

September 2011

On-Post

Quarterly Groundwater Monitoring Report



Prepared For

**Department of the Army
Camp Stanley Storage Activity
Boerne, Texas**

December 2011

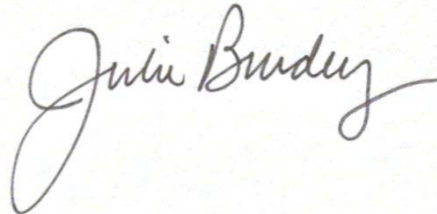
GEOSCIENTIST CERTIFICATION

September 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 September 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 September 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

11/15/2011

Date

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EXECUTIVE SUMMARY

- All 6 wells scheduled for sampling in September 2011 were sampled. Drinking water wells (CS-1, CS-10, and CS-12), two newly installed wells (CS-MW35-LGR and CS-MW36-LGR), and one former drinking water well (CS-9) were sampled.
- The 2 newly installed monitoring wells (CS-MW35-LGR and CS-MW36-LGR) were sampled for the first time in September 2011. The first sampling event for monitoring wells includes an expanded list of analytes, in accordance with Groundwater Data Quality Objectives (DQO). The other wells were analyzed for selected volatile organic compounds (VOC) (CSSA short list) and arsenic, barium, chromium, copper, cadmium, lead, mercury, and zinc analyses.
- Average groundwater elevations in September 2011 decreased 8.82 feet from the elevations measured in June 2011. Bexar County and surrounding areas are under an extreme to exceptional drought alert and the Trinity Glen Rose Groundwater Conservation District remains under stage 2 severe drought water restrictions, which went into effective June 1, 2011. The average depth to water in the Lower Glen Rose (LGR) screened wells was 298.82 feet below top of casing (BTOC) or 954.55 feet above mean sea level (msl).
- The action level (AL) for lead (0.015 mg/L) was slightly exceeded in well CS-1 (0.0294 mg/L). Lead and mercury also exceeded the AL/maximum contaminant level (MCL) in former drinking water well CS-9; this well has been offline since 2006.
- The MCL was exceeded in monitoring well CS-MW36-LGR, which is located at AOC-65, for tetrachlorethene (PCE) and trichloroethene (TCE) in September 2011.
- Westbay Wells (WB01-WB04) in the vicinity of AOC-65 were not sampled in September 2011. These wells were profiled to collect water level data in the area. The Westbay Wells are scheduled to be sampled in December 2011, in accordance with the LTMO schedule.

SEPTEMBER 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 September 2011. Laboratory analytical results are presented along with potentiometric contour figures. The purpose of this report is to present a summary of the September 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 was performed September 12 through 16, 2011.

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 and was implemented on- and off-post in June 2011.

2.0 POST-WIDE FLOW DIRECTION AND GRADIENT

Forty-nine water level measurements were recorded on September 12, 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 September 2011 are shown in **Figures 2-1, 2-2, and 2-3**.

The September 2011 potentiometric surface map for LGR-screened wells (**Figure 2-1**) exhibited a wide range of groundwater elevations, from a minimum of 882.70 feet above mean sea level (msl) at CS-MW11A-LGR to a maximum of 1013.29 feet above msl at CS-MWG-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 September 2011 decreased 8.82 feet from the elevations measured in June 2011. From June 17 to September 17, 2011, weather station north (WS-N) recorded 2.29 inches of rainfall during nine rainfall events. Weather station south (WS-S) recorded 2.13 inches of rainfall during seven rainfall events in this timeframe. A majority of the rain fell on June 22 and July 19, with 0.87 and 0.73 inches recorded at WS-S and 0.71 and 0.82 inches recorded at WS-N. The average measured water level has continued to decline since September 2010. Bexar County and surrounding areas remain under an extreme to exceptional drought alert and the Trinity Glen Rose Groundwater Conservation District declared stage 2 severe drought water restrictions, effective June 1, 2011.

Well CS-MW4-LGR, located in the central portion of CSSA, typically has one of the highest groundwater elevations of LGR-screened wells. Under average and above-average aquifer elevations, the groundwater level is 20 to 30 feet higher than the nearest comparable wells (CS-MW2-LGR and CS-MW5-LGR), creating a pronounced groundwater mound in the central portion of the facility. However, this mounding effect is normally muted or no longer present during prolonged periods of drought conditions, including September 2011. Long-term monitoring has ascertained that when groundwater in the vicinity of CS-MW4-LGR rises above about 970 feet msl, the mounding effect is evident. As measured in September 2011, the water elevation at CS-MW4-LGR was 967.98 feet msl, and typical mounding effect is almost completely absent compared to the historical normal in this area. It is postulated that perched groundwater associated with the Salado Creek drainage is hydraulically connected to the main aquifer body in this location. However, that perched water tends to disappear during extreme drought conditions.

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 July 2011 and September 2011. CSSA drinking water wells CS-1, CS-10, and CS-12 are cycled on and off to maintain the drinking water system currently in place at CSSA. Influence from the CS-12 pumping well is evident in **Figure 2-1**, and CS-MW16-CC in **Figure 2-3**. 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. An obviously erroneous water level was recorded in September 2011 at well CS-MW22-LGR; this water level was omitted from the LGR potentiometric map and also

from the water level calculations. In order to prevent this oversight in the future the field crew will carry a binder of all historic water levels, including the previous quarter's levels, which will be referred to at each well.

Historical groundwater monitoring at CSSA has demonstrated that the aquifer gradient typically slopes in a south-southeast direction (**Figure 2-1**). The potentiometric surface in both the BS and CC members of the aquifer generally trend in a southerly direction (**Figures 2-2 and 2-3**). 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, CS-I, and even off-post wells (Fair Oaks Ranch) can significantly alter the LGR groundwater gradient. The regional gradient calculation, an overall groundwater gradient averaged across CSSA, is measured from CS-MWH-LGR to CS-MW21-LGR. For September 2011, the overall LGR groundwater gradient is to the south-southeast at 0.00533 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 due to drought conditions. Water levels in September 2011 are below those measured during the 2006 drought, and correspond closely to historical drought levels reported during 2009. For the LGR, prior drought statistics show that the aquifer elevation generally does not decrease dramatically below the top of the main aquifer body, and tends to stabilize at an average elevation of 950 feet msl. However, well yield and recovery from production wells suffer significantly during the depressed aquifer conditions.

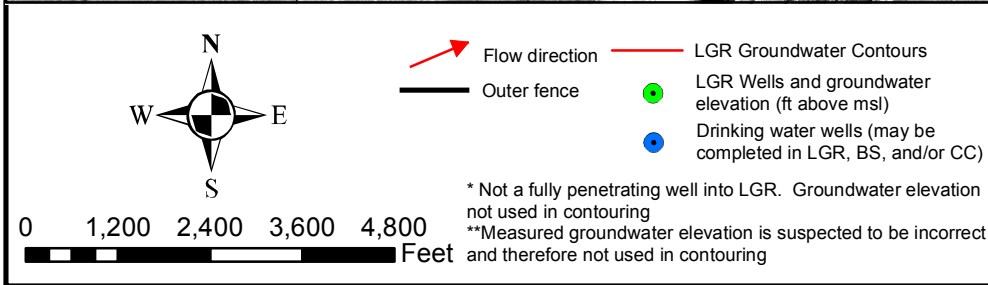
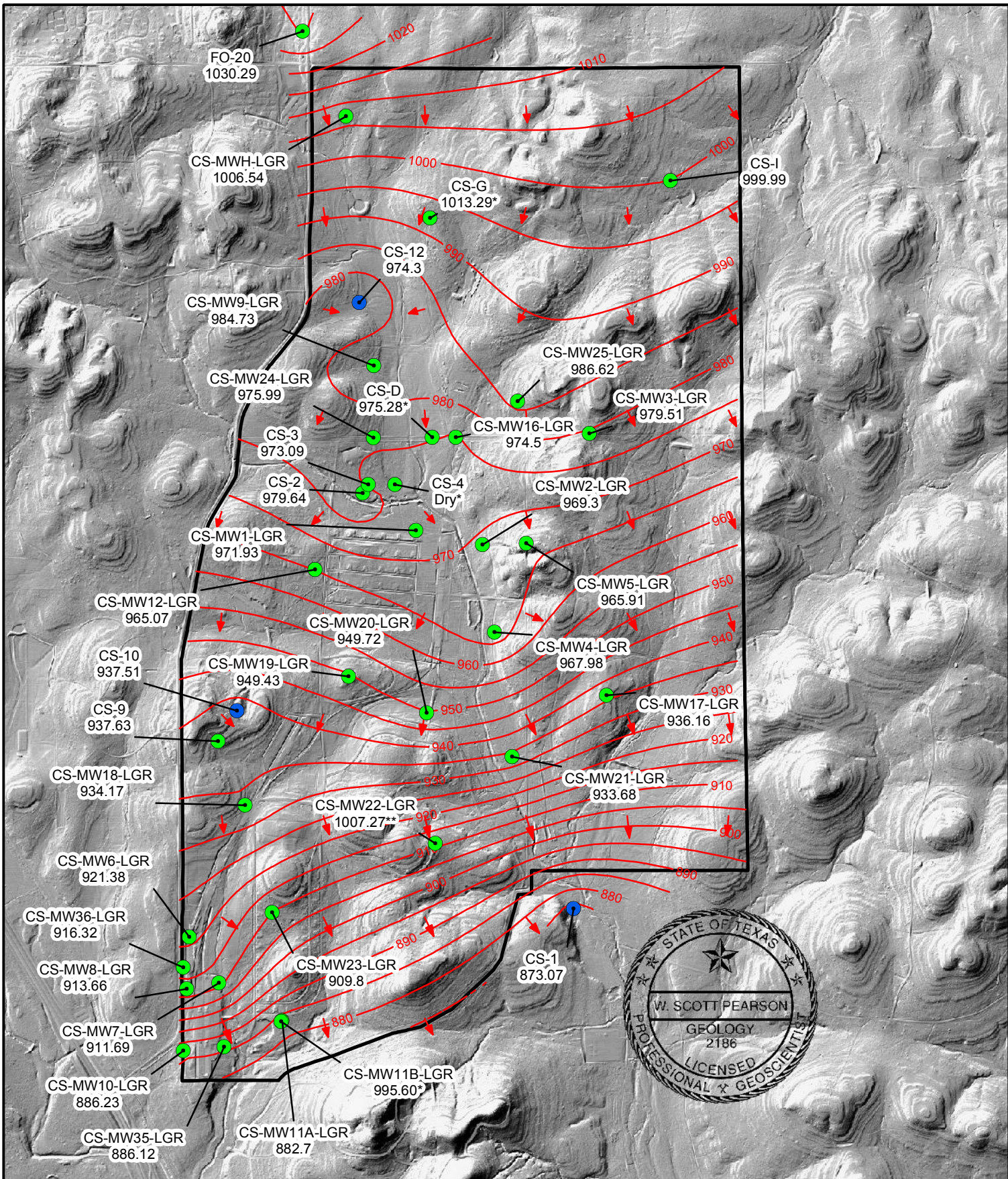
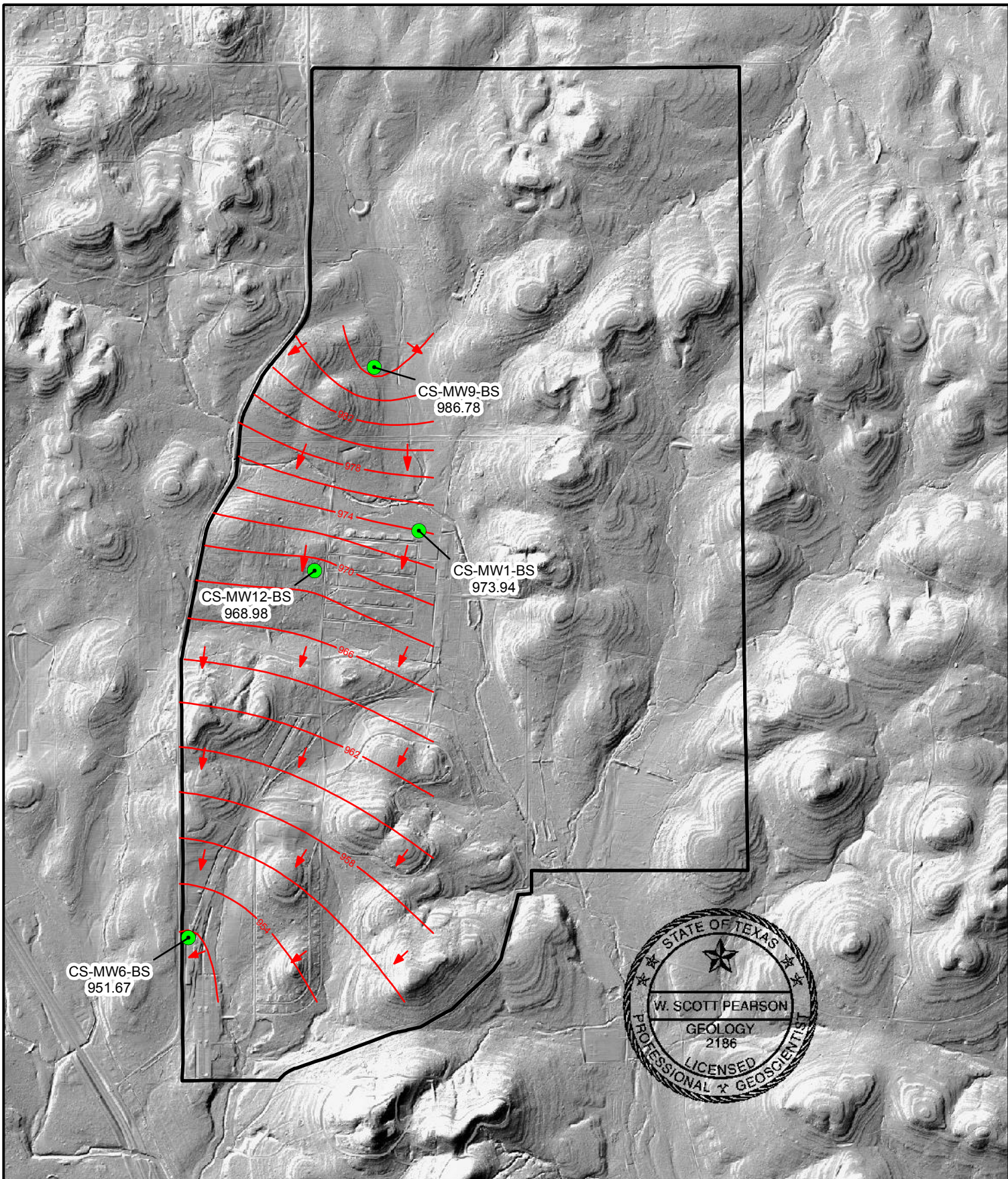


Figure 2-1
 September 2011 Potentiometric Surface Map, LGR Wells
 Camp Stanley Storage Activity
PARSONS



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





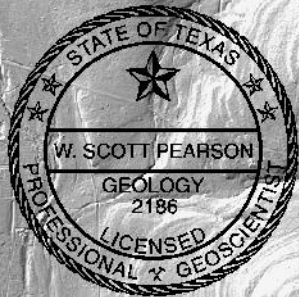
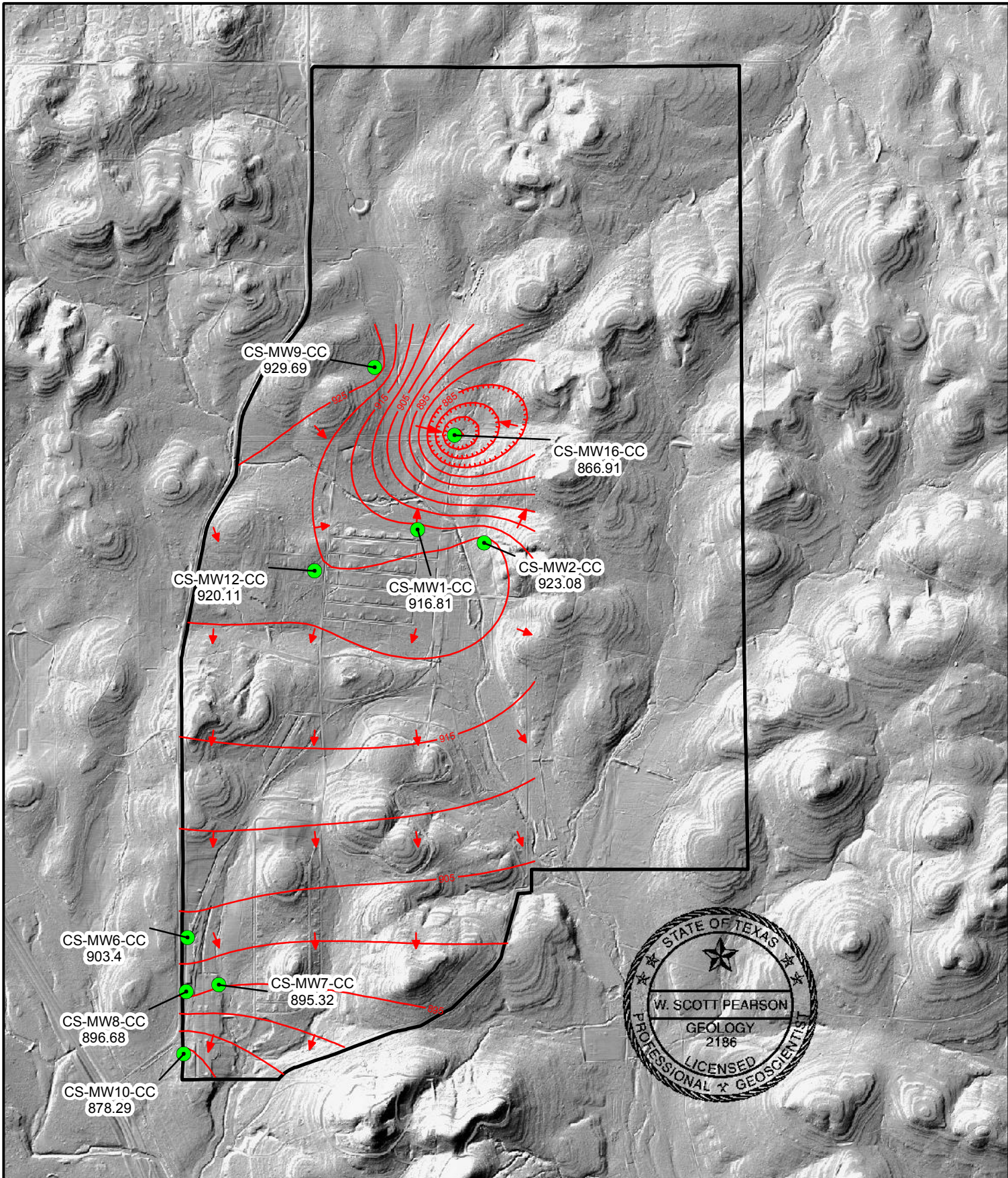
-  Flow direction
-  BS Groundwater Contours
-  Outer fence
-  BS Wells and groundwater elevation (ft above msl)

Figure 2-2

September 2011 Potentiometric
Surface Map, BS Wells

Camp Stanley Storage Activity

PARSONS



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

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

Figure 2-3
 September 2011 Potentiometric
 Surface Map, CC Wells
 Camp Stanley Storage Activity
PARSONS

3.0 SEPTEMBER ANALYTICAL RESULTS

3.1 Monitoring Wells

Under the provisions of the groundwater monitoring DQOs and the 2010 LTMO evaluation, the schedule for sampling on-post in September 2011 included six wells, and all six samples were successfully collected. No Westbay Well zones were scheduled for sampling this quarter. **Table 3-1** provides a sampling overview for September 2011 and the schedule under the LTMO recommendations. Wells CS-MW35-LGR and CS-MW36-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 September 2011 for the full list of volatile organic compounds (VOC), metals (arsenic, barium, chromium, copper, cadmium, nickel, lead, zinc, and mercury), anions (bromide, chloride, fluoride, nitrate, nitrite, and sulfate), bicarbonate, total dissolved solids (TDS), and alkalinity. This is an expanded sampling list used only for the first sampling event of newly installed monitoring wells. Wells CS-1, CS-9, CS-10, and CS-12 were analyzed for the short list VOCs and metals (arsenic, barium, chromium, copper, zinc, cadmium, mercury, and lead). Well CS-12 was also analyzed for iron and aluminum. 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 and TCE were detected above the MCL in one on-post well sampled this quarter, CS-MW36-LGR. Well CS-1 had a lead concentration of 0.0294 mg/L, above the AL of 0.015 mg/L. Well CS-9 had lead (0.019 mg/L) and mercury (0.0051 mg/L) concentrations slightly above their applicable AL and 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 747780-#127 and -#129, containing the analytical results from this sampling event were received by Parsons September 7-12, 2011. Data validation was conducted and the data validation reports are presented in **Appendix C**.

3.2 Westbay-equipped Wells

Under the provisions of the groundwater monitoring LTMO recommendations, no Westbay Well zones were scheduled for sampling in September 2011. However, these wells were profiled to capture water level readings. These wells (CS-WB01, CS-WB02, CS-WB03, and CS-WB04) are located in the vicinity of AOC-65 and are sampled on a 9-month schedule as recommended in the LTMO evaluation and will be sampled again during the December 2011 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 the SWMU B-3 Performance Status Reports.

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

Count	Well ID	Analytes	Last Sample Date	Mar-11	June-11 (snapshot)	Sep-11	Sampling Frequency *
	CS-MW1-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Semi-annual
	CS-MW1-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MW1-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MW2-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Semi-annual
	CS-MW2-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 18 months
	CS-MW3-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW4-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	Every 9 months
	CS-MW5-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW6-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	Every 9 months
	CS-MW6-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MW6-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 18 months
	CS-MW7-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW7-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 18 months
	CS-MW8-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Semi-annual
	CS-MW8-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MW9-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 18 months
	CS-MW9-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 9 months
	CS-MW9-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 9 months
	CS-MW10-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Semi-annual
	CS-MW10-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 18 months
	CS-MW11A-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Semi-annual
	CS-MW11B-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NSWL	NSWL	NS	Every 9 months
	CS-MW12-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 9 months
	CS-MW12-BS	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MW12-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 18 months
	CS-MW16-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW16-CC	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CW-MW17-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Sep-10	NS	NSWL	NS	Every 9 months
	CS-MW18-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	Every 9 months
	CS-MW19-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
1	CS-1	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-11	S	S	S	Quarterly
	CS-2	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 9 months
	CS-3	sampled as needed, no pump	Dec-99	NS	NS	NS	NS
	CS-4	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	Semi-annual
2	CS-9	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-11	S	S	S	Quarterly
3	CS-10	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn)	Jun-11	S	S	S	Quarterly
	CS-11	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-09	NS	NS	NS	NS
4	CS-12	VOCs & metals (As,Ba,Cr, Cu,Cd,Hg,Pb,Zn,Fe,Al)	Jun-11	NS	S	S	Quarterly
	CS-D	VOCs & metals (Cr, Cd, Hg, Pb)	Mar-11	S	NSWL	NS	Semi-annual
	CS-MWG-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MWH-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-I	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	NS	S	NS	Every 18 months
	CS-MW20-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW21-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW22-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW23-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
	CS-MW24-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Semi-annual
	CS-MW25-LGR	VOCs & metals (Cr, Cd, Hg, Pb)	Jun-11	S	S	NS	Every 9 months
5	CS-MW35-LGR	full suite for new wells				S	
6	CS-MW36-LGR	full suite for new wells				S	

* New LTMO sampling frequency implemented June 2011

S = Sample

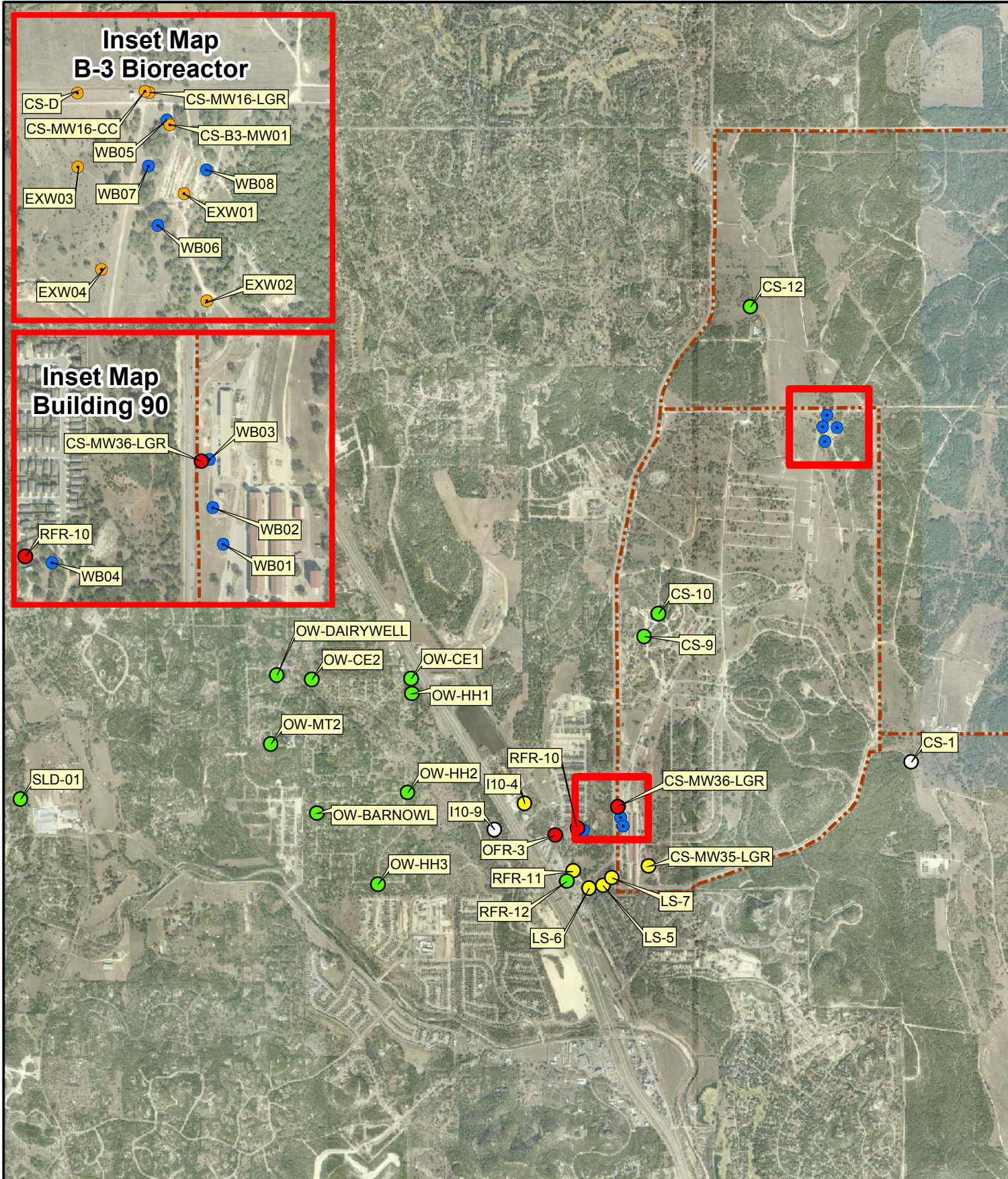
NS = No Sample

NSWL = No Sample due to low water level

Table 3-2 Westbay Sampling Frequency

Westbay Interval	Last Sample Date	Sep-11	LTMO Sampling Frequency (as of June '11)
CS-WB01-UGR-01	1-Dec-04	NS	Every 9 months
CS-WB01-LGR-01	1-Sep-10	NS	Every 9 months
CS-WB01-LGR-02	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-03	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-04	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-05	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-06	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-07	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-08	1-Mar-11	NS	Every 9 months
CS-WB01-LGR-09	1-Jun-11	NS	Every 9 months + snapshot
CS-WB02-UGR-01	1-Dec-04	NS	Every 9 months
CS-WB02-LGR-01	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-02	1-Mar-10	NS	Every 9 months
CS-WB02-LGR-03	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-04	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-05	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-06	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-07	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-08	1-Mar-11	NS	Every 9 months
CS-WB02-LGR-09	1-Jun-11	NS	Every 9 months + snapshot
CS-WB03-UGR-01	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-01	1-Sep-10	NS	Every 9 months
CS-WB03-LGR-02	1-Oct-07	NS	Every 9 months
CS-WB03-LGR-03	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-04	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-05	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-06	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-07	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-08	1-Mar-11	NS	Every 9 months
CS-WB03-LGR-09	1-Jun-11	NS	Every 9 months + snapshot
CS-WB04-UGR-01	1-Mar-04	NS	Every 9 months
CS-WB04-LGR-01	1-Mar-11	NS	Every 18 months
CS-WB04-LGR-02	1-Mar-10	NS	Every 18 months
CS-WB04-LGR-03	1-Mar-11	NS	Every 18 months
CS-WB04-LGR-04	1-Mar-11	NS	Every 18 months
CS-WB04-LGR-06	1-Jun-11	NS	Every 9 months + snapshot
CS-WB04-LGR-07	1-Jun-11	NS	Every 9 months + snapshot
CS-WB04-LGR-08	1-Mar-11	NS	Every 9 months
CS-WB04-LGR-09	1-Jun-11	NS	Every 9 months + snapshot
CS-WB04-LGR-10	1-Jun-11	NS	Every 9 months + snapshot
CS-WB04-LGR-11	1-Jun-11	NS	Every 9 months + snapshot
CS-WB04-BS-01	1-Mar-11	NS	Every 18 months
CS-WB04-BS-02	1-Mar-11	NS	Every 18 months
CS-WB04-CC-01	1-Mar-11	NS	Every 18 months
CS-WB04-CC-02	1-Mar-11	NS	Every 18 months
CS-WB04-CC-03	1-Mar-11	NS	Every 18 months

Profiling performed quarterly, in conjunction with post wide water levels.



**Inset Map
B-3 Bioreactor**

- CS-D
- CS-MW16-CC
- WB05
- EXW03
- WB07
- WB06
- EXW04
- CS-MW16-LGR
- CS-B3-MW01
- WB08
- EXW01
- EXW02

**Inset Map
Building 90**

- CS-MW36-LGR
- RFR-10
- WB04
- WB03
- WB02
- WB01

Figure 3-1

On-Post and Off-Post Well Sampling Locations for September 2011
Camp Stanley Storage Activity



0 1,500 3,000 4,500 6,000 Feet

Sampled Wells September 2011

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

Table 3-3
September 2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic	Aluminum	Barium	Cadmium	Chromium	Copper	Iron	Lead	Zinc	Mercury
CS-MW35-LGR	9/15/2011	0.0009F	NA	0.0407	0.0005U	0.004F	0.003U	NA	0.0019U	0.1	0.0001U
CS-MW36-LGR	9/15/2011	0.0014F	NA	0.0354	0.0005U	0.007F	0.003U	NA	0.0019U	0.029F	0.0001U
CS-9	9/14/2011	0.0013F	NA	0.0423	0.0005U	0.001U	0.005F	NA	0.0190F	1.722	0.0051
CSSA Drinking Water Well System											
CS-1	9/14/2011	0.0012F	NA	0.0316	0.0005U	0.001U	0.013J	NA	0.0294	0.543	0.0001U
CS-10	9/14/2011	0.0014F	NA	0.0413	0.0005U	0.002F	0.025J	NA	0.0022F	0.106	0.0001U
CS-10 FD	9/14/2011	0.0025F	NA	0.0403	0.0005U	0.001U	0.015J	NA	0.0019U	0.095	0.0001U
CS-12	9/14/2011	0.0021F	0.02U	0.0331	0.0005U	0.001U	0.015J	0.08F	0.0053F	0.201	0.0001U

Well ID	Sample Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl Chloride
CS-MW35-LGR	9/15/2011	0.12U	0.07U	0.08U	2.01	0.05U	0.08U
CS-MW36-LGR	9/15/2011	0.12U	0.07U	0.08U	9.91	9.33	0.08U
CS-9	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CSSA Drinking Water Well System							
CS-1	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.25F	0.08U
CS-10	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-10 FD	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-12	9/14/2011	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 that analyte

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

4.0 SEPTEMBER 2011 SUMMARY

- Of the six wells scheduled for sampling, all six were sampled in September 2011.
- From June 18 to September 17, 2011, CSSA's south weather station recorded 2.13 inches of rain. The north weather station recorded 2.29 inches of rain.
- Water levels decreased an average of 8.82 feet per well since last quarter. Water levels have continued to decrease since September 2010. The average water level in September 2011 (excluding pumping wells) was 298.45 feet below top of casing.
- Monitoring wells CS-MW35-LGR and CS-MW36-LGR were sampled for the first time since installation in September 2011. The first sampling event for monitoring wells includes an expanded list of analytes, in accordance with Groundwater DQOs. The following analysis were run: full list of VOCs, metals (arsenic, barium, chromium, copper, cadmium, nickel, lead, zinc, and mercury), anions (bromide, chloride, fluoride, nitrate, nitrite, and sulfate), bicarbonate, TDS, and alkalinity. These results are presented in **Appendix B**.
- VOCs were detected above the MCL in one of the six wells sampled in September 2011. Well CS-MW36-LGR was above the MCL for PCE (9.91 µg/L) and TCE (9.33 µg/L).
- PCE was above the reporting limit (RL) in CS-MW35-LGR (2.01 µg/L). TCE was above the MDL in drinking water well CS-1 (0.25 µg/L).
- Lead was slightly above the AL in well CS-1. Lead hasn't been reported above the AL in well CS-1 since December 2000. Lead and mercury were above the AL/MCL in well CS-9 in September 2011. This well has been offline since 2006.
- Westbay Wells (WB01-WB04) in the vicinity of AOC-65 were not sampled in September 2011. These wells were profiled to collect water level data in the area. The Westbay Wells are scheduled to be sampled in December 2011.

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, HSP, and LTMO recommendations.	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 September 12, 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 September 12, 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 are sampled during the '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, CS-12, 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 6 of 46 CSSA wells. Of the 6 wells scheduled to be sampled in September 2011, all 6 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-MW35-LGR and CS-MW36-LGR. Samples were analyzed for the full list of VOCs using USEPA method SW8260B, 9 CSSA metals (arsenic, barium, copper, cadmium, lead, mercury, nickel, chromium, and zinc), anions (bromide, chloride, fluoride, nitrate, nitrite, and sulfate), bicarbonate, TDS, and alkalinity. The drinking water wells (CS-1, CS-9, CS-10, and CS-12) were sampled for the short list of VOC and metals (arsenic, barium, chromium, copper, cadmium, lead, mercury, 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																											
		<table border="1"> <thead> <tr> <th>ANALYTE</th> <th>RL (µg/L)</th> <th>MCL(µg/L)</th> </tr> </thead> <tbody> <tr> <td>1,1-DCE</td> <td>1.2</td> <td>7</td> </tr> <tr> <td>cis-1,2-DCE</td> <td>1.2</td> <td>70</td> </tr> <tr> <td>trans-1,2-DCE</td> <td>0.6</td> <td>100</td> </tr> <tr> <td>PCE</td> <td>1.4</td> <td>5</td> </tr> <tr> <td>TCE</td> <td>1.0</td> <td>5</td> </tr> <tr> <td>Vinyl chloride</td> <td>1.1</td> <td>2</td> </tr> </tbody> </table>	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								
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ANALYTE	RL (µg/L)	MCL/AL (µg/L)																													
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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.	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
		<p>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.</p>	<p>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.</p>	<p>Use results for groundwater characterization purposes.</p>
Remediation	<p>Determine goals and create cost-effective and technologically appropriate methods for remediation (2.2.1).</p>	<p>Continued data collection will provide analytical results for accomplishing this objective.</p>	<p>Ongoing.</p>	<p>Continue sampling and evaluation, including quarterly groundwater monitoring teleconferences to address remediation.</p>
	<p>Determine placement of new wells for monitoring (2.3.1, 3.6)</p>	<p>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).</p>	<p>Ongoing.</p>	<p>Continue quarterly groundwater teleconferences to discuss sampling frequency and placement of new monitor wells.</p>
Project schedule/ Reporting	<p>Produce a quarterly monitoring project schedule as a road map for sampling, analysis, validation, verification, reviews, and reports.</p>	<p>Prepare schedules and sampling guidelines prior to each quarterly sampling event.</p>	<p>Yes.</p>	<p>Continue sampling schedule preparation each quarter.</p>

APPENDIX B

**QUARTERLY ON-POST GROUNDWATER
MONITORING ANALYTICAL RESULTS
SEPTEMBER 2011**

Appendix B
September 2011 Quarterly On-Post Groundwater Monitoring Analytical Results

Well ID	Sample Date	Arsenic	Aluminum	Barium	Cadmium	Chromium	Copper	Iron	Lead	Zinc	Mercury
CS-MW35-LGR	9/15/2011	0.009F	NA	0.0407	0.0005U	0.004F	0.003U	NA	0.0019U	0.1	0.0001U
CS-MW36-LGR	9/15/2011	0.0014F	NA	0.0354	0.0005U	0.007F	0.003U	NA	0.0019U	0.029F	0.0001U
CS-9	9/14/2011	0.0013F	NA	0.0423	0.0005U	0.001U	0.005F	NA	0.0190F	1.722	0.0051
CSSA Drinking Water Well System											
CS-1	9/14/2011	0.0012F	NA	0.0316	0.0005U	0.001U	0.013J	NA	0.0294	0.543	0.0001U
CS-10	9/14/2011	0.0014F	NA	0.0413	0.0005U	0.002F	0.025J	NA	0.0022F	0.106	0.0001U
CS-10 FD	9/14/2011	0.0025F	NA	0.0403	0.0005U	0.001U	0.015J	NA	0.0019U	0.095	0.0001U
CS-12	9/14/2011	0.0021F	0.02U	0.0331	0.0005U	0.001U	0.015J	0.08F	0.0053F	0.201	0.0001U

Well ID	Sample Date	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	PCE	TCE	Vinyl Chloride
CS-MW35-LGR	9/15/2011	0.12U	0.07U	0.08U	2.01	0.05U	0.08U
CS-MW36-LGR	9/15/2011	0.12U	0.07U	0.08U	9.91	9.33	0.08U
CS-9	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CSSA Drinking Water Well System							
CS-1	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.25F	0.08U
CS-10	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-10 FD	9/14/2011	0.12U	0.07U	0.08U	0.06U	0.05U	0.08U
CS-12	9/14/2011	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 that analyte

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

APPENDIX C

DATA VALIDATION REPORT

(Laboratory data packages are submitted to CSSA electronically.)

SDG 65680

SDG 65702

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) sample collected from on-post Camp Stanley Storage Activity (CSSA) under Environmental Protection Support, Investigations, and Treatability Studies on September 14, 2011. The samples in the following Sample Delivery Group (SDG) were analyzed for a reduced list of volatile organic compounds (VOCs) and metals:

65680

The field QC samples associated with this SDG were one trip blank (TB) and one set of parent and field duplicate (FD) samples. 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 one cooler. The cooler was received by the laboratory at a temperature of 3.0°C, which was within the 2-6°C 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 six (6) samples, including four (4) on-post groundwater samples, one (1) FD, and one (1) TB. The samples were collected on September 14, 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 two batches (#156633 and #156620) under two different initial calibrations (ICALs). 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. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the laboratory control spike (LCS) sample and the surrogate spikes. No sample was designated for MS/MSD analyses on the COC for this SDG.

All LCS and surrogate spike recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the parent and FD sample results. Sample CS-10 was collected in duplicate.

None of the target compounds were detected in the parent and FD samples.

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 one method blank and one TB 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 five (5) on-post groundwater samples including one FD. Samples were collected on September 14, 2011 and were analyzed for arsenic, barium, cadmium, chromium, copper, lead 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 one batch (#159553). 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 LCS sample. No sample was designated for MS/MSD analysis on the COC for this SDG.

All LCS recoveries were within acceptance criteria.

Precision

Precision were evaluated based on the relative percent difference (%RPD) of the parent and FD samples. Sample CS-10 was collected in duplicate.

%RPD calculation was only applicable when both parent and FD results are greater than reporting limits:

Metals	Parent, mg/L	FD, mg/L	%RPD	Criteria, %RPD
---------------	---------------------	-----------------	-------------	-----------------------

Barium	0.0413	0.0403	2.5	≤20
Copper	0.025	0.015	50	
Zinc	0.106	0.096	9.9	

“J” flags were applied to all copper results in this SDG.

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.

One method blank 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 five (5) on-post groundwater samples. Samples were collected on September 14, 2011 including one FD. All samples 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 one batch (#159340). 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 LCS sample. No sample was designated for MS/MSD analysis on the COC for this SDG.

The LCS recovery was within acceptance criteria.

Precision

Precision was evaluated based on the parent and FD sample results.

Mercury was not detected in both parent and FD sample of CS-10.

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 was one method blank 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%.

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 two 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 September 15, 2011. The samples in the following Sample Delivery Group (SDG) were analyzed for full list of volatile organic compounds (VOCs), selected metals, selected anions, total dissolved solid, carbonate and bicarbonate:

65702

The field QC sample associated with this SDG were one trip blank (TB) and a set of matrix spike/matrix spike duplicate (MS/MSD). 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 one cooler. The cooler was received by the laboratory at a temperature of 2.0°C, which was within the 2-6°C 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 five (5) samples, including two (2) on-post groundwater samples, one set of MS/MSD, and one (1) TB. The samples were collected on September 15, 2011 and were analyzed for full list of VOCs according to CSSA QAPP.

The VOC analyses were performed using United States Environmental Protection Agency (USEPA) SW846 Method 8260B. The samples were analyzed in one batch (#159642) under one set of different initial calibrations (ICALs). 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. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery (%R) obtained from the laboratory control sample (LCS), MS/MSD samples, and the surrogate spikes. Sample CS-MW35-LGR was designated for MS/MSD analyses on the COC for this SDG.

All LCS and surrogate spike recoveries were within acceptance criteria.

All non-compliant %Rs of MS/MSD are listed below:

Compounds	MS, %R	MSD, %R	Criteria, %R
2,2-Dichloropropane	60.6	65.2	75 – 125
<i>cis</i> -1,2-Dichloroethene	126	129	75 – 125
Dichlorodifluoromethane	(125)	129	75 - 125

() indicates the %R was compliant.

Since the parent sample had no detection of *cis*-1,2-dichloroethene and dichlorodifluoromethane, the “M” flags applied to the parent sample results were removed by Parsons data validator.

Precision

Precision was evaluated based on the MS/MSD sample results.

All %RPDs were compliant.

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 sample was 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 one method blank and one TB 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 four (4) on-post groundwater samples including one set of MS/MSD. Samples were collected on September 15, 2011 and were analyzed for arsenic, barium, cadmium, chromium, copper, lead, nickel, 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 one batch (#159552). 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 LCS. Sample CS-MW35-LGR was designated for MS/MSD analysis on the COC for this SDG.

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

Precision

Precision were evaluated based on the relative percent difference (%RPD) of the MS/MSD results.

All %RPD were compliant.

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.

One method blank 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 four (4) on-post groundwater samples. Samples were collected on September 15, 2011 including one set of MS/MSD. All samples 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 one batch (#159338). 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 LCS, MS and MSD. Sample CS-MW35-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 based on the %RPD of MS and MSD results.

The %RPD was compliant.

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 was one method blank 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%.

TOTAL DISSOLVED SOLIDS (TDS)

The TDS portion of this SDG consisted of four (4) on-post groundwater samples including a set of MS/MSD. Samples were collected on September 15, 2011. All samples were analyzed for TDS.

The TDS analyses were performed using USEPA Method 160.1. 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 TDS samples were analyzed in one batch (#159368).

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS and LCS duplicate (LCSD) and MS/MSD results.

All LCS, LCSD, MS, and MSD %recoveries were within acceptance criteria.

Precision

Precision was evaluated based on the %RPD of LCS and LCSD results and MS/MSD results.

Both %RPDs were compliant.

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 blank 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 analyzed within the holding times required by the method.

There was one method blank associated with the TDS analyses in this SDG. The method blank was free of detectable solid 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.

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

CARBONATE AND BICARBONATE (TOTAL ALKALINITY)

The total alkalinity portion of this SDG consisted of four (4) on-post groundwater samples. Samples were collected on September 15, 2011 including one set of MS/MSD. All samples were analyzed for total alkalinity.

The total alkalinity analyses were performed using Standard Method SM2320B. 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 total alkalinity samples were analyzed in one batch (#159563). All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS, LCSD, and MS. Sample CS-MW35-LGR was designated for MS/MSD analysis on the COC for this SDG. Lab did not perform MSD by mistake.

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

Precision

Precision was evaluated based on the %RPD of LCS and LCSD results.

Both %RPD for carbonate and bicarbonate were compliant.

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.

There was one method blank associated with the carbonate and one with bicarbonate analyses in this SDG. Both blanks were free of target analyte 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.

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

ANIONS

The anions portion of this SDG consisted of four (4) on-post groundwater samples. Samples were collected on September 15, 2011 including one set of MS/MSD. All samples were analyzed for bromide, chloride, fluoride, nitrate, nitrite, phosphate, and sulfate.

The anion analyses were performed using USEPA SW846 Method 9056. 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 anion samples were prepared in one batch (#159941). The samples were analyzed in a one batch under a single set of ICAL. All analyses were performed undiluted.

Accuracy

Accuracy was evaluated using the percent recovery obtained from the LCS, LCSD, MS, and MSD. Sample CS-MW35-LGR was designated for MS/MSD analysis on the COC for this SDG.

All LCS and LCSD recoveries were within acceptance criteria.

The non-compliant %Rs for MS/MSD are listed below:

Anions	MS, %R	MSD, %R	Criteria, %R
Bromide	(102)	113	86 – 112
Nitrite	137	(102)	87 - 110

() indicates the %R was compliant.

Due to the minor exceedance of the MSD for bromide, the “M” flag applied to the parent sample by lab was removed by Parsons data validator.

Since the parent sample has no nitrite detected at method detection limit (MDL), the “M” flag applied to the parent sample by lab was removed by Parsons data validator.

Precision

Precision was evaluated based on the %RPD of LCS/LCSD and MS/MSD results.

All %RPDs were compliant.

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 was one method blank and several calibration blanks associated with the mercury analyses in this SDG. All blanks were free of anions 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 anion results for the samples in this SDG were considered usable. The completeness for the anion portion of this SDG is 100%, which meets the minimum acceptance criteria of 90%.