FINAL

MARCH 2011

On-Post
Quarterly Groundwater Monitoring Report

Prepared For

Department of the Army
Camp Stanley Storage Activity
Boerne, Texas

July 2011

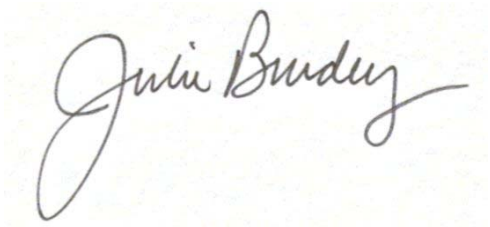
GEOSCIENTIST CERTIFICATION

March 2011 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 March 2011 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 March 2011, and is true and accurate to the best of my knowledge and belief.



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

7/28/2011

Date

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EXECUTIVE SUMMARY

- Twenty-four of 26 wells scheduled for sampling in March 2011 were sampled. Well CS-MW11B-LGR was not sampled because the water level was below the pump. Well CS-12 was not sampled due to well house construction.
- 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 March 2011 decreased 43.19 feet from the elevations measured in December 2010. Bexar County and surrounding areas are under a "severe to exceptional" drought alert and the Trinity Aquifer was in stage 1 moderate drought restrictions in March 2011. The average depth to water in the Lower Glen Rose (LGR) screened wells was 257.26 feet below top of casing (BTOC) or 996.93 feet above mean sea level (msl).
- The action level (AL) for lead (0.015 mg/L) was slightly exceeded in well CS-MW16-LGR (0.0157 mg/L). This well has been continuously cycled to feed the B-3 Bioreactor since April 2007. Lead has only exceeded the AL in this well one other time, September 2002.
- The maximum contaminant level (MCL) was exceeded in monitoring wells CS-MW1-LGR, CS-MW1-LGR field duplicate, CS-MW16-LGR, CS-MW16-CC, and CS-D for tetrachlorethene (PCE), trichloroethene (TCE), and/or *cis*-1,2-dichloroethene (*cis*-1,2-DCE) in March 2011.
- Sixteen of the 38 Westbay Well zones sampled in March 2011 had detections that exceeded the MCL. Eight zones were not sampled because they were dry. Every zone in CS-WB03 had PCE above the MCL, except the –LGR-09 zone, which reported 4.73 µg/L (micrograms/liter). The UGR zone in WB03 again has reported the highest PCE concentrations of all zones, 1767 µg/L. A water line leak was found in the area which helps explain why this zone often has water, even during drought conditions, and the other 3 UGR zones in surrounding Westbay wells do not.

MARCH 2011
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 March 2011. Laboratory analytical results are presented along with potentiometric contour figures. The purpose of this report is to present a summary of the March 2011 sampling results. Results from all four 2011 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 scoped under the U.S. Army Bridge Contract, was performed March 7 through 16, 2011. On-post groundwater monitoring conducted under this contract began with this March 2011 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 2010)** which provided recommendations for sampling based on a long-term monitoring optimization (LTMO) study performed for the CSSA groundwater monitoring program. LTMO study sampling frequencies were implemented on-post in December 2005, as approved by the Texas Commission on Environmental Quality (TCEQ) and the United States Environmental Protection Agency (USEPA). The LTMO evaluation was updated in 2010 using groundwater data from monitoring conducted between 2005 and 2009. It has been approved by the TCEQ and USEPA to be implemented on- and off-post in June 2011.

2.0 POST-WIDE FLOW DIRECTION AND GRADIENT

Forty-seven water level measurements were recorded on March 7, 2011 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 March 2011 are shown in **Figures 2-1, 2-2, and 2-3**.

The March 2011 potentiometric surface map for LGR-screened wells exhibited a wide range of groundwater elevations, from a minimum of 972.09 feet above msl at CS-MW10-CC to a maximum of 1068.18 feet above msl at FO-20. Groundwater elevations are generally higher in the northern and central portions of CSSA, and decrease to the southwest and southeast.

Average groundwater elevations in March 2011 decreased 43.19 feet from the elevations measured in December 2010. From January 1 to March 17, 2011, weather station north (WS-N) did not record a complete set of data due to power interruptions. Weather station south (WS-S) recorded 2.57 inches of rainfall during 18 rainfall events during this timeframe. A majority of the rain (2.15 inches) fell in January, with 1.01 inches falling on January 9. The average measured water level has continued to decline since September 2010. Bexar county and surrounding areas are under a severe to exceptional drought alert and the Trinity Aquifer is currently in stage 1 moderate drought restrictions.

Well CS-MW4-LGR in the central portion of CSSA has one of the highest groundwater elevations 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, B3-EXW01, and B3-EXW02 were pumped periodically to the SWMU B-3 Bioreactor between December 2010 and March 2011. 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, CS-11, and CS-12 were not in use between December 2010 and March 2011. Off-post water supply wells along Ralph Fair Road 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, CS-MW16-LGR/CC, B3-EXW01, B3-EXW02, and CS-I 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 March 2011, the overall groundwater gradient is to the south-southeast at 0.00314 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. In September 2010, water levels began to drop at a significant rate and have continued to fall to drought conditions. Water levels in March 2011 correspond closely to historical levels from December 2005. During that quarter the amount of rainfall was also similar, with 2.41 inches in December 2005 and 2.57 inches March 2011.

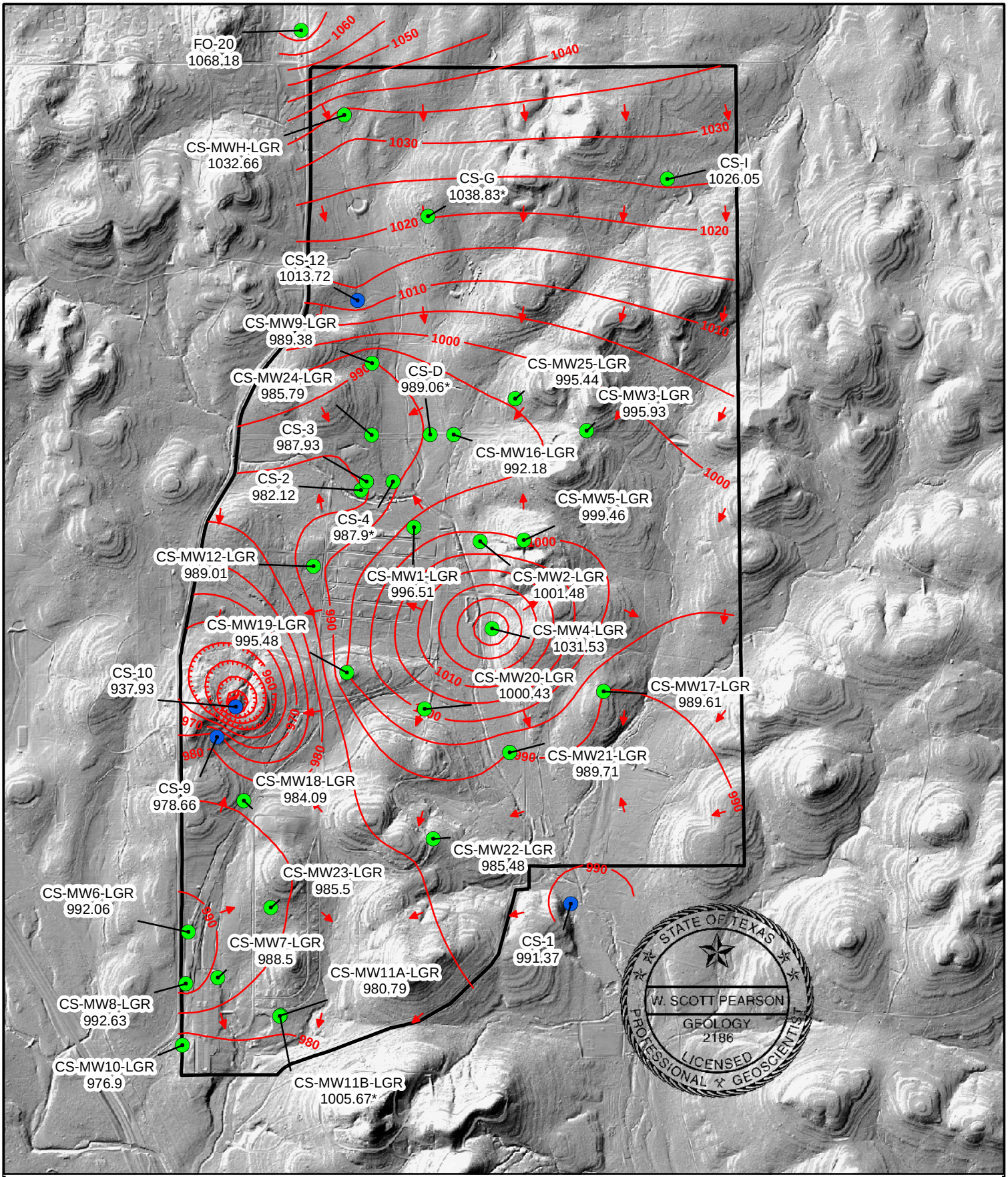

Figure 2-1

March 2011 Potentiometric Surface Map, LGR Wells

Camp Stanley Storage Activity

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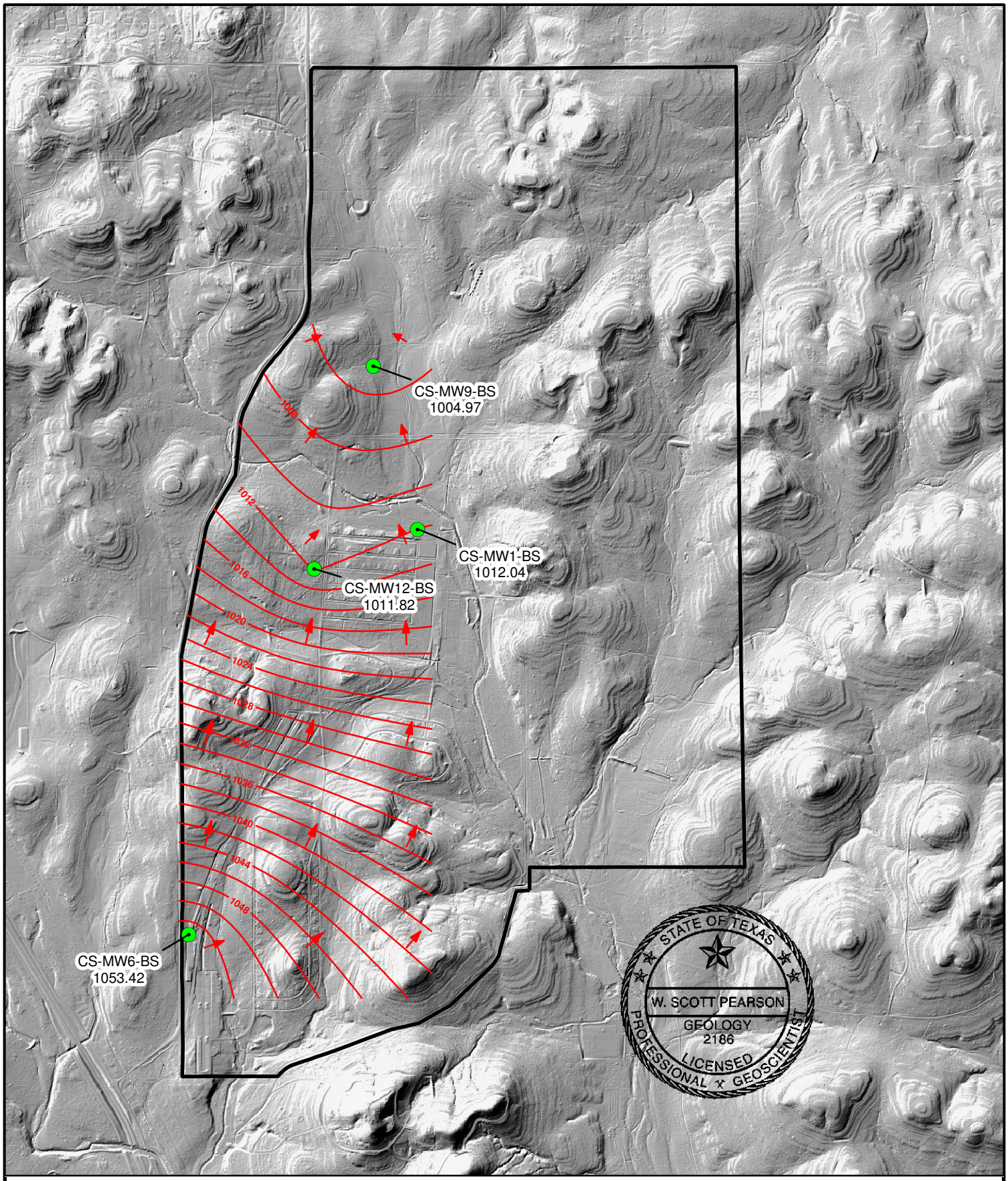

Figure 2-2

March 2011 Potentiometric Surface Map, BS Wells

Camp Stanley Storage Activity

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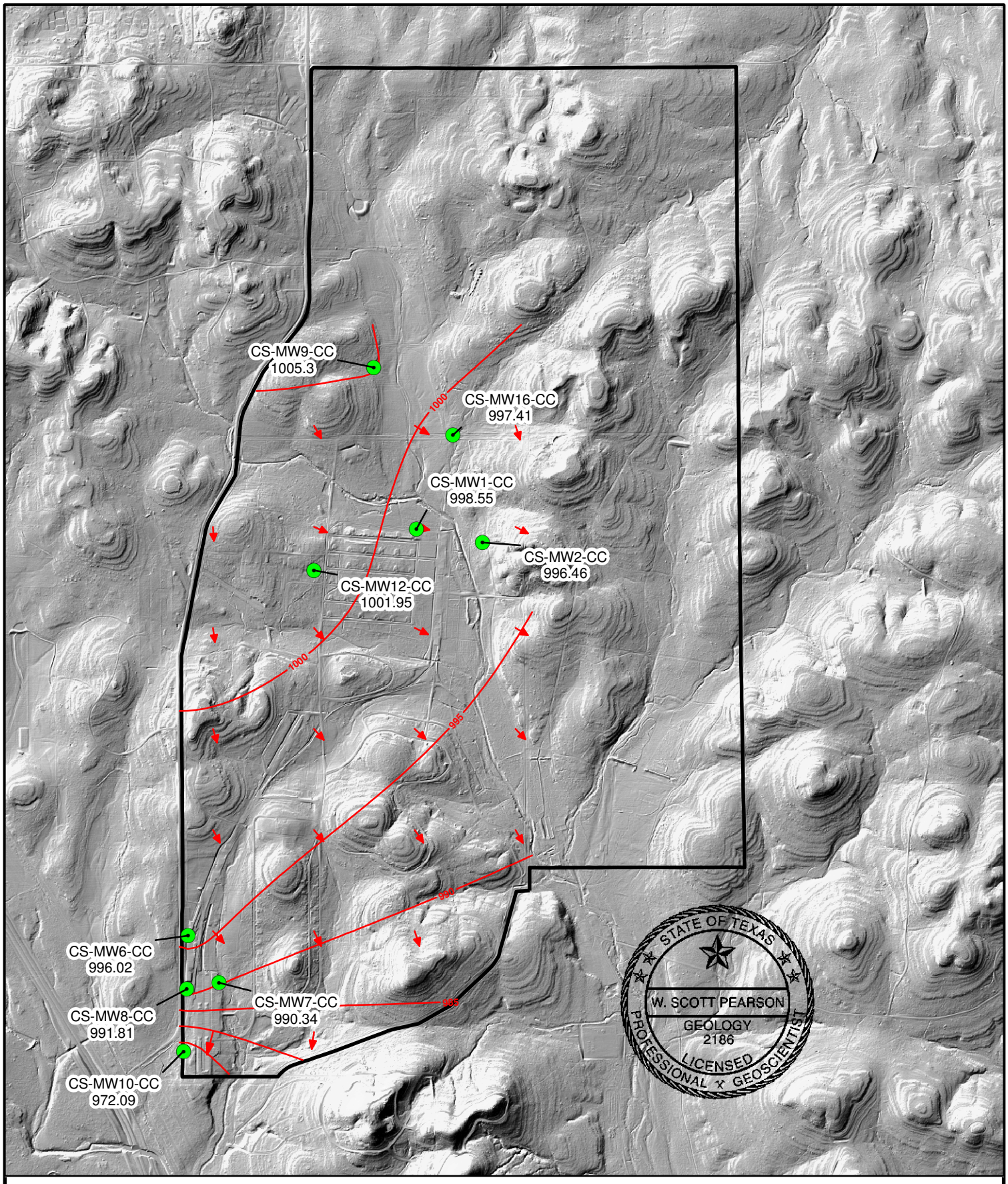

Figure 2-3

March 2011 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*	*Jun-10*	*Sep-10 (snapshot)*	*Dec-10*	*Mar-11*	*Sampling Frequency*
1	CS-MW1-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CS-MW1-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
	CS-MW1-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
2	CS-MW2-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CS-MW2-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
3	CS-MW3-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
4	CS-MW4-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
5	CS-MW5-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
6	CS-MW6-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CS-MW6-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
	CS-MW6-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
7	CS-MW7-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CS-MW7-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
	CS-MW8-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Every 9 months*
	CS-MW8-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
8	CS-MW9-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CS-MW9-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
	CS-MW9-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
	CS-MW10-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Every 9 months*
	CS-MW10-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
9	CS-MW11A-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
10	CS-MW11B-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NSWL	Semi-annual
	CS-MW12-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Every 9 months*
	CS-MW12-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
	CS-MW12-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Biennial
11	CS-MW16-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
12	CS-MW16-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CW-MW17-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Every 9 months*
13	CS-MW18-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
14	CS-MW19-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
15	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
	CS-2	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Every 9 months*
	CS-3	sampled as needed, no pump	Dec-99	NS	NS	NS	NS	as needed
16	CS-4	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
17	CS-9	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
18	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	S	Quarterly
	CS-11	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-09	NS	NS	NS	NS	pump removed
19	CS-12	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Dec-10	S	S	S	NS	Quarterly
20	CS-D	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	S	Semi-annual
	CS-MWG-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	S	NS	NS	Every 9 months*
	CS-MWH-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-09	NS	NS electical problems	NS	NS	Biennial
	CS-I	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	S	S	NS	NS	Every 9 months*
21	CS-MW20-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
22	CS-MW21-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
23	CS-MW22-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
24	CS-MW23-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
25	CS-MW24-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**
26	CS-MW25-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Dec-10	S	S	S	S	Quarterly**

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

3.0 MARCH 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 March 2011 included 22 monitoring wells, 4 drinking water wells, and 46 Westbay Well zones. Twenty-four of the 26 wells were sampled in March 2011. Two wells were not sampled: CS-MW11B-LGR was not sampled because the water level was below the pump and CS-12 was not sampled because there was ongoing construction at the well house. **Table 3-1** provides a sampling overview for March 2011 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-MW18-LGR, CS-MW19-LGR, CS-4, CS-D, 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, CS-MW16-LGR, and CS-MW16-CC 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 March 2011 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 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**.

PCE, TCE, and/or *cis*-1,2-DCE were detected above the MCL in 4 wells sampled this quarter (CS-MW1-LGR, CS-MW16-LGR, CS-MW16-CC, and CS-D). Well CS-MW16-LGR had a lead concentration of 0.0157 mg/L, slightly above the AL of 0.015 mg/L.

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 747780-#17, -#19, and -#20 containing the analytical results from this sampling event were received by Parsons April 4 – 6, 2011. Data validation was conducted and the data validation reports are presented in **Appendix D**. Plume maps from this quarter will be included in the 2011 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 March 2011 included all zones from 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 2011 event.

Thirty-eight of the 46 Westbay UGR, LGR, BS, and CC zones were sampled in March 2011. Eight zones (CS-WB01-UGR, CS-WB01-LGR-01, CS-WB02-UGR-01, CS-WB02-LGR-02, CS-WB03-LGR-01, CS-WB03-LGR-02, CS-WB04-UGR-01, and CS-WB04-LGR-02) were not sampled because they were dry. Sixteen of the 38 zones sampled reported PCE and/or TCE

above the MCL. All detected concentrations of VOCs are presented in **Table 3-3**. Full analytical results are presented in **Appendix C**.

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 quarterly in the SWMU B-3 Performance Status Reports.

4.0 MARCH 2011 SUMMARY

- Of the 26 wells scheduled for sampling, 24 were sampled in March 2011. Well CS-12 was not sampled because the well house is being constructed and CS-MW11B-LGR was not sampled because the water level was below the pump.
- From January 1 to March 17, 2011, CSSA's south weather station recorded 2.57 inches of rain. The north weather station did not record a complete set of data due to power interruptions. This is the lowest rainfall total per quarter since March 2009.
- Water levels decreased an average of 43.19 feet per well since last quarter. Water levels have continued to decrease drastically since September 2010. The average water level in March 2011 was 250.91 feet below top of casing, this excludes all pumping wells.
- VOCs were detected above the MCL in 4 of the 26 wells sampled in March 2011. Wells CS-MW1-LGR, CS-MW16-LGR, CS-MW16-CC, and CS-D were above the MCL for PCE, TCE, and/or *cis*-1,2-DCE.
- PCE, TCE, and/or *cis*-1,2-DCE were above the RL in CS-MW5-LGR, CS-MW20-LGR, CS-MW20-LGR field duplicate, and CS-4. PCE, TCE and/or *cis*-1,2-DCE were above the MDL in CS-MW2-LGR, CS-MW7-LGR, CS-MW9-LGR, CS-MW11A-LGR, CS-MW19-LGR, and CS-1.
- Lead was slightly above the AL in well CS-MW16-LGR. This well has been continuously cycled to feed the B-3 Bioreactor since April 2007. Lead has only exceeded the AL in this well one other time, September 2002.
- The AOC-65 Westbay wells were sampled in March 2011. They will now be sampled on a 9-month schedule in accordance with the updated LTMO. Eight selected LGR Westbay zones will be sampled in June 2011 to characterize plume conditions near AOC-65 as part of the 'snapshot' sampling event.
- Sixteen of the 38 zones sampled were above the MCL for PCE and/or TCE. By far, the highest contamination levels were found in WB03–UGR-01. PCE levels in this zone were 1767 ug/L. A water line leak was found in the area which helps explain why this zone often has water and the other 3 UGR zones in surrounding Westbay wells do not.

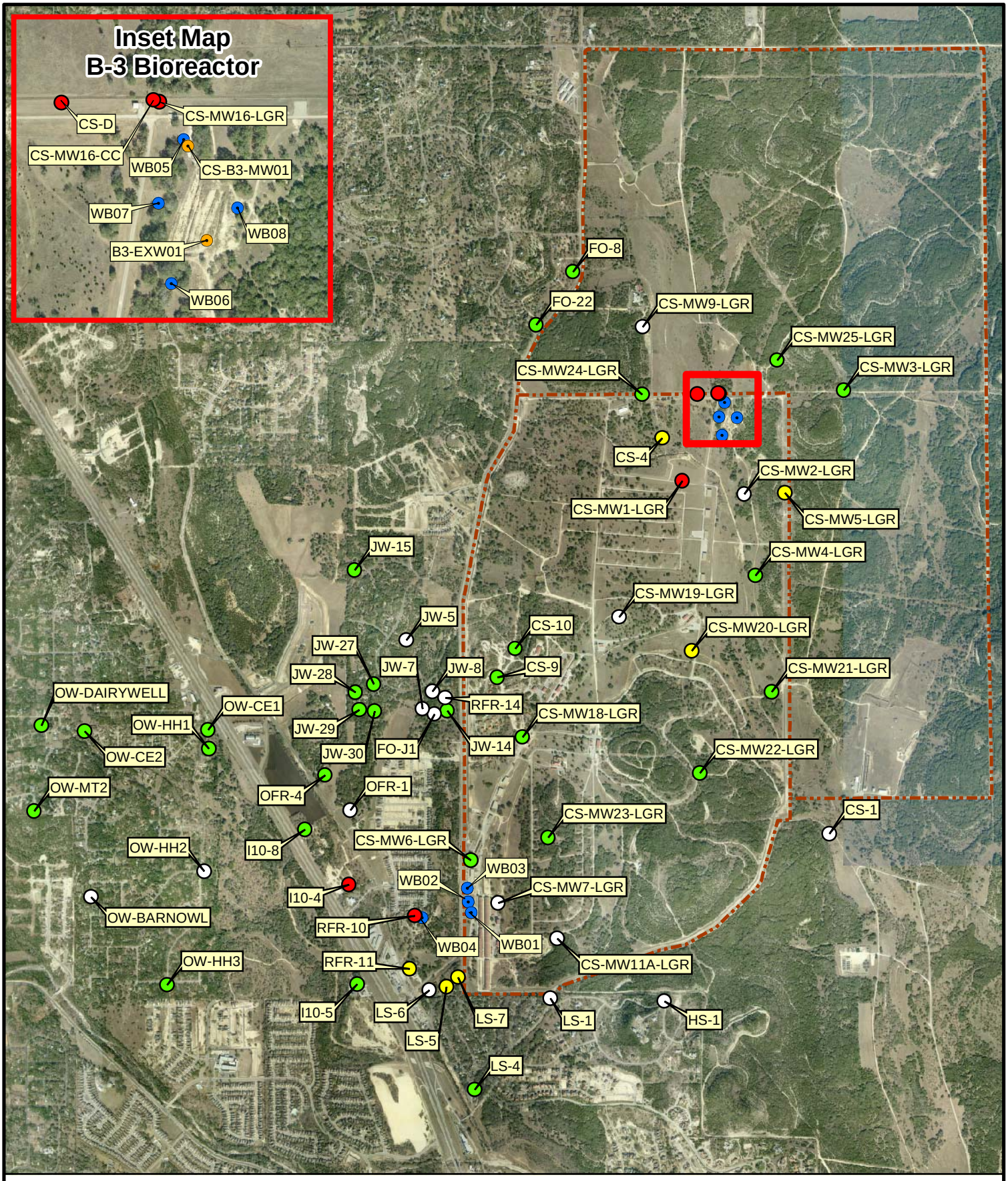

Figure 3-1

On-Post and Off-Post Well Sampling Locations for March 2011

Camp Stanley Storage Activity

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Table 3-2 March 2011 On-post Quarterly Groundwater Results, Detected Analytes

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury	Comments
CS-MW1-LGR	3/9/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW1-LGR FD	3/9/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW2-LGR	3/9/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW3-LGR	3/8/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW4-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW5-LGR	3/8/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW6-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW7-LGR	3/10/2011	NA	NA	--	**0.002F**	NA	--	NA	--	Consistently low chromium detections since 2008.
CS-MW9-LGR	3/8/2011	NA	NA	--	**0.062**	NA	--	NA	--	Highest chromium detection since well was first sampled in 2001.
CS-MW11A-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW16-LGR	3/8/2011	NA	NA	--	--	NA	**0.0157F**	NA	--	Last and only other time lead has exceeded the AL was in Sept. 2002.
CS-MW16-CC	3/8/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW18-LGR	3/9/2011	NA	NA	--	**0.039**	NA	--	NA	--	Highest chromium detection in this well since sampling began in 2002.
CS-MW19-LGR	3/9/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW20-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW20-LGR FD	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW21-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW22-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	Metals detections have gone away since water levels began to drop in Sept. 2010.
CS-MW23-LGR	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW23-LGR FD	3/10/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW24-LGR	3/9/2011	NA	NA	--	--	NA	--	NA	--	
CS-MW25-LGR	3/8/2011	NA	NA	--	**0.008F**	NA	--	NA	--	Lead was above the AL in Dec. 2010.
CS-D	3/8/2011	NA	NA	--	--	NA	**0.0023F**	NA	--	Last lead detection was in Sept. 2009.
CS-4	3/9/2011	NA	NA	--	--	NA	--	NA	--	
CSSA Drinking Water Well System										
CS-1	3/8/2011	--	**0.0334**	--	--	**0.004F**	--	**0.137**	--	Consistent barium and zinc detections throughout the history of this well.
CS-9	3/9/2011	**0.0003F**	**0.0374**	--	--	**0.008F**	**0.0149F**	**1.19**	**0.0017**	Well has been removed from drinking water system.
CS-10	3/9/2011	**0.0016F**	**0.0397**	--	--	**0.021**	--	**0.122**	--	
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	≥ MDL
BOLD	≥ RL
BOLD	≥ 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

--The analyte was analyzed for, but not detected. The associated numerical value is at or below the
F-The analyte was positively identified but the associated numerical value is below the RL.
* dilution of 5 run for this sample.

Table 3-2 March 2011 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	3/9/2011	--	**17.11**	**0.23F**	**11.9**	**29.59**	--	
CS-MW1-LGR FD	3/9/2011	--	**16.96**	**0.26F**	**12.24**	**30.15**	--	
CS-MW2-LGR	3/9/2011	--	**0.57F**	--	--	--	--	pH = 10.47 at time of sample, historically high pH in this well.
CS-MW3-LGR	3/8/2011	--	--	--	--	--	--	
CS-MW4-LGR	3/10/2011	--	--	--	--	--	--	The only PCE/TCE detection in this well was in late 2004.
CS-MW5-LGR	3/8/2011	--	**2.71**	--	**1.86**	**3.63**	--	Historical high for PCE and TCE in this well.
CS-MW6-LGR	3/10/2011	--	--	--	--	--	--	PCE and TCE initially detected in this well in 2001, no detections since.
CS-MW7-LGR	3/10/2011	--	--	--	**0.26F**	--	--	
CS-MW9-LGR	3/8/2011	--	--	--	**0.18F**	--	--	
CS-MW11A-LGR	3/10/2011	--	--	--	**1.20F**	--	--	
CS-MW16-LGR	3/8/2011	--	**189.43***	**0.24F**	**131.48***	**164.31***	--	These wells are continuously cycled to feed the B-3 Bioreactor.
CS-MW16-CC	3/8/2011	--	**29.48**	**6.81**	**0.66F**	**18.3**	--	
CS-MW18-LGR	3/9/2011	--	--	--	--	--	--	The pH was 10.77 at the time of sampling, unusual for this well.
CS-MW19-LGR	3/9/2011	--	--	--	**0.56F**	--	--	
CS-MW20-LGR	3/10/2011	--	--	--	**1.91**	--	--	Consistent levels of PCE in this well since 2007, below the MCL.
CS-MW20-LGR FD	3/10/2011	--	--	--	**1.51**	--	--	
CS-MW21-LGR	3/10/2011	--	--	--	--	--	--	Historically 1 TCE detection in Dec. 2009 for both of these wells, detections were below the RL. No PCE ever detected in these wells.
CS-MW22-LGR	3/10/2011	--	--	--	--	--	--	
CS-MW23-LGR	3/10/2011	--	--	--	--	--	--	
CS-MW23-LGR FD	3/10/2011	--	--	--	--	--	--	
CS-MW24-LGR	3/9/2011	--	--	--	--	--	--	No PCE and/or TCE ever detected in this well.
CS-MW25-LGR	3/8/2011	--	--	--	--	--	--	
CS-D	3/8/2011	--	**96.47***	**2.3**	**103.41**	**120.26***	--	
CS-4	3/9/2011	--	**1.09F**	--	**2.36**	**2.85**	--	
CSSA Drinking Water Well System								
CS-1	3/8/2011	--	--	--	--	**0.30F**	--	Active drinking water well.
CS-9	3/9/2011	--	--	--	--	--	--	Well is offline due to historical Pb & Hg issues.
CS-10	3/9/2011	--	--	--	--	--	--	Active drinking water well.
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	≥ MDL
BOLD	≥ RL
BOLD	≥ MCL

Precipitation per Quarter:	Mar-11	Comments
Weather Station South (WS-S):	2.57	Smallest rainfall total per quarter since March 2009.
Weather Station North (WS-N):	NA	Incomplete data collected due to power interruptions.

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.
* dilution of 5 run for this sample.

Table 3-3
March 2011 Westbay Results, Detected Analytes

Well ID	Date Sampled	1,1-DCE	*cis* -1,2-DCE	TCE	PCE	*trans* -1,2-DCE	Vinyl Chloride
CS-WB01-UGR-01	3/14/2011	Dry					
CS-WB01-LGR-01	3/14/2011	Dry					
CS-WB01-LGR-02	3/14/2011	--	--	**3.71**	**13**	--	--
CS-WB01-LGR-03	3/14/2011	--	--	**14.16**	**4.18**	--	--
CS-WB01-LGR-04	3/14/2011	--	--	--	--	--	--
CS-WB01-LGR-05	3/14/2011	--	--	**0.35**	--	--	--
CS-WB01-LGR-06	3/14/2011	--	**0.34**	**1.95**	**0.22**	--	--
CS-WB01-LGR-07	3/14/2011	--	**0.2**	**13.14**	**13.54**	--	--
CS-WB01-LGR-08	3/14/2011	--	**1.62**	**3.08**	**0.16**	--	--
CS-WB01-LGR-09	3/14/2011	--	**0.31**	**21.82**	**17.09**	--	--
CS-WB02-UGR-01	3/14/2011	Dry					
CS-WB02-LGR-01	3/14/2011	--	--	**1.34**	**0.48**	--	--
CS-WB02-LGR-02	3/14/2011	Dry					
CS-WB02-LGR-03	3/14/2011	--	--	--	**3.02**	--	--
CS-WB02-LGR-04	3/14/2011	--	--	**5.87**	**2.05**	--	--
CS-WB02-LGR-05	3/14/2011	--	--	**2.78**	**0.71**	**0.2**	--
CS-WB02-LGR-06	3/14/2011	--	**1.02**	**4.05**	**1.08**	**2.82**	--
CS-WB02-LGR-07	3/14/2011	--	**0.16**	**0.51**	**0.65**	--	--
CS-WB02-LGR-08	3/14/2011	--	**3.7**	**0.58**	**0.19**	**1.41**	--
CS-WB02-LGR-09	3/14/2011	--	**0.2**	**10.34**	**11.58**	--	--
CS-WB03-UGR-01	3/16/2011	--	--	**22.30***	**1767.03***	--	--
CS-WB03-LGR-01	3/16/2011	Dry					
CS-WB03-LGR-02	3/16/2011	Dry					
CS-WB03-LGR-03	3/16/2011	--	**0.17**	**9.03**	**14.41**	--	--
CS-WB03-LGR-04	3/16/2011	--	--	**5.58**	**16.22**	--	--
CS-WB03-LGR-05	3/16/2011	--	--	**5.43**	**22.49**	--	--
CS-WB03-LGR-06	3/16/2011	--	--	**0.86**	**5.86**	--	--
CS-WB03-LGR-07	3/16/2011	--	**2.32**	**7**	**8.03**	--	--
CS-WB03-LGR-08	3/16/2011	--	**7.41**	**1.67**	**7.82**	--	--
CS-WB03-LGR-09	3/16/2011	--	**0.26**	**4.04**	**4.73**	--	--
CS-WB04-UGR-01	3/15/2011	Dry					
CS-WB04-LGR-01	3/15/2011	--	--	--	**0.39**	--	--
CS-WB04-LGR-02	3/15/2011	Dry					
CS-WB04-LGR-03	3/15/2011	--	--	--	**0.17**	--	--
CS-WB04-LGR-04	3/15/2011	--	--	**0.25**	**0.2**	--	--
CS-WB04-LGR-06	3/15/2011	--	**2.87**	**14.62**	**22.35**	**0.36**	--
CS-WB04-LGR-07	3/15/2011	--	**3.82**	**19.26**	**9.21**	**0.31**	--
CS-WB04-LGR-08	3/15/2011	--	**0.15**	**1.02**	**0.38**	--	--
CS-WB04-LGR-09	3/15/2011	--	--	**5.77**	**7.15**	--	--
CS-WB04-LGR-10	3/15/2011	--	--	**0.57**	**0.8**	--	--
CS-WB04-LGR-11	3/15/2011	--	--	--	--	--	--
CS-WB04-BS-01	3/15/2011	--	--	--	--	--	--
CS-WB04-BS-02	3/15/2011	--	**0.15**	--	--	--	--
CS-WB04-CC-01	3/15/2011	--	**0.41**	--	--	--	--
CS-WB04-CC-02	3/15/2011	--	--	--	--	--	--
CS-WB04-CC-03	3/15/2011	--	--	--	--	--	--
Comparison Criteria							
Method Detection Limit	**MDL**	**0.3**	**0.16**	**0.16**	**0.15**	**0.19**	**0.23**
Reporting Limit	**RL**	**1.2**	**1.2**	**1**	**1.4**	**0.6**	**1.1**
Max. Contaminant Level	**MCL**	**7**	**70**	**5**	**5**	**100**	**2**

All samples were analyzed by APPL, Inc.
All values are reported in µg/L.
Abbreviations/Notes:

TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene

Data Qualifiers:
--The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.
* dilution of 25 run for this sample.

BOLD	≥ MDL
BOLD	≥ RL
BOLD	≥ MCL

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 March 7, 2011.	To the extent possible with data available. Due to the limited data available and the fact that wells are completed across multiple water-bearing units, potentiometric maps should only be used for regional water flow direction, not local. Ongoing pumping in the CSSA area likely affects the natural groundwater flow direction.	As additional wells are installed screened in distinct formations, future evaluations will eliminate reliance on wells screened across multiple formations.
	Describe the flow system, including the vertical and horizontal components of flow (2.1.9).	Potentiometric maps were created using March 7, 2011 water level data, and horizontal flow direction was tentatively identified. Insufficient data are currently available to determine vertical component of flow.	As described above, due to the lack of aquifer-specific water level information, potentiometric surface maps should only be used as an estimate of regional flow direction.	Same as above.
	Define formation(s) in the Middle Trinity Aquifer are impacted by the VOC contaminants (2.1.3).	Quarterly groundwater monitoring provides information on Middle Trinity Aquifer impacts. Monitoring wells equipped with Westbay® - multi-port samplers are sampled every 9 or 18 months and 8 selected zones will be sampled during the June 2011 'snapshot' 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-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 2011 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 24 of 46 CSSA wells. Of the 26 wells scheduled to be sampled in March 2011, 24 were sampled. Well CS-12 was not sampled due to well house construction and well CS-MW11B-LGR was not sampled due to the water level being below the pump.	The horizontal and vertical extent of groundwater contamination is continuously monitored.	Continue groundwater monitoring and construct additional wells as necessary.
	Determine the horizontal and vertical concentration profiles of all constituents of concern (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-MW20-LGR, CS-MW21-LGR, CS-MW22-LGR, CS-MW23-LGR, CS-MW24-LGR, CS-MW25-LGR, CS-D, and CS-4. 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.

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
March 2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Copper	Lead	Zinc	Mercury
CS-MW1-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW1-LGR FD	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW2-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW3-LGR	3/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW4-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW5-LGR	3/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW6-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW7-LGR	3/10/2011	NA	NA	0.0005U	**0.002F**	NA	0.0019U	NA	0.0001U
CS-MW9-LGR	3/8/2011	NA	NA	0.0005U	**0.062**	NA	0.0019U	NA	0.0001U
CS-MW11A-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW16-LGR	3/8/2011	NA	NA	0.0005U	0.001U	NA	**0.0157F**	NA	0.0001U
CS-MW16-CC	3/8/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW18-LGR	3/9/2011	NA	NA	0.0005U	**0.039**	NA	0.0019U	NA	0.0001U
CS-MW19-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW20-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW20-LGR FD	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW21-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW22-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW23-LGR	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW23-LGR FD	3/10/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW24-LGR	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CS-MW25-LGR	3/8/2011	NA	NA	0.0005U	**0.008F**	NA	0.0019U	NA	0.0001U
CS-D	3/8/2011	NA	NA	0.0005U	0.001U	NA	**0.0023F**	NA	0.0001U
CS-4	3/9/2011	NA	NA	0.0005U	0.001U	NA	0.0019U	NA	0.0001U
CSSA Drinking Water Well System									
CS-1	3/8/2011	0.0002U	**0.0334**	0.0005U	0.001U	**0.004F**	0.0019U	**0.137**	0.0001U
CS-9	3/9/2011	**0.0003F**	**0.0374**	0.0005U	0.001U	**0.008F**	**0.0149F**	**1.19**	**0.0017**
CS-10	3/9/2011	**0.0016F**	**0.0397**	0.0005U	0.001U	**0.021**	0.0019U	**0.122**	0.0001U

BOLD	≥ MDL
BOLD	≥ RL
BOLD	≥ 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.
* The analyte was run at a dilution of 5.

Appendix B
March 2011 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	3/9/2011	0.12U	**17.11**	**0.23F**	**11.9**	**29.59**	0.08U
CS-MW1-LGR FD	3/9/2011	0.12U	**16.96**	**0.26F**	**12.24**	**30.15**	0.08U
CS-MW2-LGR	3/9/2011	0.12U	**0.57F**	0.08U	0.06U	0.05U	0.08U
CS-MW3-LGR	3/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW4-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW5-LGR	3/8/2011	0.12U	**2.71**	0.08U	**1.86**	**3.63**	0.08U
CS-MW6-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW7-LGR	3/10/2011	0.12U	0.07U	0.08U	**0.26F**	0.05U	0.08U
CS-MW9-LGR	3/8/2011	0.12U	0.07U	0.08U	**0.18F**	0.05U	0.08U
CS-MW11A-LGR	3/10/2011	0.12U	0.07U	0.08U	**1.20F**	0.05U	0.08U
CS-MW16-LGR	3/8/2011	0.12U	**189.43***	**0.24F**	**131.48***	**164.31***	0.08U
CS-MW16-CC	3/8/2011	0.12U	**29.48**	**6.81**	**0.66F**	**18.3**	0.08U
CS-MW18-LGR	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW19-LGR	3/9/2011	0.12U	0.07U	0.08U	**0.56F**	0.05U	0.08U
CS-MW20-LGR	3/10/2011	0.12U	0.07U	0.08U	**1.91**	0.05U	0.08U
CS-MW20-LGR FD	3/10/2011	0.12U	0.07U	0.08U	**1.51**	0.05U	0.08U
CS-MW21-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW22-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW23-LGR	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW23-LGR FD	3/10/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW24-LGR	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-MW25-LGR	3/8/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-D	3/8/2011	0.12U	**96.47***	**2.3**	**103.41**	**120.26***	0.08U
CS-4	3/9/2011	0.12U	**1.09F**	0.08U	**2.36**	**2.85**	0.08U
CSSA Drinking Water Well System							
CS-1	3/8/2011	0.12U	0.07U	0.08U	0.06U	**0.30F**	0.08U
CS-9	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-10	3/9/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U

BOLD	≥ MDL
BOLD	≥ RL
BOLD	≥ 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.
* The analyte was run at a dilution of 5.

Appendix C
March 2011 Westbay Analytical Results

Well ID	Date Sampled	1,1-DCE	*cis* -1,2-DCE	TCE	PCE	*trans* -1,2-DCE	Vinyl Chloride
CS-WB01-UGR-01	3/14/2011	Dry					
CS-WB01-LGR-01	3/14/2011	Dry					
CS-WB01-LGR-02	3/14/2011	<0.12	<0.07	**3.71**	**13**	<0.08	<0.08
CS-WB01-LGR-03	3/14/2011	<0.12	<0.07	**14.16**	**4.18**	<0.08	<0.08
CS-WB01-LGR-04	3/14/2011	<0.12	<0.07	<0.05	<0.06	<0.08	<0.08
CS-WB01-LGR-05	3/14/2011	<0.12	<0.07	**0.35**	<0.06	<0.08	<0.08
CS-WB01-LGR-06	3/14/2011	<0.12	**0.34**	**1.95**	**0.22**	<0.08	<0.08
CS-WB01-LGR-07	3/14/2011	<0.12	**0.2**	**13.14**	**13.54**	<0.08	<0.08
CS-WB01-LGR-08	3/14/2011	<0.12	**1.62**	**3.08**	**0.16**	<0.08	<0.08
CS-WB01-LGR-09	3/14/2011	<0.12	**0.31**	**21.82**	**17.09**	<0.08	<0.08
CS-WB02-UGR-01	3/14/2011	Dry					
CS-WB02-LGR-01	3/14/2011	<0.12	<0.07	**1.34**	**0.48**	<0.08	<0.08
CS-WB02-LGR-02	3/14/2011	Dry					
CS-WB02-LGR-03	3/14/2011	<0.12	<0.07	<0.05	**3.02**	<0.08	<0.08
CS-WB02-LGR-04	3/14/2011	<0.12	<0.07	**5.87**	**2.05**	<0.08	<0.08
CS-WB02-LGR-05	3/14/2011	<0.12	<0.07	**2.78**	**0.71**	**0.2**	<0.08
CS-WB02-LGR-06	3/14/2011	<0.12	**1.02**	**4.05**	**1.08**	**2.82**	<0.08
CS-WB02-LGR-07	3/14/2011	<0.12	**0.16**	**0.51**	**0.65**	<0.08	<0.08
CS-WB02-LGR-08	3/14/2011	<0.12	**3.7**	**0.58**	**0.19**	**1.41**	<0.08
CS-WB02-LGR-09	3/14/2011	<0.12	**0.2**	**10.34**	**11.58**	<0.08	<0.08
CS-WB03-UGR-01	3/16/2011	<3.00*	<1.75*	**22.30***	**1767.03***	<2.00*	<2.00*
CS-WB03-LGR-01	3/16/2011	Dry					
CS-WB03-LGR-02	3/16/2011	Dry					
CS-WB03-LGR-03	3/16/2011	<0.12	**0.17**	**9.03**	**14.41**	<0.08	<0.08
CS-WB03-LGR-04	3/16/2011	<0.12	<0.07	**5.58**	**16.22**	<0.08	<0.08
CS-WB03-LGR-05	3/16/2011	<0.12	<0.07	**5.43**	**22.49**	<0.08	<0.08
CS-WB03-LGR-06	3/16/2011	<0.12	<0.07	**0.86**	**5.86**	<0.08	<0.08
CS-WB03-LGR-07	3/16/2011	<0.12	**2.32**	**7**	**8.03**	<0.08	<0.08
CS-WB03-LGR-08	3/16/2011	<0.12	**7.41**	**1.67**	**7.82**	<0.08	<0.08
CS-WB03-LGR-09	3/16/2011	<0.12	**0.26**	**4.04**	**4.73**	<0.08	<0.08
CS-WB04-UGR-01	3/15/2011	Dry					
CS-WB04-LGR-01	3/15/2011	<0.12	<0.07	<0.05	**0.39**	<0.08	<0.08
CS-WB04-LGR-02	3/15/2011	Dry					
CS-WB04-LGR-03	3/15/2011	<0.12	<0.07	<0.05	**0.17**	<0.08	<0.08
CS-WB04-LGR-04	3/15/2011	<0.12	<0.07	**0.25**	**0.2**	<0.08	<0.08
CS-WB04-LGR-06	3/15/2011	<0.12	**2.87**	**14.62**	**22.35**	**0.36**	<0.08
CS-WB04-LGR-07	3/15/2011	<0.12	**3.82**	**19.26**	**9.21**	**0.31**	<0.08
CS-WB04-LGR-08	3/15/2011	<0.12	**0.15**	**1.02**	**0.38**	<0.08	<0.08
CS-WB04-LGR-09	3/15/2011	<0.12	<0.07	**5.77**	**7.15**	<0.08	<0.08
CS-WB04-LGR-10	3/15/2011	<0.12	<0.07	**0.57**	**0.8**	<0.08	<0.08
CS-WB04-LGR-11	3/15/2011	<0.12	<0.07	<0.05	<0.06	<0.08	<0.08
CS-WB04-BS-01	3/15/2011	<0.12	<0.07	<0.05	<0.06	<0.08	<0.08
CS-WB04-BS-02	3/15/2011	<0.12	**0.15**	<0.05	<0.06	<0.08	<0.08
CS-WB04-CC-01	3/15/2011	<0.12	**0.41**	<0.05	<0.06	<0.08	<0.08
CS-WB04-CC-02	3/15/2011	<0.12	<0.07	<0.05	<0.06	<0.08	<0.08
CS-WB04-CC-03	3/15/2011	<0.12	<0.07	<0.05	<0.06	<0.08	<0.08

BOLD	≥ MDL
BOLD	≥ RL
BOLD	≥ MCL

All samples were analyzed by APPL, Inc.
All values are reported in µg/L.

Abbreviations/Notes:

TCE	Trichloroethene
PCE	Tetrachloroethene
DCE	Dichloroethene

Data Qualifiers:

* The analyte was run at a dilution of 25.

APPENDIX D

DATA VALIDATION REPORT

(Laboratory data packages are submitted to CSSA electronically.)

SDG 64127

DATA VERIFICATION SUMMARY REPORT

for on-post samples collected from

CAMP STANLEY STORAGE ACTIVITY

BOERNE, TEXAS

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

INTRODUCTION

The following data verification summary report covers quarterly groundwater samples and the associated field quality control (QC) samples collected from on-post Camp Stanley Storage Activity (CSSA) under Environmental Protection Support, Investigations, and Treatability Studies on March 8, 9, and 10, 2011. The samples in the following Sample Delivery Group (SDG) were analyzed for a reduced list of volatile organic compounds (VOCs) and metals:

64127

The field QC samples associated with this SDG included one matrix spike/matrix spike duplicate (MS/MSD) pair, three field duplicate (FD) samples, and two trip blanks (TBs). No ambient blanks were collected. During the initiation of this project, it was determined that ambient blanks were not necessary due to the absence of a source at these sites.

All samples were collected by Parsons and analyzed by APPL, Inc. following the procedures outlined in the Statement of Work and CSSA QAPP, Version 1.0. The samples in this SDG were shipped to the laboratory in two coolers. Coolers were received by the laboratory at temperatures of 2.5ºC and 3.0ºC, which were within the 2-6ºC range recommended by the CSSA QAPP.

EVALUATION CRITERIA

The data submitted by the laboratory has been reviewed and verified following the guidelines outlined in the CSSA QAPP, Version 1.0. Information reviewed in the data packages included sample results; field and laboratory quality control samples; calibrations; case narratives; raw data; chain-of-custody (COC) forms and the sample receipt checklist. The findings presented in this report are based on the reviewed information, and whether the guidelines in the CSSA QAPP, Version 1.0, were met.

VOLATILES

General

The volatiles portion of this data package consisted of thirty-one (31) samples, including five (5) on-post drinking water samples, nineteen (19) on-post groundwater samples, three (3) FDs, one (1) MS/MSD pair, and two (2) TBs. The samples were collected on March 8, 9, and 10, 2011 and were analyzed for a reduced list of VOCs which included: 1,1-dichloroethene, *cis*-1,2-dichloroethene, tetrachloroethene, *trans*-1,2-dichloroethene, trichloroethene, and vinyl chloride.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in three batches (#153174, 153175, and 153176) under a single initial calibration (ICAL). All samples were analyzed following the procedures outlined in the CSSA QAPP and were prepared and analyzed within the holding time required by the method.

Sample CS-MW16-LGR required a 5x dilution for *cis*-1,2-dichloroethene, tetrachloroethene, and trichloroethene due to the high concentrations present. Sample CS-D required a 5x dilution for *cis*-1,2-dichloroethene and trichloroethene due to the high concentrations present. All other analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the three laboratory control spike (LCS) samples, the MS/MSD samples, and the surrogate spikes. Sample CS-MW4-LGR was designated for MS/MSD analyses on the COC.

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

Precision

Precision was evaluated using the relative percent difference (RPD) obtained from the MS/MSD concentrations. Precision was further evaluated by comparing the parent and field duplicate analyte results. Samples CS-MW1-LGR, CS-MW20-LGR, and CS-MW23-LGR were collected in duplicate. The second set of vials from each location was submitted as a field duplicate.

All MS/MSD RPDs were within acceptance criteria.

All target VOCs were non-detect in sample CS-MW23-LGR and the associated field duplicate.

All target VOCs detected above the reporting limit (RL) in sample CS-MW1-LGR and the associated field duplicate met RPD criteria, as follows:

Analyte	Parent (µg/L)	FD (µg/L)	RPD	Criteria
Cis-1,2-DCE	17.11	16.96	0.9	
TCE	29.59	30.15	1.8	RPD ≤ 20
Tetrachloroethene	11.90	12.24	2.8	

All target VOCs were non-detect in sample CS-MW21-LGR and the associated field duplicate with the exception of tetrachloroethene. Tetrachloroethene failed to meet RPD criteria in the field duplicate pair, as follows:

CS-MW20-LGR

Analyte	Parent (µg/L)	FD (µg/L)	RPD	Criteria
Tetrachloroethene	1.91	1.51	23	RPD ≤ 20

Since the RPD for this field duplicate pair was only slightly above criteria and all analytes demonstrated acceptable precision in the other two sets of field duplicate samples, it is the professional opinion of the Parsons' data validator that the variability demonstrated by this field duplicate pair is not indicative of the data set as a whole. In addition, the minor exceedance is not severe enough to indicate any problem with the sampling technique utilized by Parsons. Therefore, no corrective action was deemed necessary.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining trip and laboratory blanks for cross contamination of samples during transit or analysis.

All samples in this data package were analyzed following the COC and the analytical procedures described in the CSSA QAPP, Version 1.0. All samples were prepared and analyzed within the holding time required by the method.

- All instrument performance check criteria were met.
- All initial calibration criteria were met.
- The LCS samples were prepared using a secondary source. All second source verification criteria were met.
- All initial calibration verification (ICV) criteria were met.
- All continuing calibration verification (CCV) criteria were met.
- All internal standard criteria were met.

There were three method blanks and two TBs associated with the VOC analyses in this SDG. All blanks were non-detect for all target VOCs.

Completeness

Completeness has been evaluated in accordance with the CSSA QAPP. The number of usable results has been divided by the number of possible individual analyte results and expressed as a percentage to determine the completeness of the data set.

All VOC results for the samples in this SDG were considered usable. The completeness for this SDG is 100%, which meets the minimum acceptance criteria of 95%.

ICP-AES METALS

General

The ICP-AES portion of this SDG consisted of twenty-nine (29) samples, including five (5) on-post drinking water samples, nineteen (19) on-post groundwater samples, three (3) FDs, and one (1) MS/MSD pair. Samples were collected on March 8, 9, and 10, 2011 and were analyzed for cadmium, chromium, and lead. Drinking water samples CS-1, CS-9, and CS-10 were also analyzed for arsenic, barium, copper, and zinc.

The ICP-AES metals analyses were performed using USEPA SW846 Method 6010B. All samples were analyzed following the procedures outlined in the CSSA QAPP and were prepared and analyzed within the holding time required by the method.

The samples for ICP-AES metals were digested in two batches (#153432 and #153434). The samples were analyzed in one batch under a single ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the two LCS samples and the MS/MSD samples. Sample CS-MW4-LGR was designated for MS/MSD analysis on the COC for this SDG.

Two LCS samples were analyzed, one for each digestion batch. All LCS and MS/MSD recoveries were within acceptance criteria.

Precision

Precision was evaluated using the RPD obtained from the MS/MSD concentrations. Precision was further evaluated by comparing the field duplicate metal results. Samples CS-MW1-LGR, CS-MW20-LGR, and CS-MW23-LGR were collected in duplicate.

All MS/MSD RPDs were within acceptance criteria.

All target metals were non-detect in the parent and field duplicate samples for all three field duplicate pair.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating preservation and holding times; and
- Examining laboratory blanks for cross contamination of samples during analysis.

All samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP, Version 1.0. All samples were prepared and analyzed within the holding time required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All CCV criteria were met.
- All interference check (ICSA/ICSAB) criteria were met.
- No dilution test was required, as per the CSSA QAPP.

Two method blanks and several calibration blanks were analyzed in association with the ICP-AES analyses in this SDG. All blanks were free of target metals at or above the RL.

Completeness

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

All ICP-AES metals results for the samples in this SDG were considered usable. The completeness for the ICP metals portion of this SDG is 100%, which meets the minimum acceptance criteria of 95%.

MERCURY

General

The mercury portion of this SDG consisted of twenty-nine (29) samples, including five (5) on-post drinking water samples, nineteen (19) on-post groundwater samples, three (3) FDs, and one (1) MS/MSD pair. Samples were collected on March 8, 9, and 10, 2011 and were analyzed for mercury.

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

The mercury samples were digested in two batches (#153525 and 153526). The samples were analyzed in a one batch under a single ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the two LCS samples and the MS/MSD samples. Sample CS-MW4-LGR was designated for MS/MSD analysis on the COC for this SDG.

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

Precision

Precision was evaluated using the RPD obtained from the MS/MSD concentrations. Precision was further evaluated by comparing the field duplicate mercury results. Samples CS-MW1-LGR, CS-MW20-LGR, and CS-MW23-LGR were collected in duplicate.

The MS/MSD RPD was within acceptance criteria.

Mercury was non-detect in the parent and field duplicate samples for all three field duplicate pair.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents actual site conditions. Representativeness has been evaluated by:

- Comparing the COC procedures to those described in the CSSA QAPP;
- Comparing actual analytical procedures to those described in the CSSA QAPP;
- Evaluating holding times; and
- Examining laboratory blanks for cross contamination of samples during analysis.

The samples in this SDG were analyzed following the COC and the analytical procedures described in the CSSA QAPP. All samples were prepared and analyzed within the holding times required by the method.

- All initial calibration criteria were met.
- All second source verification criteria were met. The ICV was prepared using a secondary source.
- All calibration verification criteria were met.

There were two method blanks and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of mercury at or above the RL.

Completeness

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

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