FINAL

JUNE 2009

On-Post
Quarterly Groundwater Monitoring Report

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

October 2009

GEOSCIENTIST CERTIFICATION

June 2009 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 2009 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 2009, and is true and accurate to the best of my knowledge and belief.

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

10/12/2009

Date

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EXECUTIVE SUMMARY

- Of the 15 wells scheduled to be sampled in June 2009, one well (CS-MW10-LGR) was not sampled due to low water levels associated with the prolonged drought. Samples were submitted for VOC (CSSA short list) and cadmium, chromium, lead, and mercury analyses. Drinking water wells (CS-1, CS-9 and CS-10) were also analyzed for arsenic, barium, copper, and zinc.

- Water levels increased an average of 0.65 feet per well since last quarter. The slight increase in water levels can be attributed to the ¾ inch of rain that fell on June 3rd, just five days before water levels were collected on June 8, 2009. Although CSSA received roughly 4 inches of rain between March and June 2009, the area was still in a severe drought.

- The maximum contaminant level (MCL) and action level (AL) were exceeded for mercury and lead in well CS-9. No VOCs were detected above the MCL in the 14 wells sampled in June 2009.

- The multi-port Westbay wells were not sampled this quarter; they will be sampled again in September 2009. Water level data was collected from Westbay wells CS-WB01 through CS-WB04.

JUNE 2009
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 2009. Laboratory analytical results are presented along with potentiometric contour figures. The purpose of this report is to present a summary of the sampling results. Results from all four 2009 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, Task Order (TO) DO11, was performed June 8, 2009 through June 12, 2009. On-post groundwater monitoring conducted under this TO began with the March 2009 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).

2.0 POST-WIDE FLOW DIRECTION AND GRADIENT

Forty-seven water level measurements were recorded on June 8, 2009 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 2009 are shown in **Figures 2-1, 2-2, and 2-3**.

The June 2009 potentiometric surface map for LGR-screened wells exhibited a wide range of groundwater elevations, from a minimum of 887.08 feet above mean sea level (msl) at CS-MW11A-LGR to a maximum of 1047.62 feet above msl at FO-20. One LGR well, CS-MW11B-LGR, was dry. 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 2009 increased 0.65 feet from the elevations measured in March 2009, reflecting the recent ¾ inch of precipitation on June 3, 2009. From March 21, 2009 to June 14, 2009, weather station south (WS-S) recorded 17 rainfall events with 4.41 inches of rain. Weather station north (WS-N) recorded 17 rainfall events with a total of 3.77 inches of rain during the same period. May 16, 2009 was the most significant recorded rainfall amount with approximately an inch of rain recorded at both weather stations. All other rainfall events were sporadic. Despite the rain the area remained in a severe drought.

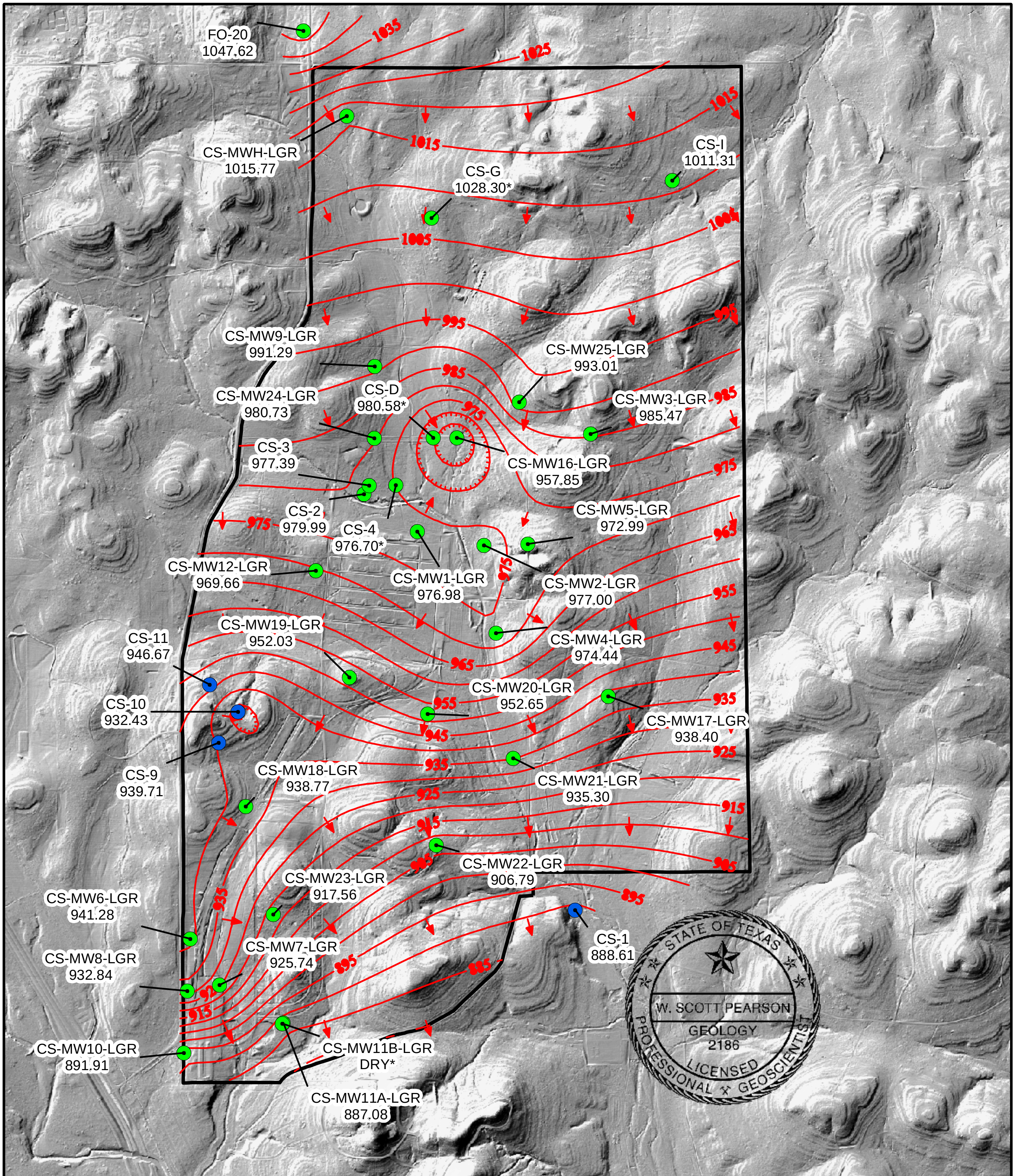
Well CS-MW4-LGR in the central portion of CSSA usually has one of the highest groundwater elevations of LGR-screened wells. The elevation is usually 20 to 40 feet higher than the nearest comparable wells (CS-MW2-LGR and CS-MW5-LGR). However, the prolonged drought of 2008-2009 has muted this effect to the point that the groundwater mounding is no longer evident in June 2009. This effect has been observed in the past, most recently in 2006. When groundwater in the vicinity of CS-MW4-LGR drops below about 970 feet MSL, the mounding effect is negated.

It should be noted that well pumping on and around CSSA affects the potentiometric surface. On-post monitoring wells CS-MW16-LGR and CS-MW16-CC pumped groundwater continuously to the SWMU B-3 Bioreactor between March and June 2009. CSSA drinking water wells CS-1 and CS-10 are cycled on and off periodically 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 2009. 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. Past groundwater reports have used several methods and strategies for determining an “average” groundwater gradient for the Middle Trinity aquifer water table (Lower Glen Rose component). The most recent reports have used a set number of well pairs to calculate and average the groundwater gradient; however, the use of these well pairs cannot be consistently applied across monitoring events for true directional gradient.

In order to simplify and standardize the regional gradient calculation, an overall groundwater gradient averaged across CSSA (as measured from CS-MWH-LGR to CS-MW21-LGR) will be employed for this and future reports. This approach will standardize the process and make comparisons between monitoring events more meaningful. For June 2009, the overall groundwater gradient is to the south-southeast at 0.00589 ft/ft.

Groundwater elevations have been measured and recorded since 1992. Previous droughts resulted in water levels decreasing substantially in 1996, 1999, 2000, and 2006. However, there was unusually high rainfall, 53.17 inches, in 2007. The current drought has caused groundwater elevations to decrease since the December 2007 event. Water levels in June 2009 are essentially equivalent to the groundwater lows that occurred in December 2006.



N
W E
S

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

Flow direction

LGR Groundwater Contours

Outer fence

LGR Wells and groundwater elevation (ft above msl)

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

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

Figure 2-1

June 2009 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

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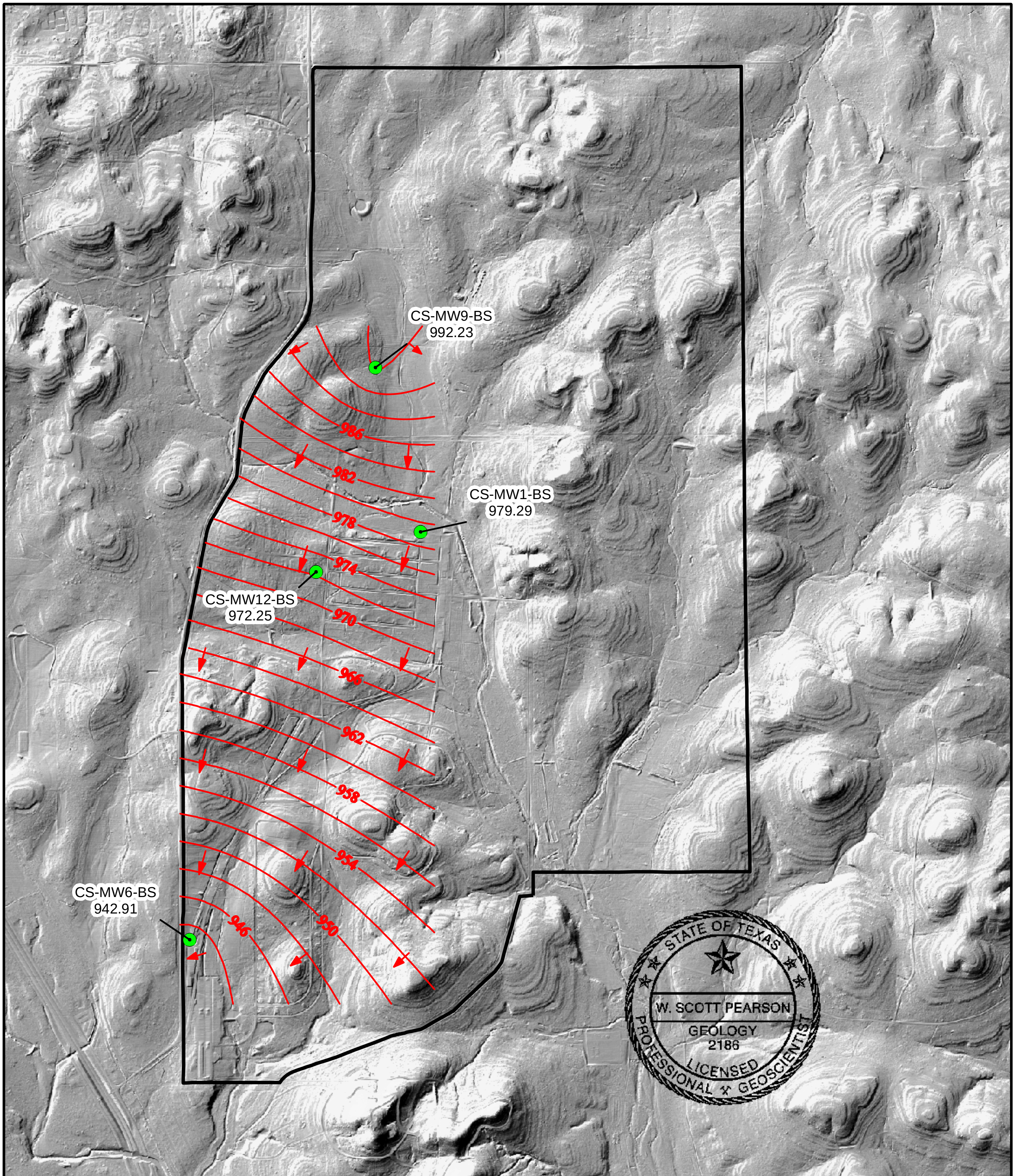

N
W E
S

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

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

Figure 2-2

June 2009 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

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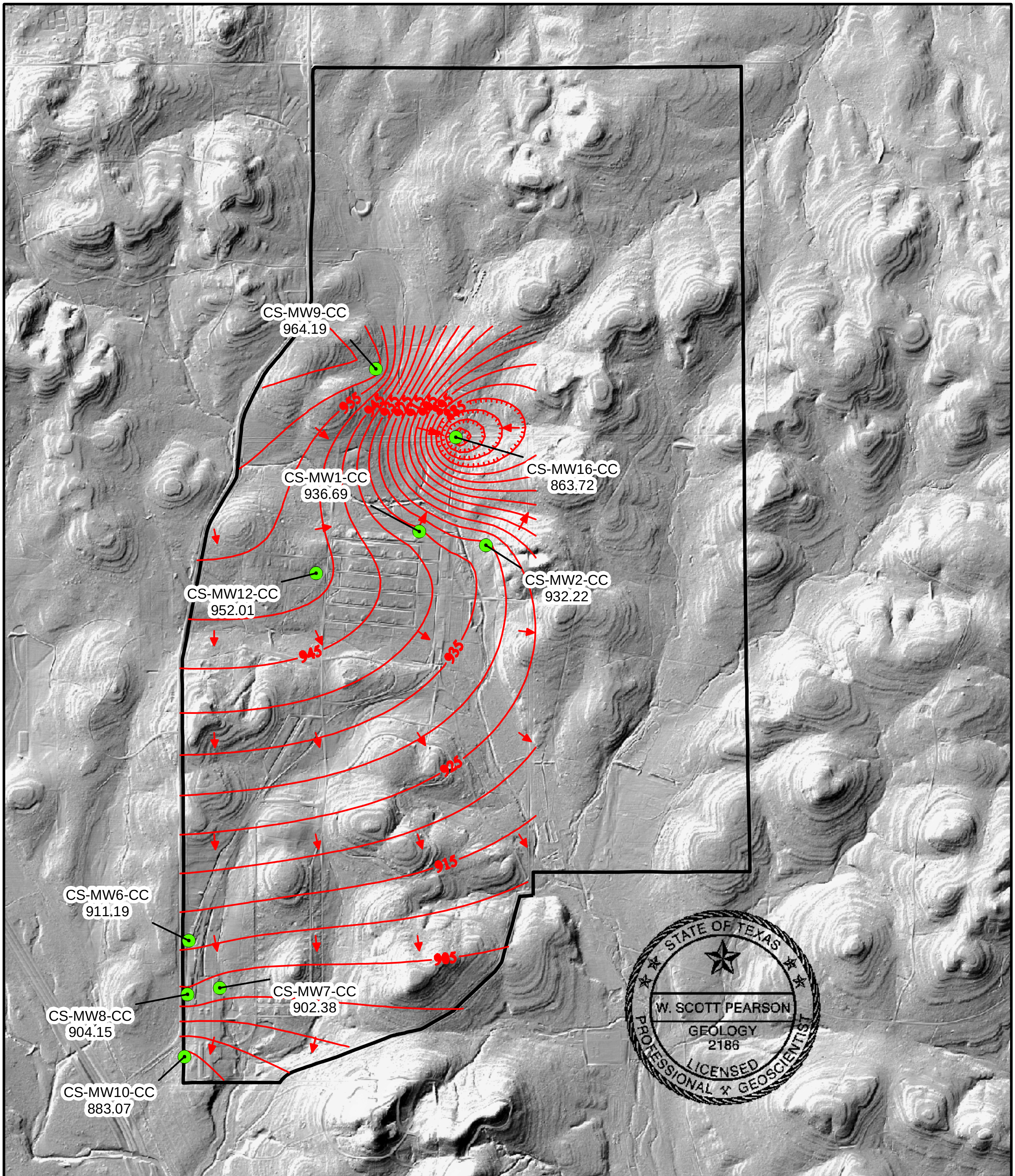

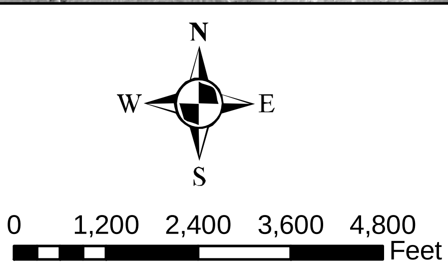

Flow direction

CC Groundwater Contours

Outer fence

CC Wells and groundwater elevation (ft above msl)

Figure 2-3

June 2009 Potentiometric Surface Map, CC Wells

Camp Stanley Storage Activity

PARSONS

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

Count	Well ID	*Analytes*	*Last Sample Date*	*Mar-09*	*Jun-09*	*Sep-09*	*Dec-09*	*Sampling Frequency*
1	CS-MW1-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
2	CS-MW1-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
3	CS-MW1-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
4	CS-MW2-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
5	CS-MW2-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
6	CS-MW3-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
7	CS-MW4-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-08	S	NS	S	NS	Semi-annual
8	CS-MW5-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
9	CS-MW6-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
10	CS-MW6-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Oct-07	NS	NS	S	NS	Biennial
11	CS-MW6-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Oct-07	NS	NS	S	NS	Biennial
12	CS-MW7-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
13	CS-MW7-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Oct-07	NS	NS	S	NS	Biennial
14	CS-MW8-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	NS	S	NS	NS	Every 9 months*
15	CS-MW8-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Oct-07	NS	NS	S	NS	Biennial
16	CS-MW9-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
17	CS-MW9-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
18	CS-MW9-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
19	CS-MW10-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	NS	S	NS	NS	Every 9 months*
20	CS-MW10-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Oct-07	NS	NS	S	NS	Biennial
21	CS-MW11A-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
22	CS-MW11B-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-08	S	NS	S	NS	Semi-annual
23	CS-MW12-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	NS	S	NS	NS	Every 9 months*
24	CS-MW12-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
25	CS-MW12-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
26	CS-MW16-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
27	CS-MW16-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
28	CW-MW17-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-07	S	NS	NS	S	Every 9 months*
29	CS-MW18-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-08	S	NS	S	NS	Semi-annual
30	CS-MW19-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
31	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-08	NS	NS	S	NS	Every 9 months*
32	CS-2	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	NS	S	NS	NS	Every 9 months*
33	CS-4	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
34	CS-9	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-08	NS	NS	S	NS	Every 9 months*
35	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-08	NS	NS	S	NS	Every 9 months*
36	CS-11	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	NS	S	NS	NS	Every 9 months*
37	CS-D	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	S	NS	S	NS	Semi-annual
38	CS-MWG-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-08	NS	S	NS	NS	Every 9 months*
39	CS-MWH-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-07	NS	NS	S	NS	Biennial
40	CS-I	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-06	S	NS	NS	S	Every 9 months*
41	CS-MW20-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-08	S	S	S	S	Quarterly**
42	CS-MW21-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-08	S	S	S	S	Quarterly**
43	CS-MW22-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-08	S	S	S	S	Quarterly**
44	CS-MW23-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-08	S	S	S	S	Quarterly**
45	CS-MW24-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-08	S	S	S	S	Quarterly**
46	CS-MW25-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-08	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 2009 included 15 on-post monitoring wells. **Table 3-1** provides a sampling overview for June 2009 and the schedule under the LTMO recommendations. The monitoring wells (CS-MW8-LGR, CS-MW12-LGR, CS-2, CS-MWG-LGR, 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, and CS-10 were sampled using dedicated submersible pumps. Well CS-11 was sampled using a bailer because the pump has been removed from the well and CS-MW10-LGR was not sampled due to the water level falling below the bladder pump. **Figure 3-1** shows well sampling locations.

Wells sampled by low-flow pumps were purged until the field parameters stabilized. Field parameters including pH, temperature, and conductivity, were recorded to ensure stabilization during well purging. The on-post monitoring wells were sampled in June 2009 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 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. 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 15 wells scheduled for sampling, 14 were sampled in June 2009. One well (CS-MW10-LGR) was not sampled because the water level was below the bladder pumps. PCE and TCE were not detected above the MCL in any wells sampled in June 2009. Well CS-9 had lead and mercury detections above the AL/MCL.

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 DO-11 #52 and #54 containing the analytical results from this sampling event were received by Parsons June 25 - 30, 2009. 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 2009 Annual Groundwater Report.

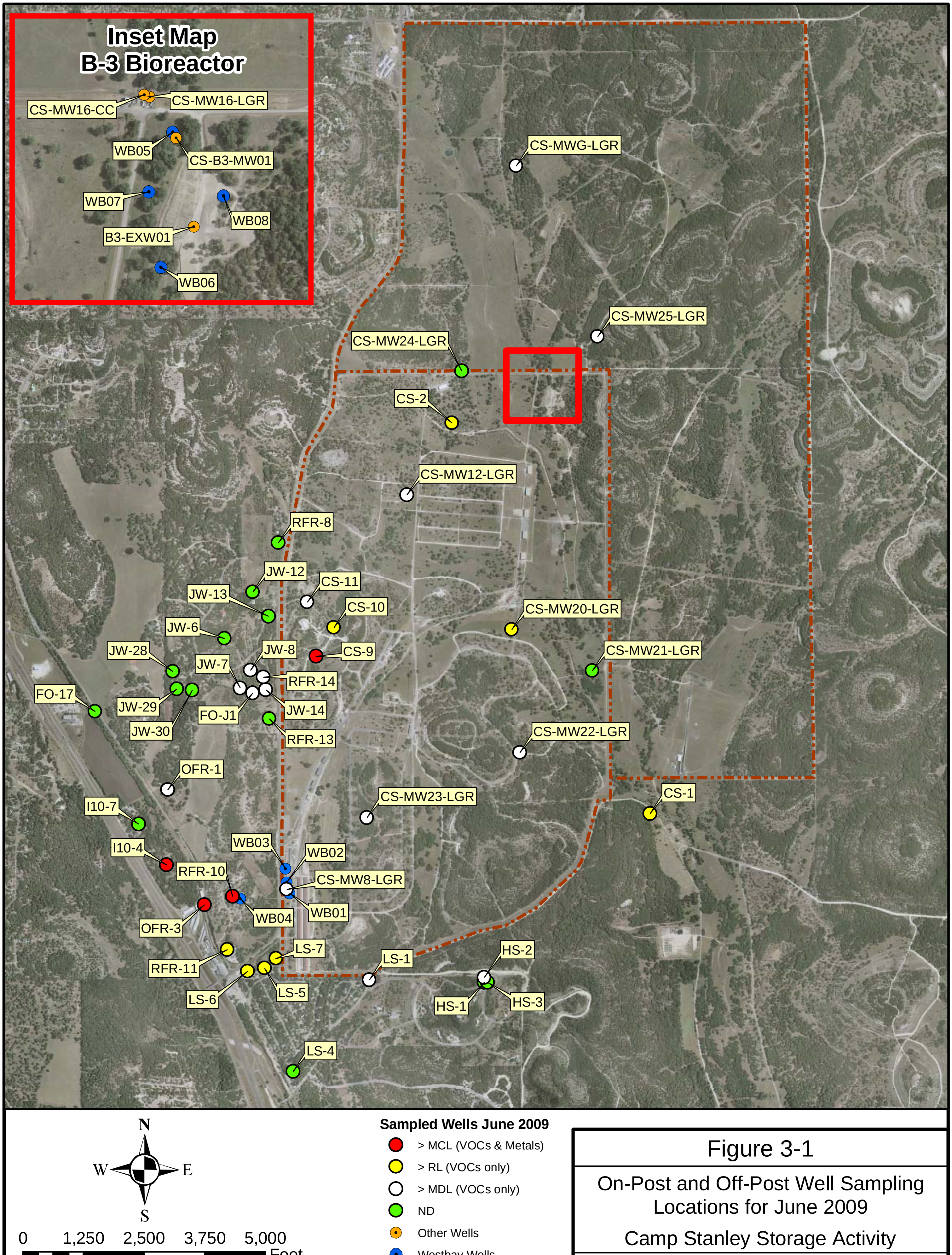
3.2 Westbay-equipped Wells

Under the provisions of the groundwater monitoring DQOs and the LTMO study, the schedule for on-post sampling in June 2009 did not include the 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 2009 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 2009 SUMMARY

- Of the 15 wells scheduled for sampling, 14 were sampled in June 2009. One well (CS-MW10-LGR) was not sampled because the water level was below the bladder pumps.
- From March 21 to June 14, 2009, weather stations north and south recorded 3.77 and 4.41 inches of rain, respectively. The area remained in a severe drought.
- Water levels increased an average of 0.65 feet per well since last quarter. The slight increase in water levels can be attributed to the ¾ inch of rain that fell on June 3rd, just five days before water levels were collected on June 8, 2009.
- PCE and TCE were not detected above the MCL in any wells sampled in June 2009.
- PCE was above the RL in CS-MW20-LGR.
- Lead and mercury were above the AL/MCL in well CS-9. Well CS-9 is a former drinking water well that is no longer used to supply water to the CSSA drinking water system. Lead and mercury have been above the AL/MCL since June 2006.
- Lead was detected in CS-MW22-LGR just above the MDL (but below the AL). This well was last above the AL in March 2008.
- Lead was detected in CS-MW25-LGR just above the MDL (but below the AL). This well was last above the AL in December 2007.



Sampled Wells June 2009

- > MCL (VOCs & Metals)
- > RL (VOCs only)
- > MDL (VOCs only)
- ND
- Other Wells
- Westbay Wells
- Fence Line

Figure 3-1

On-Post and Off-Post Well Sampling Locations for June 2009

Camp Stanley Storage Activity

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Table 3-2
June 2009 On-post Quarterly Groundwater Results, Detected Analytes

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury	Comments
CS-MW8-LGR	6/11/2009	NA	NA	--	--	NA	**0.0023F**	NA	--	
CS-MW12-LGR	6/11/2009	NA	NA	--	**0.002F**	NA	--	NA	--	
CS-MW12-LGR FD	6/11/2009	NA	NA	--	**0.002F**	NA	--	NA	--	
CS-MW20-LGR	6/10/2009	NA	NA	--	--	NA	**0.0021F**	NA	--	lead last detected in Dec. 08
CS-MW21-LGR	6/10/2009	NA	NA	--	--	NA	--	NA	--	
CS-MW22-LGR	6/10/2009	NA	NA	--	**0.005F**	NA	**0.0088F**	NA	**0.0002F**	lead above the AL in Mar. 08
CS-MW23-LGR	6/10/2009	NA	NA	--	**0.002F**	NA	**0.0023F**	NA	**0.0002F**	sporadic lead hits
CS-MW24-LGR	6/9/2009	NA	NA	--	--	NA	--	NA	--	
CS-MW24-LGR FD	6/9/2009	NA	NA	--	--	NA	--	NA	--	
CS-MW25-LGR	6/9/2009	NA	NA	--	**0.004F**	NA	**0.0023F**	NA	--	lead detected in 7 of 9 sampling events
CS-MWG-LGR	6/9/2009	NA	NA	--	--	NA	**0.0025F**	NA	--	
CS-2	6/9/2009	NA	NA	--	**0.015**	NA	**0.0027F**	NA	--	consistant low levels of Pb
CS-11	6/9/2009	NA	NA	--	--	NA	--	NA	**0.0002F**	pump removed from well, sampled with a bailer
CSSA Drinking Water Well System										
CS-1	6/11/2009	--	**0.0356**	--	--	--	**0.0143F**	**0.423**	**0.0002F**	
CS-9	6/11/2009	--	**0.0455**	--	**0.002F**	**0.012**	**0.0215F**	**2.54**	**0.0105***	Pb & Hg above the AL/MCL since June 2006
CS-10	6/11/2009	--	**0.0452**	--	--	--	**0.0032F**	**0.288**	**0.0002F**	
Comparison Criteria										
Method Detection Limit (MDL)		**0.00022**	**0.0003**	**0.0005**	**0.001**	**0.003**	**0.0019**	**0.008**	**0.0001**	
Reporting Limit (RL)		**0.03**	**0.005**	**0.007**	**0.01**	**0.01**	**0.025**	**0.05**	**0.001**	
Max. Contaminant Level (MCL)		**0.01**	**2**	**0.005**	**0.1**	**AL=1.3**	**AL=0.015**	**SS=5.0**	**0.002**	

Well ID	Sample Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl Chloride	Comments
CS-MW8-LGR	6/11/2009	--	--	--	**1.26F**	--	--	PCE consistantly detected in this well
CS-MW12-LGR	6/11/2009	--	--	--	--	--	--	
CS-MW12-LGR FD	6/11/2009	--	--	--	--	--	--	no historic PCE/TCE detections
CS-MW20-LGR	6/10/2009	--	--	--	**2.09**	--	--	PCE is consistantly above the RL
CS-MW21-LGR	6/10/2009	--	--	--	--	--	--	
CS-MW22-LGR	6/10/2009	--	--	--	--	--	--	
CS-MW23-LGR	6/10/2009	--	--	--	--	--	--	
CS-MW24-LGR	6/9/2009	--	--	--	--	--	--	
CS-MW24-LGR FD	6/9/2009	--	--	--	--	--	--	
CS-MW25-LGR	6/9/2009	--	--	--	--	--	--	
CS-MWG-LGR	6/9/2009	--	--	--	--	--	--	no historic PCE/TCE detections
CS-2	6/9/2009	--	--	--	--	--	--	
CS-11	6/9/2009	--	--	--	--	--	--	PCE last detected in March 2002
CSSA Drinking Water Well System								
CS-1	6/11/2009	--	--	--	--	**0.47F**	--	sporadic PCE/TCE detections since 1998
CS-9	6/11/2009	--	--	--	--	--	--	last PCE detection was in June 2004
CS-10	6/11/2009	--	--	--	--	--	--	last PCE detection was in September 2004
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-09	Jun-09
Weather Station South (WS-S):	3.16	4.41
Weather Station North (WS-N):	2.58	3.77

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.
* - The analyte was run at dilution of 5.

APPENDIX A

EVALUATION OF DATA QUALITY OBJECTIVES ATTAINMENT

Appendix A Evaluation of Data Quality Objectives Attainment

Activity	Objectives	Action	Objective Attained?	Recommendations
Field Sampling	Conduct field sampling in accordance with procedures defined in the project work plan, SAP, QAPP, 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 8, 2009.	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 8, 2009 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 2009 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-MW9-LGR, CS-MW9-BS, CS-MW9-CC, CS-MW16-LGR, CS-MW16-CC, CS-MW1-LGR, CS-MW1-BS, CS-MW1-CC, CS-MW12-LGR, CS-MW12-BS, CS-MW12-CC, CS-MW10-LGR, CS-MW10-CC, CS-MW6-LGR, CS-MW6-BS, CS-MW6-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 June 2009 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 14 of 46 CSSA wells. Of the 15 wells scheduled to be sampled in June 2009, 14 were sampled. One well was not sampled due to low water levels.	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 (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-MW8-LGR, CS-MW12-LGR, CS-MW20-LGR, CS-MW21-LGR, CS-MW22-LGR, CS-MW23-LGR, CS-MW24-LGR, CS-MW25-LGR, CS-11 and CS-2. 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, and CS-10) 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.
		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		

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," and "F" are usable for characterizing contamination. All "R" flagged data are considered unusable.	Yes.	NA
		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.

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 B

QUARTERLY ON-POST GROUNDWATER MONITORING ANALYTICAL RESULTS JUNE 2009

Appendix B
June 2009 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury
CS-MW8-LGR	6/11/2009	NA	NA	0.0005U	0.001U	NA	**0.0023F**	NA	0.0001U
CS-MW12-LGR	6/11/2009	NA	NA	0.0005U	**0.002F**	NA	0.0019U	NA	0.0001U
CS-MW12-LGR FD	6/11/2009	NA	NA	0.0005U	**0.002F**	NA	0.0019U	NA	0.0001U
CS-MW20-LGR	6/10/2009	NA	NA	0.0005U	0.001U	NA	**0.0021F**	NA	0.0001U
CS-MW21-LGR	6/10/2009	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW22-LGR	6/10/2009	NA	NA	0.0005U	**0.005F**	NA	**0.0088F**	NA	**0.0002F**
CS-MW23-LGR	6/10/2009	NA	NA	0.0005U	**0.002F**	NA	**0.0023F**	NA	**0.0002F**
CS-MW24-LGR	6/9/2009	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW24-LGR FD	6/9/2009	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW25-LGR	6/9/2009	NA	NA	0.0005U	**0.004F**	NA	**0.0023F**	NA	0.0001U
CS-MWG-LGR	6/9/2009	NA	NA	0.0005U	0.001U	NA	**0.0025F**	NA	0.0001U
CS-2	6/9/2009	NA	NA	0.0005U	**0.015**	NA	**0.0027F**	NA	0.0001U
CS-11	6/9/2009	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	**0.0002F**
CSSA Drinking Water Well System									
CS-1	6/11/2009	0.0002U	**0.0356**	0.0005U	0.001U	0.003U	**0.0143F**	**0.423**	**0.0002F**
CS-9	6/11/2009	0.0002U	**0.0455**	0.0005U	**0.002F**	**0.012**	**0.0215F**	**2.54**	**0.0105***
CS-10	6/11/2009	0.0002U	**0.0452**	0.0005U	0.001U	0.003U	**0.0032F**	**0.288**	**0.0002F**

Well ID	Sample Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl Chloride
CS-MW8-LGR	6/11/2009	0.12U	0.07U	0.08U	**1.26F**	0.05U	0.08U
CS-MW12-LGR	6/11/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW12-LGR FD	6/11/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW20-LGR	6/10/2009	0.12U	0.07U	0.08U	**2.09**	0.05U	0.08U
CS-MW21-LGR	6/10/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW22-LGR	6/10/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW23-LGR	6/10/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW24-LGR	6/9/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW24-LGR FD	6/9/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW25-LGR	6/9/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MWG-LGR	6/9/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-2	6/9/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-11	6/9/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CSSA Drinking Water Well System							
CS-1	6/11/2009	0.12U	0.07U	0.08U	0.06U	**0.47F**	0.08U
CS-9	6/11/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-10	6/11/2009	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U

BOLD	= Above the MDL
BOLD (blue)	= Above the RL
BOLD (red)	= 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 bleow the MDL.
F - The analyte was positively identified but the associated numerical value is below the RL.
* - The analyte was run at a dilution of 5.