	<0.098	<5.0	**1.0**	<0.6	<0.056	**0.65**	NA	NA
CS-WB02-LGR-07	9/27/06	NA	NA	<0.098	NA	**0.9**	NA	<0.056	**0.63**	<0.074	<0.078
CS-WB02-LGR-08	3/14/06	<5.0	<5.0	<0.098	<5.0	**2.4**	<0.6	<0.056	**1.99**	NA	NA
CS-WB02-LGR-08	9/27/06	NA	NA	<0.098	NA	**2.7**	NA	<0.056	**2.2**	<0.074	<0.078
CS-WB02-LGR-09	3/14/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB02-LGR-09	9/27/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB03-UGR-01	3/16/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB03-UGR-01	9/28/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB03-LGR-01	3/16/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB03-LGR-01	9/28/06	NA	NA	dry	NA	dry	NA	dry	dry	dry	dry
CS-WB03-LGR-02	3/16/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB03-LGR-02	9/28/06	NA	NA	dry	NA	dry	NA	dry	dry	dry	dry
CS-WB03-LGR-03	3/16/06	<5.0	<5.0	**0.53**	<5.0	**31.7**	<0.6	<0.056	**16.3**	NA	NA
CS-WB03-LGR-03	9/28/06	NA	NA	**0.4**	NA	**23**	NA	<0.056	**10**	<0.074	<0.078
CS-WB03-LGR-04	3/16/06	<5.0	<5.0	**0.2**	<5.0	**25.1**	<0.6	<0.056	**11.3**	NA	NA
CS-WB03-LGR-04	9/28/06	NA	NA	<0.098	NA	**22**	NA	<0.056	**9.5**	<0.074	<0.078
CS-WB03-LGR-05	3/16/06	<5.0	<5.0	<0.098	<5.0	**21.1**	<0.6	<0.056	**4.59**	NA	NA
CS-WB03-LGR-05	9/28/06	NA	NA	<0.098	NA	**19**	NA	<0.056	**7**	<0.074	<0.078
CS-WB03-LGR-06	3/16/06	<5.0	<5.0	<0.098	<5.0	**21.1**	<0.6	<0.056	**2.9**	NA	NA
CS-WB03-LGR-06	9/28/06	NA	NA	<0.098	NA	**15**	NA	<0.056	**2.1**	<0.074	<0.078
CS-WB03-LGR-07	3/16/06	<5.0	<5.0	<0.098	<5.0	**16.8**	<0.6	<0.056	**3.69**	NA	NA
CS-WB03-LGR-07	9/28/06	NA	NA	<0.098	NA	**9.2**	NA	<0.056	**1.5**	<0.074	<0.078
CS-WB03-LGR-08	3/16/06	<5.0	<5.0	<0.098	<5.0	**20.4**	<0.6	<0.056	**1.95**	NA	NA
CS-WB03-LGR-08	9/28/06	NA	NA	<0.098	NA	**11**	NA	<0.056	**1.1**	<0.074	<0.078
CS-WB03-LGR-09	3/16/06	<5.0	<5.0	<0.098	<5.0	**12.7**	<0.6	<0.056	**8.05**	NA	NA
CS-WB03-LGR-09	9/28/06	NA	NA	<0.098	NA	**11**	NA	<0.056	**6.8**	<0.074	<0.078
CS-WB04-UGR-01	3/21/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB04-UGR-01	9/28/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB04-LGR-01	3/21/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB04-LGR-01	9/28/06	NA	NA	<0.098	NA	**0.44**	NA	<0.056	<0.1	<0.074	<0.078
CS-WB04-LGR-02	3/21/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB04-LGR-02	9/28/06	NA	NA	dry	NA	dry	NA	dry	dry	dry	dry
CS-WB04-LGR-03	3/21/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB04-LGR-03	9/28/06	NA	NA	<0.098	NA	**0.2**	NA	<0.056	<0.1	<0.074	<0.078
CS-WB04-LGR-04	3/21/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB04-LGR-04	9/28/06	NA	NA	<0.098	NA	**0.17**	NA	<0.056	<0.1	<0.074	<0.078
CS-WB04-LGR-05	3/21/06	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
CS-WB04-LGR-05	9/28/06	NA	NA	dry	NA	dry	NA	dry	dry	dry	dry
CS-WB04-LGR-06	3/21/06	<5.0	<5.0	**1.57**	<5.0	<0.14	<0.6	<0.056	**2.91**	NA	NA
CS-WB04-LGR-06	9/28/06	NA	NA	**3.0**	NA	**0.65**	NA	**0.27**	**8.2**	<0.074	<0.078
CS-WB04-LGR-07	3/21/06	<5.0	<5.0	**0.71**	<5.0	**1.14**	<0.6	<0.056	**2.09**	NA	NA
CS-WB04-LGR-07	9/28/06	NA	NA	**2.3**	NA	**0.87**	NA	**0.24**	**5.8**	<0.074	<0.078
CS-WB04-LGR-08	3/21/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB04-LGR-08	9/28/06	NA	NA	<0.098	NA	**0.43**	NA	<0.056	**1.1**	<0.074	<0.078
CS-WB04-LGR-09	3/21/06	<5.0	<5.0	**0.21**	<5.0	**7.99**	<0.6	<0.056	**7.89**	NA	NA
CS-WB04-LGR-09	9/28/06	NA	NA	<0.098	NA	**7.4**	NA	<0.056	**8.6**	<0.074	<0.078
CS-WB04-LGR-10	3/21/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB04-LGR-10	9/28/06	NA	NA	<0.098	NA	**0.94**	NA	<0.056	**0.6**	<0.074	<0.078
CS-WB04-LGR-11	3/21/06	<5.0	<5.0	<0.098	<5.0	<0.14	<0.6	<0.056	<0.1	NA	NA
CS-WB04-LGR-11	9/28/06	NA	NA	<0.098	NA	**1.1**	NA	<0.056	<0.1	<0.074	<0.078

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

All samples were analyzed by DHL as screening data.
All values are reported in µg/L
- NA = sample was not analyzed for that parameter.

APPENDIX F

WELL CS-9 REHABILITATION SUMMARY

DEPARTMENT OF THE ARMY
CAMP STANLEY STORAGE ACTIVITY, MCAAP
25800 RALPH FAIR ROAD, BOERNE, TX 78015-4800

January 5, 2007

U-022-07

Mr. David Laughlin
Texas Commission on Environmental Quality
Water Supply Division
P.O. Box 13087 (MC-153)
Austin, TX 78711-3087

Subject: Supplementary Reconditioning of Production Well CS-9, Camp Stanley Storage activity, Boerne Texas
PWS I.D. 0150117

Dear Mr. Laughlin:

The Camp Stanley Storage Activity (CSSA), McAlester Army Ammunition Plant, US Army Field Support Command, Army Materiel Command, U.S. Army is submitting notification of our plans to recondition groundwater supply well CS-9 in mid-January 2007.

CSSA completed the general rehabilitation/maintenance on Well CS-9 in June 2006. Results from the quarterly groundwater monitoring taken that same month revealed concentrations of lead and mercury above the MCL. Further investigation was conducted. CSSA has been sampling Well CS-9 for approximately 10 years to ensure and enhance the post's groundwater monitoring sample data is complete.

Then investigation revealed an obstruction in Well CS-9 at approximately 553 feet. The debris appeared to be a section of 6-inch diameter steel pipe of unknown length that may have been lodged against the borehole wall by fallen rock and other debris. The metal pipe and other man-made debris may be the source of lead and mercury detected when the well was sampled in June 2006. A description of recent Well CS-9 investigation activities is included in the attached General Summary.

CSSA proposes to close the bottom of Well CS-9 by placing cement grout approximately 2 to 3 feet above the top of the pipe obstruction. This would encase the obstruction and seal off any potentially lead-containing parts from the rest of the well and circulating waters. A "neat" cement grout would be pressure-injected into Well CS-9 via tremie pipe, from the lowest depth attainable by the tremie pipe and upward in accordance with 16 Texas Administrative Code (TAC) Chapter 76, and 30 TAC Chapter 290 Subchapter D §290.41. "Neat" cement grout in this case would consist of cement without any additives mixed with 6 to 7 gallons of clean water per 94-lbs of dry Portland cement. This would insure maximum flow into the spaces, crevasses, and voids in and around the debris and surrounding borehole wall. A final lift of grout capping the sealed debris and separating it from the remaining open portion of the well above would have a 2 to 3 percent bentonite addition to prevent potential minor shrinkage and small scale cracking that might occur during curing of the cement seal.

After the grout has cured, Well CS-9 will be purged and sampled for metals. If the sample analysis results reveal metal concentrations below drinking water MCLs, then CSSA would proceed with disinfection and bacteriological analyses before returning the well to service. The grouting may cause a slight drop in well yield due to the closing of minor water-bearing zones. CSSA believes any reduction to water yield would be minimal and not affect the overall well performance and production. In addition to PWS sampling requirements, CSSA plans to continue sampling Well CS-9 for lead to supplement CSSA groundwater monitoring data as needed.

Well CS-9 is a critical component to the facility water system and the overall CSSA mission. The well serves as a supplemental water source to Wells CS-1 and CS-10. The ongoing area drought, depressed water levels, and the facility fire protection requirements are additional reasons to retain Well CS-9 as a backup supply well for future use.

If you have any questions please feel free to contact Glare Sanchez, Environmental Program Manager, at (210) 295-7416.

Sincerely,

Jason D. Shirley
Installation Manager

Attachment

cc: Ms. Glare Sanchez, CSSA Environmental Program Manager
Mr. Greg Lyssy, EPA Region 6
Mr. Sonny Rayos, TCEQ Central Office
Ms. Mary Knipfer, TCEQ Central Office
Ms. Abigail Power, TCEQ Region 13
Ms. Julie Burdey, Parsons
Ms. Kimberly Vaughn, Parsons

GENERAL SUMMARY

CSSA WELL CS-9 SUPPLEMENTARY RECONDITIONING

DECEMBER, 2006

Background. Well CS-9 is one of three groundwater production wells contributing to the Camp Stanley (CSSA) water supply. The well was originally drilled in 1918. A rehabilitation of Well CS-9 was completed in June 2006. The routine rehabilitation included replacement of the pump, column piping, wellhead valves and meters, wellhead connections, and upgrading of the surface completion. During the rehabilitation, the CS-9 borehole was found to be unstable in sections. Consequently the borehole was reamed, and an attempt was also made to deepen the well to the base of the Cow Creek Formation, which is the bottom of the Middle Trinity Aquifer. The total depth of the well at that time (before deepening) was reported in contemporary documents as 534 feet. Some older historical records list different completion depths for CS-9, some citing 601 feet and others 800 feet. According to geologic logs, the bottom of the Cow Creek at that location is estimated as 578 feet below ground surface. Well drillers (Geoprojects) reamed the well to 553 feet and encountered refusal, or, extremely hard resistance against the drill bit. Rehabilitation was then completed according to project plans and regulatory requirements and the well was returned to service.

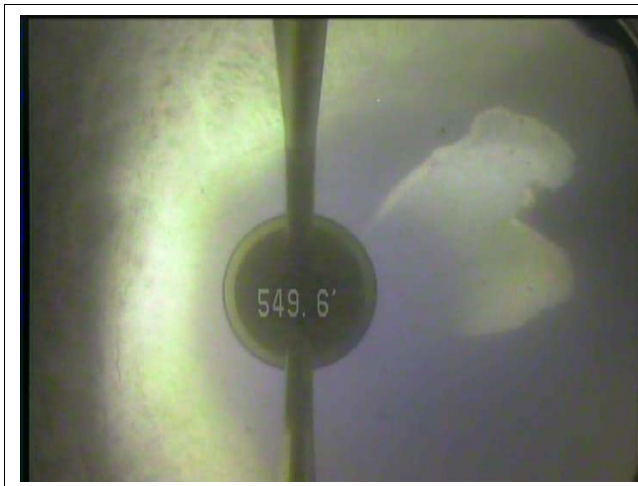
The supplemental Well CS-9 reconditioning work results from detections of lead (Pb) and mercury (Hg) in concentrations slightly above drinking water MCLs (Table attached). Well CS-9 was taken out of service immediately upon receipt of the metals analysis results. The well had reduced yield due to drought conditions and its contribution to the system reservoir was limited.

Summary. The rehabilitation at Well CS-9 was completed in June 2006. One water sample collected in June indicated elevated concentrations of lead and mercury. Sampling on subsequent dates continued to show lead concentrations above the MCL, but all subsequent mercury levels were below the MCL. The drilling contractor returned to CS-9 on October 23, 2006 to investigate the cause of the metals concentrations in the well water. The hypothesis was that broken pumps or equipment within the well could be a source of lead and mercury. Many older model pumps contained up to several pounds of mercury in their seals. If an old pump fell into the well it could be a source of mercury. The following summarizes supplemental CS-9 activities during October:

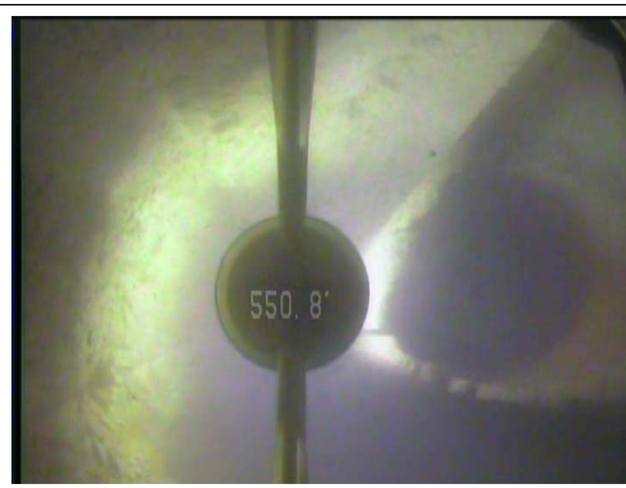
- After the initial detection of lead and mercury, additional water samples were collected from wells CS-9 and CS-10. The samples were analyzed for metals. Well CS-10 results were all far below MCLs or not detected. In CS-9 Mercury was no longer detected. Lead was detected in CS-9 water at 9.1 and 17.0 µg/l, from samples collected after 2.5 and 60 minutes of pumping, respectively. The higher lead value in the second sample may be due to an increase in suspended fine sediments in the water that were agitated by the rapid drawdown in the well. Morlandt disconnected power from CS-9 and installed disconnects on the adjacent pole after sampling was completed and power to the pump was no longer needed.

- Geoprojects removed the wellhead tree, column piping, and pump. The materials were sealed against the elements and stored on-site.
- Geoprojects attempted to capture a perceived object at bottom of CS-9 with an 8-foot overwash bit. No large debris could be removed, but it was positively determined that a steel object or debris was at the bottom of the well.
- Video in the well revealed a broken section of steel pipe in the well. The top of the pipe is at an approximate depth of 551 feet. The full length of the pipe and the actual bottom depth of the well could not be determined. The diameter of the pipe debris is estimated to be 6 inches. The original purpose of the pipe is unknown at this time.
- It is now apparent that CS-9 is much deeper than has been recorded in recent documents. Old reports (1940s & 1950s) give conflicting total depths of 601 and 800 feet for CS-9. Given the unknown total depth of the well and amount of potential infilling, the actual length of the pipe debris also remained undetermined. It could not be determined if additional debris (pipe shards, pump part, etc.) of different composition is also in the borehole beyond the maximum view of the camera.
- The debris in CS-9 was found to be much larger than at first anticipated. The unknown size of the broken pipe and unknown total depth of the well will make removal difficult to plan, and may prove costly. If the well were in fact 601 feet deep, then the pipe would be about 48 feet long, and may be jammed in the borehole by fallen rock debris and other pipe shards. The situation becomes even more critical if the well is in fact 800 feet deep as some older records indicate.
- A rough cost estimate to remove the pipe and reclean the well was worked out. The costs appear uneconomical considering the improvements in water quality and yield that might be achieved.
- Well CS-9 remains disconnected from the system and off-line.

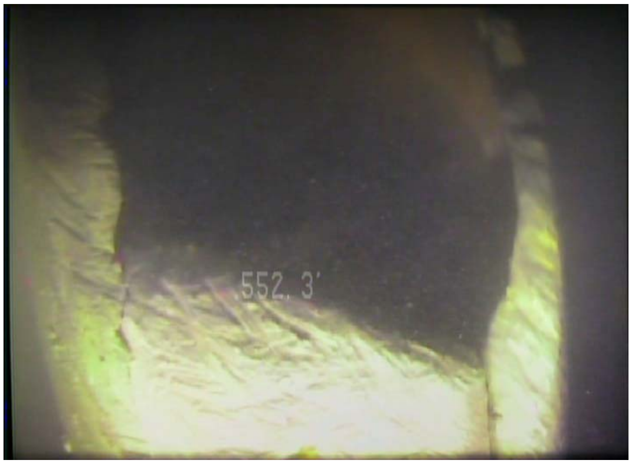
Photos with descriptions are provided below:



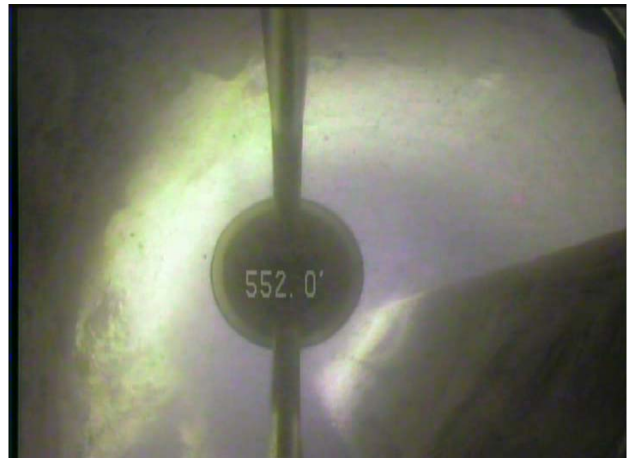
Looking down at top of pipe debris.



Broken pipe material in 10-inch diameter hole.

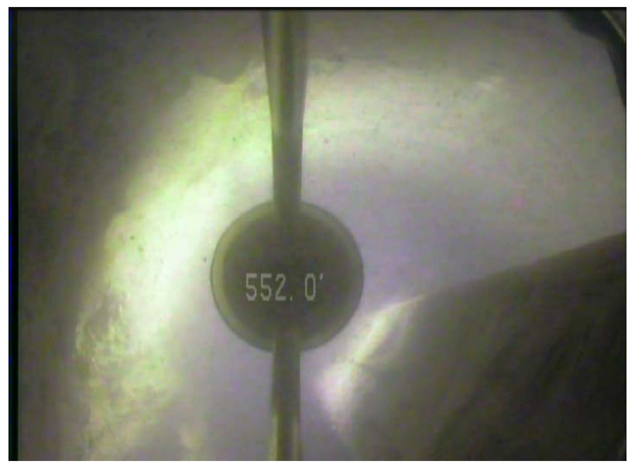


Fresh abrasions made by drill bit.



Near camera's depth limit, cannot see bottom.

Well CS-9 before rehabilitation



Near camera's depth limit, cannot see bottom.

APPENDIX G

OFF-POST WELL PLUGGING REPORTS

STATE OF TEXAS PLUGGING REPORT for Tracking #36724

Owner:	**Centex Homes**	Owner Well #:	**No Data**
Address:	**1354 N. Loop 1604 East San Antonio , TX 78232**	Grid #:	**68-19-6**
Well Location:	**27397 Ralph Fair Road Boerne , TX 78015**	Latitude:	**29° 42' 22" N**
Well County:	**Bexar**	Longitude:	**098° 37' 56" W**
		GPS Brand Used:	**No Data**

Well Type: **Water** RFR-6

HISTORICAL DATA ON WELL TO BE PLUGGED

Original Well Driller:	**No Data**
Driller's License Number of Original Well Driller:	**No Data**
Date Well Drilled:	**No Data**
Well Report Tracking Number:	**No Data**
Diameter of Well:	**6" I.D. inches**
Total Depth of Well:	**500 feet**

Date Well Plugged:	**2/26/2007**
Person Actually Performing Plugging Operation:	**Troy A. Dennis**
License Number of Plugging Operator:	**51651**
Plugging Method:	**Tremmie pipe cement from bottom to top.**
Plugging Variance #:	**No Data**
Casing Left Data:	1st Interval: **6" I.D. inches diameter, From -82 ft to -5 ft** 2nd Interval: **No Data** 3rd Interval: **No Data**
Cement/Bentonite Plugs Placed in Well:	1st Interval: **From -300 ft to -5 ft; Sack(s)/type of cement used: 3 Cubic Yards Neat Cement** 2nd Interval: **No Data** 3rd Interval: **No Data** 4th Interval: **No Data** 5th Interval: **No Data**

Certification Data:	The plug installer certified that the plug installer plugged this well (or the well was plugged under the plug installer's direct supervision) and that each and all of the statements herein are true and correct. The plug installer understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Haskin-One Pump, Ltd.**

	P.O. Box 791325 **San Antonio , TX 78279**
Plug Installer License Number:	**51651**
Licensed Plug Installer Signature:	**Troy A. Dennis**
Registered Plug Installer Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Plugging Method Comments:	**Chlorinated 3/8" Washed Pea Gravel from -500 Feet to -300 Feet Pumped Slurry Cement from -300 Feet to -5 Feet**

Please include the plugging report's tracking number (Tracking #36724) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

STATE OF TEXAS PLUGGING REPORT for Tracking #36723

Owner:	**Centex Homes**	Owner Well #:	**No Data**
Address:	**1354 N. Loop 1604 East San Antonio , TX 78232**	Grid #:	**68-19-6**
Well Location:	**27207 Ralph Fair Road Boerne , TX 78015**	Latitude:	**29° 42' 17" N**
Well County:	**Bexar**	Longitude:	**098° 37' 56" W**
		GPS Brand Used:	**No Data**

Well Type: **Water** – RFR-7

HISTORICAL DATA ON WELL TO BE PLUGGED

Original Well Driller:	**No Data**
Driller's License Number of Original Well Driller:	**No Data**
Date Well Drilled:	**No Data**
Well Report Tracking Number:	**No Data**
Diameter of Well:	**6" I.D. inches**
Total Depth of Well:	**483 feet**

Date Well Plugged:	**2/26/2007**
Person Actually Performing Plugging Operation:	**Troy A. Dennis**
License Number of Plugging Operator:	**51651**
Plugging Method:	**Tremmie pipe cement from bottom to top.**
Plugging Variance #:	**No Data**
Casing Left Data:	1st Interval: **6 inches diameter, From -203 ft to -5 ft** 2nd Interval: **No Data** 3rd Interval: **No Data**
Cement/Bentonite Plugs Placed in Well:	1st Interval: **From -300 ft to -5 ft; Sack(s)/type of cement used: 3 Cubic Yards Neat Cement** 2nd Interval: **No Data** 3rd Interval: **No Data** 4th Interval: **No Data** 5th Interval: **No Data**

Certification Data:	The plug installer certified that the plug installer plugged this well (or the well was plugged under the plug installer's direct supervision) and that each and all of the statements herein are true and correct. The plug installer understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Haskin-One Pump, Ltd.**

	P.O. Box 791325 **San Antonio , TX 78279**
Plug Installer License Number:	**51651**
Licensed Plug Installer Signature:	**Troy A. Dennis**
Registered Plug Installer Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Plugging Method Comments:	**Chlorinated 3/8" Washed Pea Gravel from -463 Feet to -300 Feet Pumped Slurry Cement from -300 Feet to -5 Feet**

-- Please include the plugging report's tracking number (Tracking #36723) on your written request.

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