FINAL

JUNE 2010

On-Post
Quarterly Groundwater Monitoring Report

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

September 2010

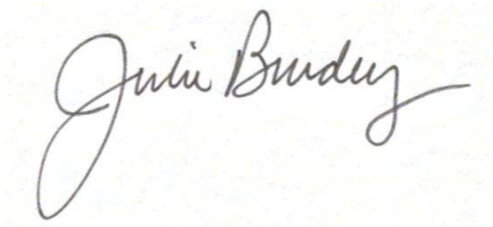
GEOSCIENTIST CERTIFICATION

June 2010 On-post Quarterly Groundwater Monitoring Report

For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

I, Julie Burdey, P.G., hereby certify that the June 2010 On-post Quarterly Groundwater Monitoring Report for the Camp Stanley Storage Activity installation in Boerne, Texas accurately represents the site conditions of the subject area. This certification is limited only to geoscientific products contained in the subject report and is made on the basis of written and oral information provided by the CSSA Environmental Office, laboratory data provided by APPL Laboratories, and field data obtained during groundwater monitoring conducted at the site in June 2010, and is true and accurate to the best of my knowledge and belief.



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

09/03/2010

Date

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EXECUTIVE SUMMARY

- All wells scheduled for sampling in June 2010 were sampled. This included twenty-two monitoring wells, two active drinking water wells, and two inactive drinking water wells.
- Samples were submitted for selected volatile organic compounds (VOC) (CSSA short list) and cadmium, chromium, lead, and mercury analyses. Active drinking water wells CS-1 and CS-10, and inactive drinking water wells CS-9 and CS-12, were also analyzed for arsenic, barium, copper, and zinc.
- Average groundwater elevations in June 2010 increased 3.97 feet from the elevations measured in March 2010, reflecting continued rebound from the past drought conditions. The average depth to water in the LGR screened wells was 102.98 feet BTOC or 1148.50 feet above MSL.
- The action level (AL) / maximum contaminant level (MCL) was exceeded for lead and mercury in well CS-9. This former drinking water well has been offline since 2006.
- The MCL was exceeded in monitoring wells CS-MW1-LGR, CS-MW16-LGR, CS-D, and CS-4 for PCE, TCE, and/or *cis*-1,2-DCE in June 2010.
- Monitoring well CS-4 had a significant increase in PCE (43.44 µg/L) and TCE (86.89 µg/L) in December 2009 which corresponded to a flood test being run at the SWMU B-3 Bioreactor. In June 2010 PCE was slightly above the MCL (5.55 µg/L). PCE has only been above the MCL three times since the well was first sampled in 1991.

JUNE 2010
GROUNDWATER MONITORING REPORT
CAMP STANLEY STORAGE ACTIVITY, TEXAS

1.0 INTRODUCTION

This report presents results from the on-post quarterly sampling performed at Camp Stanley Storage Activity (CSSA) in June 2010. Laboratory analytical results are presented along with potentiometric contour figures. The purpose of this report is to present a summary of the June 2010 sampling results. Results from all four 2010 quarterly monitoring events (March, June, September, and December) will be described in detail in an Annual Report. The Annual Report will also provide an interpretation of all analytical results and an evaluation of any temporal or spatial trends observed in the groundwater contaminant plume during investigations.

Groundwater monitoring at CSSA, scoped under the U.S. Army Corps of Engineers (USACE) Fort Worth District (CESWF), Contract W9126G-07-D-0028, Delivery Order (DO50), was performed June 8 through 14, 2010. On-post groundwater monitoring conducted under this project began with the March 2010 sampling event.

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

The CSSA groundwater monitoring program follows the provisions of the groundwater monitoring program DQOs as well as the recommendations of the **Three-Tiered Long Term Monitoring Network Optimization Evaluation (Parsons 2005)** which provided recommendations for sampling based on a long-term monitoring optimization (LTMO) study performed for the CSSA groundwater monitoring program. LTMO study sampling frequencies were implemented on-post in December 2005, as approved by the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA). The LTMO evaluation will be updated in 2010 using groundwater data from monitoring conducted between 2005 and 2009.

2.0 POST-WIDE FLOW DIRECTION AND GRADIENT

Forty-seven water level measurements were recorded on June 7, 2010 from on-post monitoring wells completed in the Lower Glen Rose (LGR), Bexar Shale (BS), and Cow Creek (CC) formations. The groundwater potentiometric surface maps illustrating groundwater elevations from the LGR, BS, and CC zones in June 2010 are shown in **Figures 2-1, 2-2, and 2-3**.

The June 2010 potentiometric surface map for LGR-screened wells exhibited a wide range of groundwater elevations, from a minimum of 1122.00 feet above mean sea level (msl) at CS-MW11B-LGR to a maximum of 1172.97 feet above msl at CS-MW4-LGR. Groundwater elevations are generally higher in the northern and central portions of CSSA, and decrease to the

southwest and southeast. Average groundwater elevations in June 2010 increased 3.97 feet from the elevations measured in March 2010, showing continuing recovery from the drought conditions for the third consecutive quarter. From March 27 to June 14, 2010, weather station north (WS-N) did not record a complete set of data due to SCADA interruptions. Weather station south (WS-S) recorded 10.66 inches of rainfall during 20 rainfall events during this timeframe. A majority of the rain (5.51 inches) fell May 14 and 15, 2010. With the above average rainfall for this specific time of year, the water table has remained steady through the beginning of the summer months.

Well CS-MW4-LGR in the central portion of CSSA has the highest groundwater elevation of LGR-screened wells. The elevation is 20 to 30 feet higher than the nearest comparable wells (CS-MW2-LGR and CS-MW5-LGR). This mounding effect was muted during the prolonged drought of 2008-2009. As rainfall increased in late 2009 and early 2010 the mounding effect returned. When groundwater in the vicinity of CS-MW4-LGR rises above about 970 feet MSL, the mounding effect is evident.

It should be noted that well pumping on and around CSSA affects the potentiometric surface. On-post wells CS-MW16-LGR, CS-MW16-CC, and B3-EXW01 were pumped periodically to the SWMU B-3 Bioreactor between March and June 2010. CSSA drinking water wells CS-1 and CS-10 are cycled on and off to maintain the drinking water system currently in place at CSSA. Influence from these pumping wells is depicted in **Figure 2-1**. Drinking water wells CS-9 and CS-11 were not in use between March and June 2010. Off-post water supply wells along Ralph Fair Road and in the Leon Springs Villas area may also exert a subtle influence to gradients along the western and southern boundaries of the post.

Historical groundwater monitoring at CSSA has demonstrated that the aquifer gradient is typically in a south-southeast direction. However, variable aquifer levels and well pumping scenarios all can affect the localized and regional gradients. In particular, pumping action at wells CS-1, CS-10, and CS-MW16-LGR/CC can significantly alter the perceived groundwater gradient. The regional gradient calculation, an overall groundwater gradient averaged across CSSA, is measured from CS-MWH-LGR to CS-MW21-LGR. For June 2010, the overall groundwater gradient is to the south-southeast at 0.00078 ft/ft.

Groundwater elevations have been measured and recorded since 1992. Previous droughts resulted in water levels decreasing substantially in 1996, 1999, 2000, 2006, 2008, and 2009. In late 2009 recovery from the effects of the 2008/2009 drought began. Water levels in June 2010 correspond closely to water levels from December 2002, when quarterly rainfall totaled 13 inches.

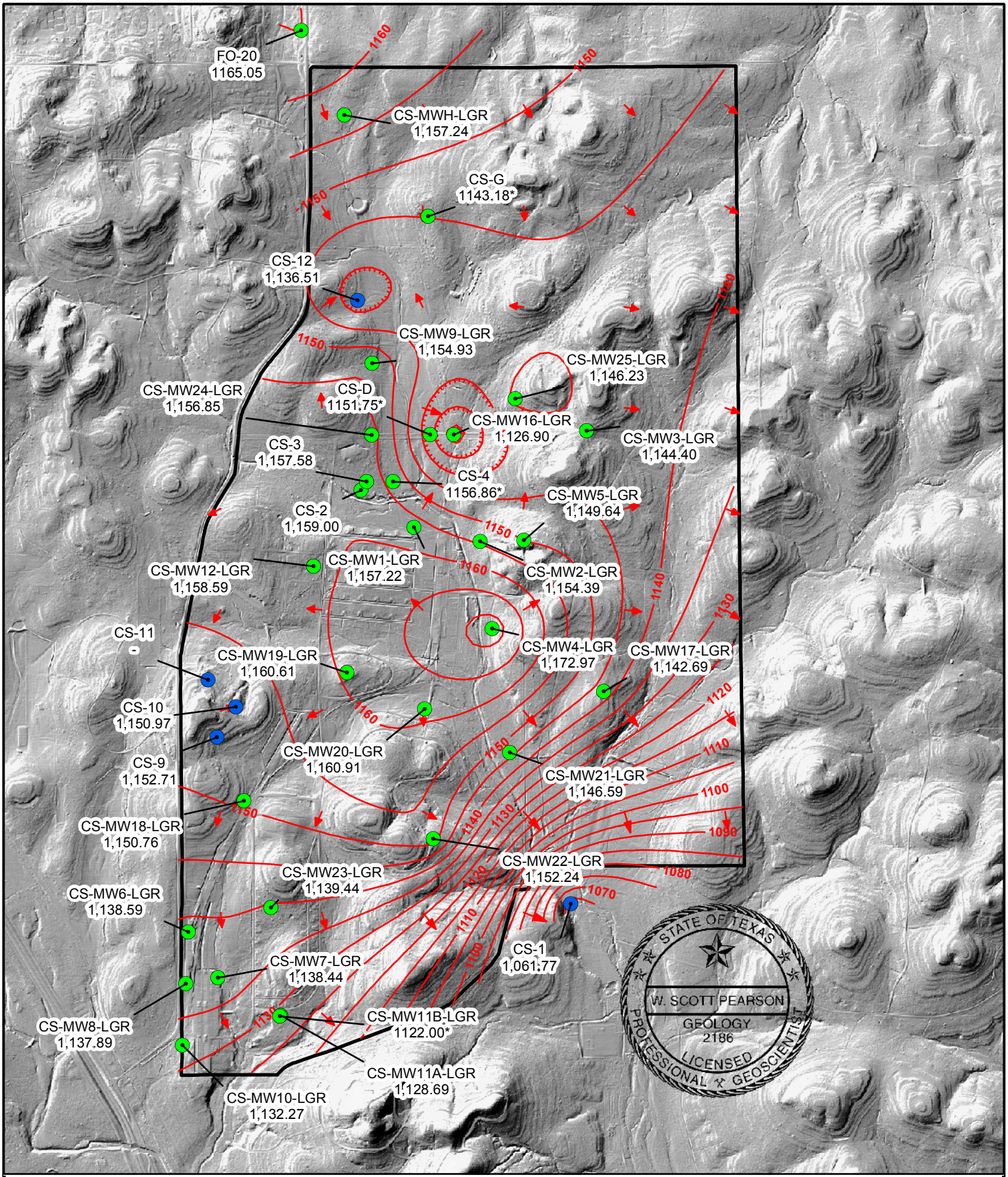

Figure 2-1

June 2010 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

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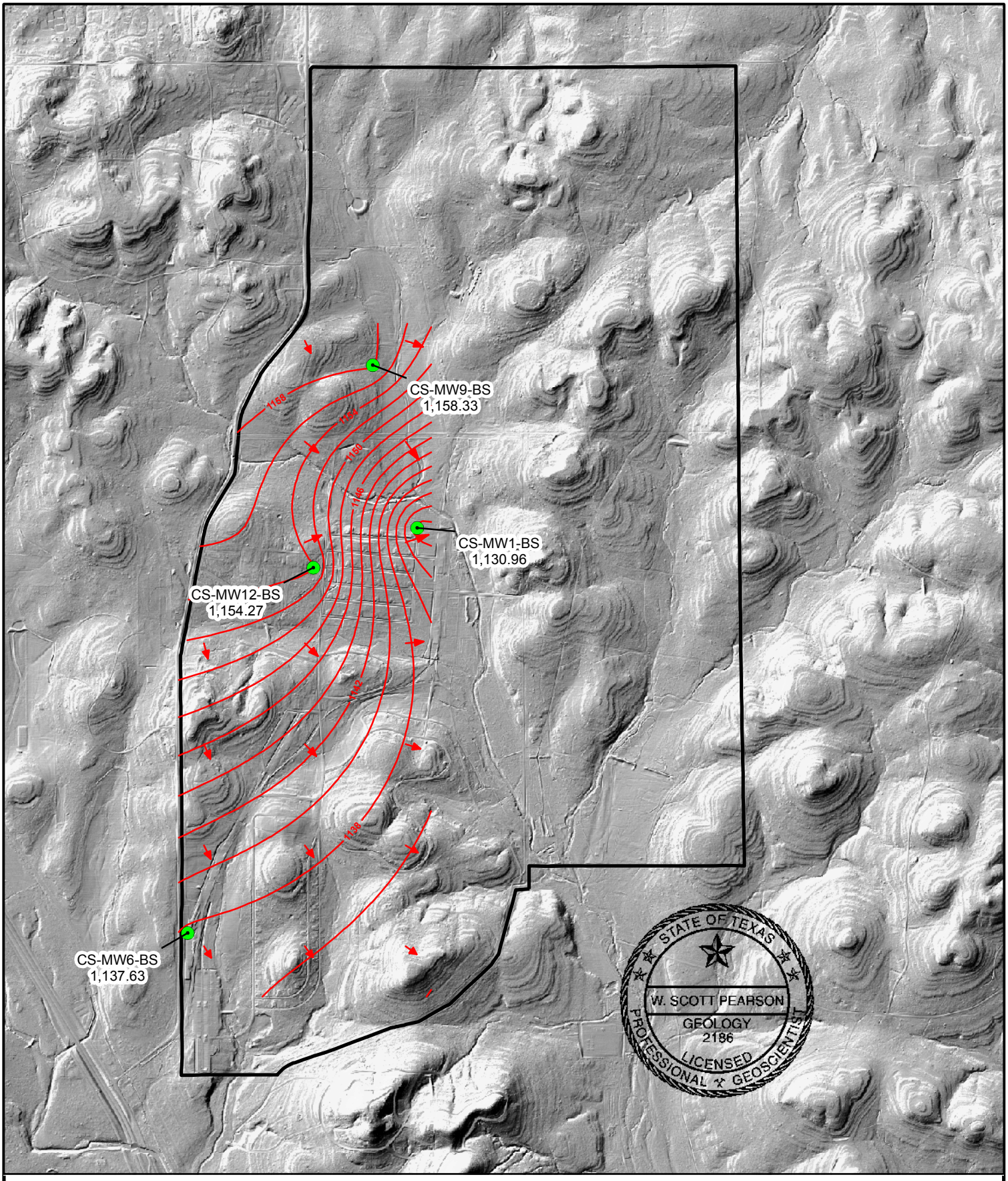

Figure 2-2

June 2010 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

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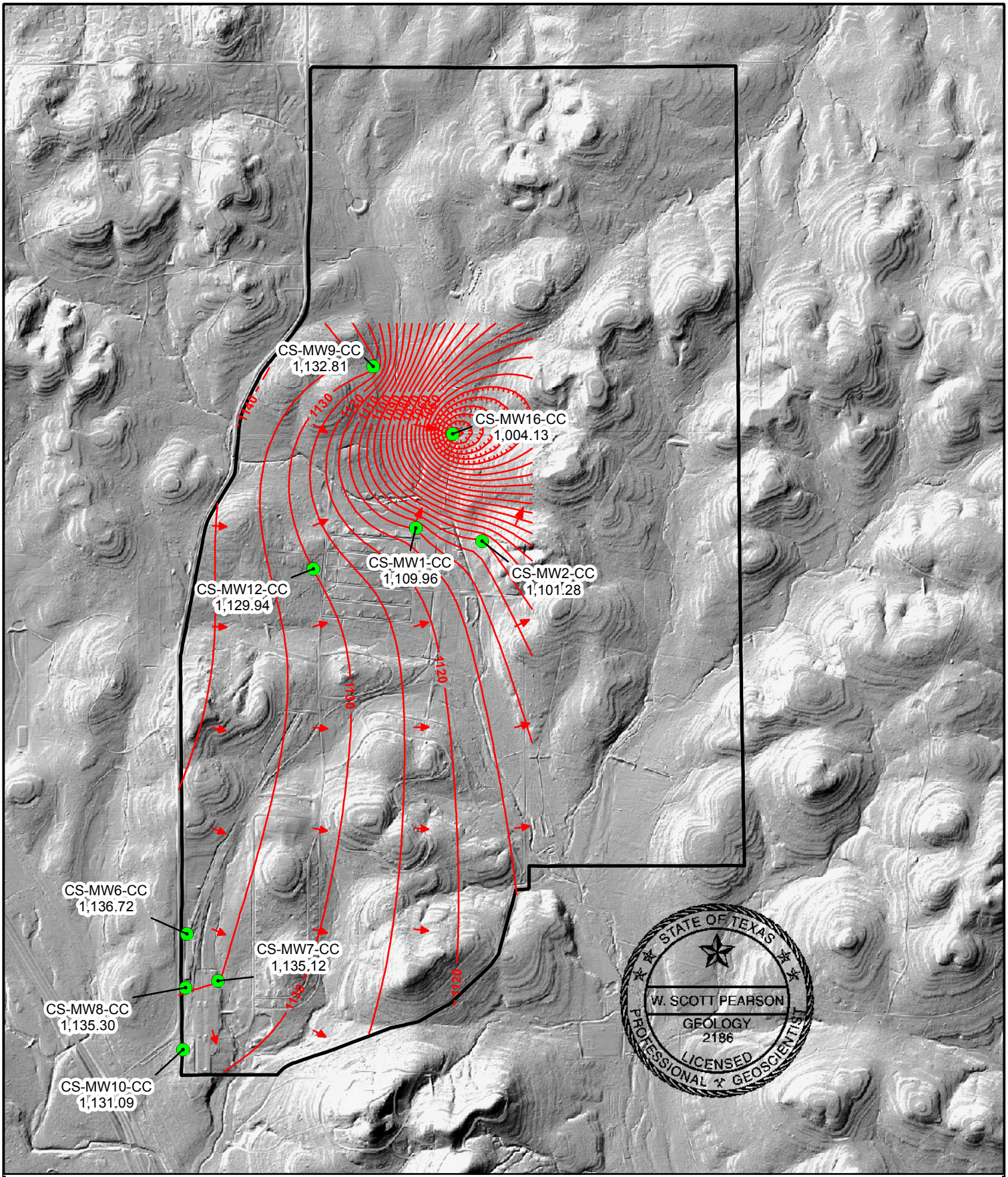

Figure 2-3

June 2010 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

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Table 3-1
Overview of the On-Post Monitoring Program

Count	Well ID	*Analytes*	*Last Sample Date*	*Mar-10*	*Jun-10*	*Sep-10*	*Dec-10*	*Sampling Frequency*
1	CS-MW1-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
2	CS-MW1-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
3	CS-MW1-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
4	CS-MW2-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
5	CS-MW2-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
6	CS-MW3-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
7	CS-MW4-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
8	CS-MW5-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
9	CS-MW6-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
10	CS-MW6-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
11	CS-MW6-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
12	CS-MW7-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
13	CS-MW7-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
14	CS-MW8-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Every 9 months*
15	CS-MW8-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
16	CS-MW9-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
17	CS-MW9-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
18	CS-MW9-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
19	CS-MW10-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Every 9 months*
20	CS-MW10-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
21	CS-MW11A-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
22	CS-MW11B-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-08	S	NS	S	S	Semi-annual
23	CS-MW12-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Every 9 months*
24	CS-MW12-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
25	CS-MW12-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
26	CS-MW16-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
27	CS-MW16-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
28	CW-MW17-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Every 9 months*
29	CS-MW18-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
30	CS-MW19-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
31	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Mar-10	S	S	S	S	Quarterly
32	CS-2	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Every 9 months*
	CS-3	sampled as needed, no pump	Dec-99	NS	NS	S	NS	as needed
33	CS-4	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
34	CS-9	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Mar-10	S	S	S	S	Quarterly
35	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Mar-10	S	S	S	S	Quarterly
	CS-11	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-09	NS	NS	S	NS	pump removed
36	CS-12	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Mar-10	S	S	S	S	Quarterly
37	CS-D	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	S	S	S	Semi-annual
38	CS-MWG-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Every 9 months*
39	CS-MWH-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS	S	S	Biennial
40	CS-I	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	**pump not working**	S	S	S	Every 9 months*
41	CS-MW20-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	S	S	S	S	Quarterly**
42	CS-MW21-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	S	S	S	S	Quarterly**
43	CS-MW22-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	S	S	S	S	Quarterly**
44	CS-MW23-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	S	S	S	S	Quarterly**
45	CS-MW24-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	S	S	S	S	Quarterly**
46	CS-MW25-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-09	S	S	S	S	Quarterly**

*Wells recommended for annual sampling frequency in the LTMO are scheduled every nine months (every third quarter) to gather seasonal data.

**Quarterly until LTMO Update Study can recommend a frequency.

S = Sample

NS = No Sample

3.0 JUNE ANALYTICAL RESULTS

3.1 Monitoring Wells

Under the provisions of the groundwater monitoring DQOs and the LTMO study, the schedule for sampling on-post in June 2010 included 22 on-post monitoring wells and 4 drinking water supply wells. **Table 3-1** provides a sampling overview for June 2010 and the schedule under the LTMO recommendations. The monitoring wells (CS-MW1-LGR, CS-MW2-LGR, CS-MW3-LGR, CS-MW4-LGR, CS-MW5-LGR, CS-MW6-LGR, CS-MW7-LGR, CS-MW9-LGR, CS-MW11A-LGR, CS-MW16-LGR, CS-MW16-CC, CS-MW18-LGR, CS-MW19-LGR, CS-4, CS-D, CS-I, CS-MW20-LGR, CS-MW21-LGR, CS-MW22-LGR, CS-MW23-LGR, CS-MW24-LGR, and CS-MW25-LGR) were sampled using dedicated low-flow gas operated bladder pumps. Wells CS-1, CS-9, CS-10, and CS-12 were sampled using dedicated submersible pumps. **Figure 3-1** shows well sampling locations.

Wells sampled by low-flow pumps were purged until the field parameters of pH, temperature, and conductivity stabilized. The on-post monitoring wells were sampled in June 2010 for the short list of volatile organic compounds (VOC), and metals (cadmium, lead, chromium, and mercury). Drinking water system wells CS-1, CS-9, and CS-10, and new well CS-12 were analyzed for additional metals (arsenic, barium, copper, and zinc). Well CS-9 has not been used for drinking water since June 2006 due to recent metals detections. Well CS-12 is not yet connected to the drinking water system. Samples were analyzed by APPL Laboratories in Clovis, California. All detected concentrations of VOCs and metals are presented in **Table 3-2**. Full analytical results are presented in **Appendix B**.

Of the 26 wells scheduled for sampling, all 26 were sampled in June 2010. PCE, TCE, and/or *cis*-1,2-DCE were detected above the MCL in 5 wells sampled this quarter (CS-MW1-LGR, CS-MW16-LGR, CS-MW16-CC, CS-D, and CS-4). Well CS-9 reported lead and mercury detections above the AL/MCL in June 2010.

Results from on-post monitoring wells are considered definitive data and are subject to data validation and verification under provisions of the CSSA Quality Assurance Project Plan (QAPP). Parsons data packages numbered BRAC50-#30, -#31, -#33, -#34, and -#36 containing the analytical results from this sampling event were received by Parsons June 25 – July 2, 2010. Data validation was conducted and the data validation summary was submitted to CSSA. Cumulative historical analytical results can be found in **Tables 6** and **7** of the **Introduction to the Quarterly Groundwater Monitoring Program** (Parsons 2001) (**Volume 5, Groundwater**). Plume maps from this quarter will be included in the 2010 Annual Groundwater Report.

3.2 Westbay-equipped Wells

Under the provisions of the groundwater monitoring DQOs and the LTMO study, the schedule for on-post sampling in June 2010 did not include Westbay wells CS-WB01, CS-WB02, CS-WB03, and CS-WB04. These wells are sampled on a semi-annual frequency as recommended in the LTMO study and will be sampled again during the September 2010 event.

Westbay wells CS-WB05, CS-WB06, CS-WB07, and CS-WB08 are not sampled as part of the groundwater monitoring program but are sampled as part of the SWMU B-3 bioreactor monitoring. Results for those wells are presented in a separate report.

4.0 JUNE 2010 SUMMARY

- Of the 26 wells scheduled for sampling, all 26 were sampled in June 2010.
- From March 27 to June 14, 2010, weather station south recorded 10.66 inches of rain. Weather station north did not record a complete set of data due to SCADA interruptions. For comparison, during this quarter last year 4.41 inches of rain were recorded.
- Water levels increased an average of 3.97 feet per well since last quarter. Water levels have continued to increase since September 2009.
- VOCs were detected above the MCL in 5 of the 26 wells sampled in June 2010. Wells CS-MW1-LGR, CS-MW16-LGR, CS-MW16-CC, CS-D an CS-4 were above the MCL for PCE, TCE, and/or *cis*-1,2-DCE.
- PCE was above the RL in CS-MW20-LGR. PCE, TCE and/or *cis*-1,2-DCE were above the MDL in CS-MW2-LGR, CS-MW5-LGR, CS-MW11A-LGR, and CS-MW19-LGR.
- Lead and mercury were above their respective AL/MCL in well CS-9. This well has been offline since 2006.
- The AOC-65 Westbay wells were not sampled in June 2010. They are sampled semi-annually and will be sampled again in September 2010.

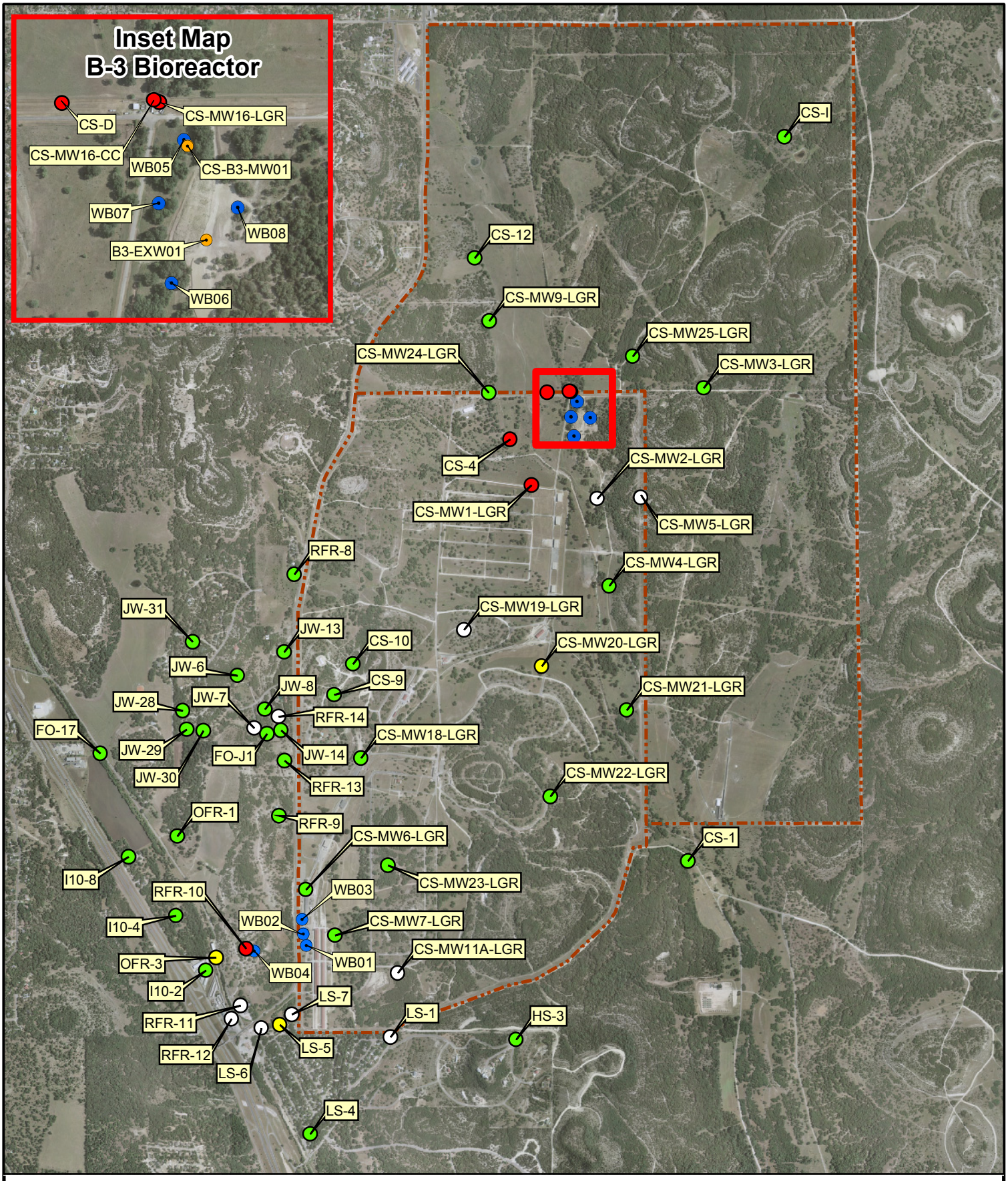

Figure 3-1

On-Post and Off-Post Well Sampling Locations for June 2010

Camp Stanley Storage Activity

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Table 3-2
June 2010 On-post Quarterly Groundwater Results, Detected Analytes

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury	Comments
CS-MW1-LGR	6/9/2010	NA	NA	--	**0.003F**	NA	--	NA	--	
CS-MW2-LGR	6/9/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW3-LGR	6/10/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW4-LGR	6/10/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW5-LGR	6/9/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW6-LGR	6/8/2010	NA	NA	--	**0.002F**	NA	--	NA	--	sporadic chromium detections
CS-MW7-LGR	6/8/2010	NA	NA	--	**0.004F**	NA	--	NA	--	consistent chromium detections since 2008, below the RL
CS-MW9-LGR	6/10/2010	NA	NA	--	**0.002F**	NA	--	NA	--	
CS-MW11A-LGR	6/8/2010	NA	NA	--	**0.002F**	NA	--	NA	--	
CS-MW16-LGR	6/14/2010	NA	NA	--	--	NA	--	NA	--	No metals detection since March 2009. Wells constantly cycling
CS-MW16-CC	6/14/2010	NA	NA	--	--	NA	--	NA	--	to the B-3 Bioreactor.
CS-MW18-LGR	6/8/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW19-LGR	6/8/2010	NA	NA	--	**0.003F**	NA	--	NA	--	sporadic chromium detections
CS-MW20-LGR	6/9/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW21-LGR	6/10/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW22-LGR	6/9/2010	NA	NA	--	**0.002F**	NA	**0.0033F**	NA	--	
CS-MW23-LGR	6/8/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW24-LGR	6/9/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW24-LGR FD	6/9/2010	NA	NA	--	--	NA	--	NA	--	
CS-MW25-LGR	6/10/2010	NA	NA	--	--	NA	--	NA	--	
CS-D	6/10/2010	NA	NA	--	--	NA	--	NA	--	
CS-I	6/14/2010	NA	NA	--	--	NA	--	NA	--	
CS-4	6/10/2010	NA	NA	--	--	NA	--	NA	--	
CSSA Drinking Water Well System										
CS-1	6/14/2010	**0.0023F**	**0.045**	--	--	**0.009F**	--	**0.081**	--	
CS-9	6/14/2010	**0.0004F**	**0.0455**	--	**0.002F**	**0.011**	**0.0168F**	**1.939**	**0.0036**	Pb & Hg sporadically above the AL/MCL since 2006, well is offline.
CS-10	6/14/2010	**0.0035F**	**0.0503**	--	--	**0.008F**	--	**0.11**	--	
CS-10 FD	6/14/2010	**0.0034F**	**0.0499**	--	--	**0.011**	--	**0.117**	--	
CS-12	6/14/2010	**0.0034F**	**0.038**	**0.0006F**	**0.002F**	**0.01**	**0.0039F**	**0.431**	--	Well offline
Comparison Criteria										
Method Detection Limit (MDL)		**0.00022**	**0.0003**	**0.0005**	**0.001**	**0.003**	**0.0019**	**0.008**	**0.0001**	
Reporting Limit (RL)		**0.03**	**0.005**	**0.007**	**0.01**	**0.01**	**0.025**	**0.05**	**0.001**	
Max. Contaminant Level (MCL)		**0.01**	**2**	**0.005**	**0.1**	**AL=1.3**	**AL=0.015**	**SS=5.0**	**0.002**	

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

Precipitation per Quarter:	Mar-10	Jun-10	Comments
Weather Station North (WS-N):	9.23	NA	weather station down in June 2010 due to SCADA interruptions
Weather Station South (WS-S):	NA	10.66	weather station down for calibration in March 2010.

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

Abbreviations/Notes:

FD	Field Duplicate
TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene
AL	Action Level
SS	Secondary Standard
NA	Not Analyzed for this parameter

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

Table 3-2
June 2010 On-post Quarterly Groundwater Results, Detected Analytes

Well ID	Sample Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl Chloride	Comments
CS-MW1-LGR	6/9/2010	--	**54.85**	**0.68**	**37.85**	**51.15**	--	highest levels of TCE and cis since the well was first sampled in 1997
CS-MW2-LGR	6/9/2010	--	**1.13F**	--	**0.16F**	--	--	
CS-MW3-LGR	6/10/2010	--	--	--	--	--	--	non-detect since 2005
CS-MW4-LGR	6/10/2010	--	--	--	--	--	--	
CS-MW5-LGR	6/9/2010	--	**0.96F**	--	**0.88F**	**0.94F**	--	
CS-MW6-LGR	6/8/2010	--	--	--	--	--	--	non-detect since 2001
CS-MW7-LGR	6/8/2010	--	--	--	--	--	--	
CS-MW9-LGR	6/10/2010	--	--	--	--	--	--	
CS-MW11A-LGR	6/8/2010	--	--	--	**0.86F**	--	--	consistent PCE detections, below the MCL
CS-MW16-LGR	6/14/2010	--	**136.56**	**0.22F**	**142.56**	**162.6**	--	
CS-MW16-CC	6/14/2010	**0.33F**	**33.86**	**3.92**	**4.9**	**42.6**	--	
CS-MW18-LGR	6/8/2010	--	--	--	--	--	--	non-detect since 2004
CS-MW19-LGR	6/8/2010	--	--	--	**0.43F**	--	--	consistent PCE detections, below the RL
CS-MW20-LGR	6/9/2010	--	--	--	**1.95**	--	--	
CS-MW21-LGR	6/10/2010	--	--	--	--	--	--	
CS-MW22-LGR	6/9/2010	--	--	--	--	--	--	
CS-MW23-LGR	6/8/2010	--	--	--	--	--	--	No VOC detections since these wells were installed in 2007.
CS-MW24-LGR	6/9/2010	--	--	--	--	--	--	
CS-MW24-LGR FD	6/9/2010	--	--	--	--	--	--	
CS-MW25-LGR	6/10/2010	--	--	--	--	--	--	
CS-D	6/10/2010	--	**98.94**	**0.88**	**100.03**	**137.52**	--	
CS-I	6/14/2010	--	--	--	--	--	--	
CS-4	6/10/2010	--	**2.03**	--	**4.34**	**5.55**	--	significant decrease in VOCs since last sampled in Dec. 2009
CSSA Drinking Water Well System								
CS-1	6/14/2010	--	--	--	--	--	--	
CS-9	6/14/2010	--	--	--	--	--	--	
CS-10	6/14/2010	--	--	--	--	--	--	
CS-10 FD	6/14/2010	--	--	--	--	--	--	
CS-12	6/14/2010	--	--	--	--	--	--	No VOC detections since well was installed in Sept. 2009.
Comparison Criteria								
Method Detection Limit (MDL)		**0.12**	**0.07**	**0.08**	**0.06**	**0.05**	**0.08**	
Reporting Limit (RL)		**1.2**	**1.2**	**0.6**	**1.4**	**1**	**1.1**	
Max. Contaminant Level (MCL)		**7**	**70**	**100**	**5**	**5**	**2**	

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

Precipitation per Quarter:	**Mar-10**	**Jun-10**	**Comments**
Weather Station North (WS-N):	9.23	NA	weather station down in June 2010 due to SCADA interruptions
Weather Station South (WS-S):	NA	10.66	weather station down for calibration in March 2010.

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

Abbreviations/Notes:

FD	Field Duplicate
TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene
AL	Action Level
SS	Secondary Standard
NA	Not Analyzed for this parameter

Data Qualifiers

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

Appendix A Evaluation of Data Quality Objectives Attainment

Activity	Objectives	Action	Objective Attained?	Recommendations
Field Sampling	Conduct field sampling in accordance with procedures defined in the project work plan, SAP, QAPP, 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 on June 7, 2010.	To the extent possible with data available. Due to the limited data available and the fact that wells are completed across multiple water-bearing units, potentiometric maps should only be used for regional water flow direction, not local. Ongoing pumping in the CSSA area likely affects the natural groundwater flow direction.	As additional wells are installed screened in distinct formations, future evaluations will eliminate reliance on wells screened across multiple formations.
	Describe the flow system, including the vertical and horizontal components of flow (2.1.9).	Potentiometric maps were created using June 7, 2010 water level data, and horizontal flow direction was tentatively identified. Insufficient data are currently available to determine vertical component of flow.	As described above, due to the lack of aquifer-specific water level information, potentiometric surface maps should only be used as an estimate of regional flow direction.	Same as above.
	Define formation(s) in the Middle Trinity Aquifer are impacted by the VOC contaminants (2.1.3).	Quarterly groundwater monitoring provides information on Middle Trinity Aquifer impacts. Monitoring wells equipped with Westbay® - multi-port samplers are sampled semiannually and will be sampled again during the September 2010 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 transducers in wells: CS-MW4-LGR, CS-MW18-LGR, CS-MW21-LGR, and CS-MW24-LGR. Additional continuous reading transducers were added to the program through the SCADA project. The following wells can be uploaded to see real time water level data: CS-MW16-LGR, CS-MW16-CC, CS-1, and CS-10. 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 data through December 2010 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 26 of 46 CSSA wells. Of the 26 wells scheduled to be sampled in June 2010, all 26 were sampled.	The horizontal and vertical extent of groundwater contamination is continuously monitored.	Continue groundwater monitoring and construct additional wells as necessary.
	Determine the horizontal and vertical concentration profiles of all constituents of concern (COC) in the groundwater that are measured by USEPA-approved procedures (3.1.2). COCs are those chemicals that have been detected in groundwater in the past and their daughter (breakdown) products.	Groundwater samples were collected from wells: CS-MW1-LGR, CS-MW2-LGR, CS-MW3-LGR, CS-MW4-LGR, CS-MW5-LGR, CS-MW6-LGR, CS-MW7-LGR, CS-MW9-LGR, CS-MW11A-LGR, CS-MW16-LGR, CS-MW16-CC, CS-MW18-LGR, CS-MW19-LGR, CS-1, CS-4, CS-9, CS-10, CS-12, CS-D, CS-I, CS-MW20-LGR, CS-MW21-LGR, CS-MW22-LGR, CS-MW23-LGR, CS-MW24-LGR and CS-MW25-LGR. Samples were analyzed for the short list of VOCs using USEPA method SW8260B, and metals (cadmium, lead, mercury, and chromium). The drinking water wells (CS-1, CS-9, CS-10 and CS-12) were also sampled for 4 additional metals (arsenic, barium, copper and zinc). Analyses were conducted in accordance with the AFCEE QAPP and approved variances. All RLs were below MCLs, as listed below:	Yes.	Continue sampling.

Activity	Objectives	Action	Objective Attained?	Recommendations
		ANALYTE / **RL (µg /L)** / **MCL(µg/L)** 1,1-DCE 1.2 7 *cis*-1,2-DCE 1.2 70 *trans*-1,2-DCE 0.6 100 PCE 1.4 5 TCE 1.0 5 Vinyl chloride 1.1 2		
		ANALYTE / **RL (µg/L)** / **MCL/AL (µg /L)** Barium 5 2,000 Chromium 10 100 Copper 10 1,300 Zinc 50 5,000 Arsenic 30 10 Cadmium 7 5 Lead 25 15 Mercury 1 2		
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," and "F" are usable for characterizing contamination. All "R" flagged data are considered unusable.	Yes.	NA

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

Appendix B
June 2010 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury
CS-MW1-LGR	6/9/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	NA	0.0001U
CS-MW2-LGR	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW3-LGR	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW4-LGR	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW5-LGR	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW6-LGR	6/8/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	NA	0.0001U
CS-MW7-LGR	6/8/2010	NA	NA	0.0005U	**0.004F**	NA	0.0019U	NA	0.0001U
CS-MW9-LGR	6/10/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	NA	0.0001U
CS-MW11A-LGR	6/8/2010	NA	NA	0.0005U	**0.002F**	NA	0.0019U	NA	0.0001U
CS-MW16-LGR	6/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW16-CC	6/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW18-LGR	6/8/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW19-LGR	6/8/2010	NA	NA	0.0005U	**0.003F**	NA	0.0019U	NA	0.0001U
CS-MW20-LGR	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW21-LGR	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW22-LGR	6/9/2010	NA	NA	0.0005U	**0.002F**	NA	**0.0033F**	NA	0.0001U
CS-MW23-LGR	6/8/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW24-LGR	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW24-LGR FD	6/9/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW25-LGR	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-D	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-I	6/14/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-4	6/10/2010	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-12	6/14/2010	**0.0034F**	**0.038**	**0.0006F**	**0.002F**	**0.01**	**0.0039F**	**0.431**	0.0001U
CSSA Drinking Water Well System									
CS-1	6/14/2010	**0.0023F**	**0.045**	0.0005U	0.001U	**0.009F**	0.0019U	**0.081**	0.0001U
CS-9	6/14/2010	**0.0004F**	**0.0455**	0.0005U	**0.002F**	**0.011**	**0.0168F**	**1.939**	**0.0036**
CS-10	6/14/2010	**0.0035F**	**0.0503**	0.0005U	0.001U	**0.008F**	0.0019U	**0.11**	0.0001U
CS-10 FD	6/14/2010	**0.0034F**	**0.0499**	0.0005U	0.001U	**0.011**	0.0019U	**0.117**	0.0001U

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

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

FD	Field Duplicate
TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene
AL	Action Level
SS	Secondary Standard
NA	Not Analyzed for this parameter

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

Appendix B
June 2010 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl Chloride
CS-MW1-LGR	6/9/2010	0.12U	**54.85**	**0.68**	**37.85**	**51.15**	0.08U
CS-MW2-LGR	6/9/2010	0.12U	**1.13F**	0.08U	**0.16F**	0.05U	0.08U
CS-MW3-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW4-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW5-LGR	6/9/2010	0.12U	**0.96F**	0.08U	**0.88F**	**0.94F**	0.08U
CS-MW6-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW7-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW9-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW11A-LGR	6/8/2010	0.12U	0.07U	0.08U	**0.86F**	0.05U	0.08U
CS-MW16-LGR	6/14/2010	0.12U	**136.56**	**0.22F**	**142.56**	**162.6**	0.08U
CS-MW16-CC	6/14/2010	**0.33F**	**33.86**	**3.92**	**4.9**	**42.6**	0.08U
CS-MW18-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW19-LGR	6/8/2010	0.12U	0.07U	0.08U	**0.43F**	0.05U	0.08U
CS-MW20-LGR	6/9/2010	0.12U	0.07U	0.08U	**1.95**	0.05U	0.08U
CS-MW21-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW22-LGR	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW23-LGR	6/8/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW24-LGR	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW24-LGR FD	6/9/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW25-LGR	6/10/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-D	6/10/2010	0.12U	**98.94**	**0.88**	**100.03**	**137.52**	0.08U
CS-I	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-4	6/10/2010	0.12U	**2.03**	0.08U	**4.34**	**5.55**	0.08U
CS-12	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CSSA Drinking Water Well System							
CS-1	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-9	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-10	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-10 FD	6/14/2010	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U

BOLD	= Above the MDL
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BOLD	= Above the MCL

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