

**CSSA B-3 BIOREACTOR OPERATIONS  
PERFORMANCE STATUS REPORT  
(QUARTER 14, MONTHS 40 – 42, AUGUST – OCTOBER, 2010)**

**FEBRUARY 9, 2011**

---

---

This status report summarizes the operation of a bioreactor at Solid Waste Management Unit (SWMU) B-3 from August 1, 2010 through October 31, 2010, comprising the fourteenth quarter of bioreactor operations and monitoring since system start-up. This status report includes descriptions of current conditions, field observations, analytical results, and an anticipated schedule of activities for the next reporting period. Analytical results from monthly and quarterly regulatory and performance sampling through October 2010 are attached for reference. Parsons personnel working on this project during the reporting period include Ken Rice, Samantha Elliott, Eric Tennyson, Adrien Lindley, Julie Bouch, Bill Butler, Scott Pearson, and William Martin.

***Executive Summary***

Site conditions were seasonal and wet through the quarter with 8.83 inches of precipitation reported. Injection of extracted groundwater continued through the quarter with few interruptions. Minor interruptions in injection operations were due to decreased aquifer levels triggering the automatic cut-off in the extraction wells and/or storage tank. Approximately 31,158,859 gallons of groundwater extracted from CS-MW16-LGR, CS-MW16-CC, B3-EXW01, and B3-EXW02 have been injected into bioreactor trenches 1, 2, and 6 since the start of normal operations. During quarter 14, a total of 4,004,059 gallons of extracted groundwater from wells CS-MW16-LGR, CS-MW16-CC, B3-EXW01, and B3-EXW02 were injected into the bioreactor. The majority of extracted groundwater, ~1,822,250 gallons, was from CS-MW16-CC, while ~1,194,000 gallons was extracted from CS-MW16-LGR, 987,400 gallons were extracted from CS-B3-EXW01, and 300 gallons were extracted from B3-EXW02.

Data from monitoring efforts indicate that the B-3 bioreactor has continued to maintain appropriate geochemical conditions for effective anaerobic dechlorination of chlorinated aliphatic hydrocarbons (CAHs). Geochemical parameters indicating optimal conditions include the following:

- Concentrations of dissolved oxygen (DO) are generally less than 0.5 milligrams per liter (mg/L) and oxidation-reduction potential (ORP) values are less than -100 millivolts (mV), indicating an anaerobic environment conducive to dechlorination of CAHs within the trenches;
- Production of methane indicating that fermentation is occurring; and
- Hydrogen concentrations are greater than 1.0 nanomoles per liter (nmol/L), indicating that there is sufficient electron donor present to stimulate anaerobic dechlorination of CAHs.

Analytical results for samples collected in trench 1 and 6 sumps provide evidence that biotic and abiotic dechlorination of trichloroethene (TCE) is occurring. The consistent presence of the end product ethene provides evidence that the biotic reductive dechlorination process appears to be the major pathway for degradation of CAHs within trench 1. Additionally, two other degradation mechanisms, both biotic and abiotic, appear to be occurring within trench 1.

It appears that biotic anaerobic oxidation of CAHs to carbon dioxide may be occurring with Mn (IV) as the terminal electron acceptor. This degradation pathway reaction results in the production of the reduced form of manganese [Mn (II)]. The detections of high concentrations of Mn(II) in trenches 1 and 6 may be the result of this biotic process.

Evidence for the existence of an abiotic reductive dechlorination is indicated by the presence of reduced iron [Fe(II)] and trans-DCE in trenches 1 and 6. Field sampling analyses (Noblis) indicated positive results for hydrogen sulfide and sulfate-reducing bacteria. Hydrogen sulfide likely reduces iron [III] in soil minerals to iron [II], which is then available to facilitate reductive dechlorination of CAHs. Although evidence suggests this degradation pathway exists, it may not be a significant contributor to the overall degradation of contaminants.

### ***Summary of Bioreactor Operation***

Initial baseline and quarter 1 through quarter 13 analytical results from monitoring of the bioreactor sumps indicate that the SWMU B-3 trenches contain a range of *cis*-DCE levels (ND – 95 µg/L – Quarter 14) as well as concentrations of other dechlorination products (e.g., VC, ethene). Sump samples for Quarter 14 were collected from Trenches 1 and 6. Over this reporting period, minor amounts of toluene and other fuel related compounds were identified. A summary of the analytical data collected for the reporting period is included in Table 1. A summary of monthly and quarter 14 monitoring results from the bioreactor trench sumps are attached, analytical results of the surrounding SWMU B-3 multi-port monitoring wells (MPMW or Westbay<sup>®</sup>) and monitoring wells are also attached.

Results of VOC analyses indicate that groundwater from the uppermost saturated zone (LGR-03B) of Westbay<sup>®</sup> wells CS-WB05, CS-WB06 and CS-WB07 contain less than 100 micrograms per liter (µg/L) of PCE and TCE, while *cis*-DCE was detected in concentrations less than 100 µg/L in CS-WB07 and greater than 100 µg/L in CS-WB05, and CS-WB06. Well CS-WB08 contained greater than 100 µg/L of PCE, TCE, and *cis*-DCE. Groundwater from CS-MW16-LGR and B3-EWX01 contain greater than 100 µg/L of PCE, TCE, and *cis*-DCE while CS-MW16-CC contains less than 100 µg/L of PCE, TCE, and *cis*-DCE. Quarterly data from the bioreactor trench sumps indicate a decrease in contaminant mass (total molar concentration) in all sumps in trench 1 from the previous quarter and an increase in contaminant mass in trench 6 through the quarter. Over the bioreactor operational period, contaminant mass appears stable or decreasing.

Water quality field measurements from the bioreactor trench 1 sumps indicate that DO has fallen from the previous quarter to an average of 0.34 mg/L, ORP has fallen since the previous quarter, averaging -241.8 mV, pH ~ 6.54, temperatures range from ~ 23°C to 28 °C, and specific conductivity ranges from 0.376 to 1.275 millisiemens per centimeter (mS/cm). Other observations regarding the data collected during this reporting period are listed below.

Water quality field measurements from trench 6 include: average DO, pH, and ORP ~0.33 mg/L, ~6.52, and ~ -230.4 mV, respectively; temperature ranges from 25.85 °C to 27.34 °C; and specific conductivity ranges from 0.412 to 0.921 mS/cm.

Ground water elevation data from the newly installed UGR wells combined with similar data from the Westbay UGR zones in (WB-06, -07, -08) and the bioreactor sumps helped confirm the presence of a groundwater “mound” around the bioreactor trenches. Analyses of samples from these wells found vinyl chloride levels ranging from non-detect to 48 ppb, with the highest levels found north and west of the bioreactor. MW-28, located southwest of the bioreactor, has been consistently dry, and MW-29 was also dry during the sampling event. Water quality parameters in the UGR wells fluctuated during the reporting period. In general, good reducing conditions (low DO, ORP, and pH) were reported in MW-26, 27, 31, and 34, while MW-33 showed fair reducing

conditions and MW-32 showed poor reducing conditions. Wells MW-28, 29, and 30 did not consistently have enough water to collect field parameters.

Through the 14<sup>th</sup> quarter of bioreactor operation, 8.83 inches of precipitation were measured at the weather stations proximal to the bioreactor site. Average water thickness in Trench 1 during this period was approximately 4.06 feet. Average water thickness in Trench 6 during this period was approximately 1.39 feet. Although, water is injected in trench 6 at approximately 50 gallons per minute, water thicknesses in sump 6-1 are minimal (on average 0.77 feet). This suggests that the injected water is infiltrating at a rate near the injection rate.

Attached are graphs including a cumulative total volume of recovered groundwater from CS-MW16-LGR, CS-MW16-CC, and B3-EXW-01 applied into trench 1, the B-3 Trench 1 average water thickness with rainfall data and average water applied daily to trench 1, the CVOC concentrations in the extraction wells, and the water level elevations in the defined uppermost saturated zone (zone LGR-03B) of the B-3 multi-port monitoring wells with rainfall data.

### ***Analytical Data Observations***

1. Arsenic (As) was not detected in concentrations exceeding the MCL (10 µg/L) in any of the trench samples collected during quarter 14. Manganese (Mn) was reported in bioreactor trench samples in concentrations ranging from 17.8 to 427 µg/L (MCL is 50 µg/L). Elevated levels of Mn were reported in seven of nine newly installed shallow UGR wells around the bioreactor with concentrations ranging from 79.4 to 573 µg/L. Two of the shallow UGR wells did not produce enough water to sample. An elevated level of Mn was reported in CS-B3-MW01 (150.3 µg/L) during this quarter. Arsenic was not detected above the MCL in any of the monitoring wells surrounding the bioreactor during the quarter. Elevated levels of Mn were reported in CS-WB05-LGR-04B (61.3 µg/L), CS-WB07-UGR01 (1,501 µg/L), and CS-WB08-UGR01 (660 µg/L), and elevated levels of As were reported in CS-WB05-LGR04B (18 µg/L); all other MPMW zones reported Mn and As levels below the MCL. The elevated levels are likely due to changing pH conditions of the groundwater and the reduction of naturally occurring As and Mn within the limestone media to more soluble forms. Additionally, the biotic anaerobic oxidation pathway of CAHs may also be contributing to the elevated levels of Mn within the treatment system.
2. No lead exceedances were reported in groundwater collected from sumps, monitoring wells and MPMW zones during the quarter, the drinking water Action Level is 15 µg/L.
3. DO and ORP values were favorable for the reduction of CAHs (generally less than 0.50 mg/L and less than -100 mV), and it is likely that geochemical conditions will continue to be favorable as normal bioreactor operations persist.
4. The volatile organic compound summary for the trenches indicates a continuation of a predominately a three-component (VC, DCE isomer, and ethene) chemical composition in water collected from the trench sumps. This indicates the further reduction of contaminants along the degradation pathway toward the end product ethene. Total molar concentrations in trench 1 sumps decreased from the previous quarter, while total molar concentrations in trench 6 depict an increasing trend. The trans-DCE isomer in trenches 1 and 6 is theorized to be the result of an abiotic reductive dechlorination pathway.
5. Reductive dechlorination of CAHs by microbial activity appears to be occurring as DHC bacterial counts are within the range of biostimulated populations (1.0E +03

cell/mL) in trenches 6, however, populations in trench 1 have fallen in the 1.0E +01 cell/mL range.

6. Saturated conditions within the bioreactor are maintained (while groundwater injection activities were sustained) through the quarter with average water thicknesses of approximately 4.06 feet and 1.39 feet trenches 1 and 6, respectively. Although the saturated thickness in trench 6 remains relatively low, field parameter data collected from trench 6 sumps indicate appropriate geochemical conditions for effective anaerobic dechlorination of CAHs is being maintained.
7. High levels of vinyl chloride were noted in deeper zones of the Lower Glen Rose. Samples from WB05-LGR04B and CS-B3-MW01 found 283 and 187 ppb, respectively. Both of these wells are located north of the bioreactor. This data indicates reduction byproducts are migrating vertically in this area.

***Anticipated Schedule for Next Period (November, 2010 – January, 2011):***

- Continue monitoring and maintenance activities for delivery of groundwater to the bioreactor trenches.
- Conduct monthly monitoring events in November and December (Months 43 and 44), and quarterly monitoring event in January (Month 45) for bioreactor system.
- Continue UIC monthly monitoring with semi-annual reporting due June 2011.
- Begin design phase to replace existing 6,000 gallon tank upstream of the injection manifold with a new 10,000 gallon tank.
- Investigate other potential extraction well installation area(s).

**Specific Data Observation Notes for Attachments**

- Analytical results from the B-3 Trench Sump (trenches 1 through 6) samples, shown in Table 14.1.2, present data from quarter 13 sampling events.
- Table 14.1.1 indicates a water thickness of approximately 4.06 feet in trench 1 and 1.39 feet in trench 6 was maintained.
- Table 14.1.2 indicates that VC was present at low to moderate concentrations in trench sumps, ranging from non-detect to 11 µg/L in trench 1 and between 2.7 and 9.3 µg/L in trench 6. Ethene was observed in concentrations ranging from ND to 3.2 µg/L in trench 1 and from 1.0 to 9.8 µg/L in trench 6.
- Table 14.1.3 indicates that Mn(II) and Fe(II) were present at concentrations consistent with alternative degradation pathways. Additionally, Table 14.1.3 provides evidence of the biotic anaerobic degradation pathway with the elevated concentrations of Mn and CO<sub>2</sub>. Ethane was observed in trench 1 sumps (T1-2 and T1-3) in concentrations ranging from 0.7 to 3.6 µg/L and in T6-2 in concentrations ranging from non-detect to 3.7 µg/L. Samples from trench sumps T1-1 and T6-1 did not detect the presence of ethane.
- Table 14.3.3 indicates that VC was present (187 µg/L) in the sample collected from monitoring well CS-B3-MW01. Table 13.2.3a shows similarly (to CS-B3-MW01)

high VC concentrations in WB05-LGR04B (283  $\mu\text{g/L}$ ) suggesting a connection between this zone and CS-B3-MW01. Ethene was observed in WB05-LGR04B during the quarter (7.9  $\mu\text{g/L}$ ).

- Table 14.4.4 indicates that the *Dehalococcoides* (DHC) bacteria populations are low to moderate in trenches 1 and 6.
- The changes in molar fraction and total molar concentrations shown in graphs of quarter 14 trench 1 sumps indicate a continued reduction in contaminant mass to end products VC and ethene, while an upward trend is present in trench 6 sump 2.
- Figure 14.2.5 shows that the water levels in Westbay wells are significantly influenced by precipitation, while pumping at CS-MW16-LGR and CS-B3-EXW01 shows strong influence in the deeper LGR zones. Pumping at CS-MW16-CC appears to have no influence on UGR or upper LGR zones.
- Table 14.7.3 indicates the presence of VC in several of the shallow UGR wells with concentrations ranging from non-detect to 48  $\mu\text{g/L}$ . Additionally, Table 14.7.3 provides evidence of the biotic anaerobic degradation pathway with the elevated concentrations of Mn and  $\text{CO}_2$ .

## Analytical Summary Data

**Table 1 Summary of Analysis Presented for Reporting Period**

Event	VOCs	TDS	TOC	DOC	MEE & CO <sub>2</sub>	SO <sub>3</sub> <sup>-</sup>	Chloride, Sulfate	Alkalinity	N, NO <sub>3</sub> & NO <sub>2</sub>	Fe <sup>2+</sup>	Mn	Metals	H <sup>+</sup>	DHC
Monthly Sampling <sup>a</sup> (40)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monthly Sampling <sup>a</sup> (41)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quarterly Sampling <sup>b</sup> (14)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

a - Monthly sampling includes samples from B3-trench sumps, the uppermost saturated intervals of the multi-port wells (Zone 03B) and B3-UIC samples.

b - Quarterly sampling includes samples from B3-trench sumps, Monitoring Wells, and Multi-port (Westbay) wells and monthly samples.

## Figures

Key for table/figure numbering	
First digit (Sample Event)	0 = Baseline
	1 = Quarter 1 (or baseline through quarter 1)
	2 = Quarter 2
	3 = Quarter 3
	4 = Quarter 4
	5 = Quarter 5
	6 = Quarter 6
	7 = Quarter 7
	8 = Quarter 8
	9 = Quarter 9
	10 = Quarter 10
	11 = Quarter 11
	12 = Quarter 12
	13 = Quarter 13
14 = Quarter 14	
Second digit (Well/Sump Sampled)	1 = Trench Sumps
	2 = Westbay Wells
	3 = Monitoring Wells
	4 = Combination of Wells and Sumps
	5 = Injection System
	6 = Extraction Wells
	7 = Shallow UGR Wells
Third digit (Sampled for)	1 = Field Parameters
	2 = VOC Analytical Data
	3 = Other Analytical Data
	4 = Microbial Data
	5 = Applied Water Volume
	6 = System Physical Parameters
Third digit qualifier (Westbay Identifier)	a = CS-WB05
	b = CS-WB06
	c = CS-WB07
	d = CS-WB08

**Table 0 COC MCLs**

COC	MCL (mg/L)	MCL (µg/L)	Type
Arsenic	0.01	10	Metal
Manganese	0.05	50	
<i>cis</i> -Dichloroethene	0.07	70	Organic Compound
<i>trans</i> -Dichloroethene	0.1	100	
Trichloroethene	0.005	5	
Tetrachloroethene	0.005	5	
Vinyl Chloride	0.002	2	



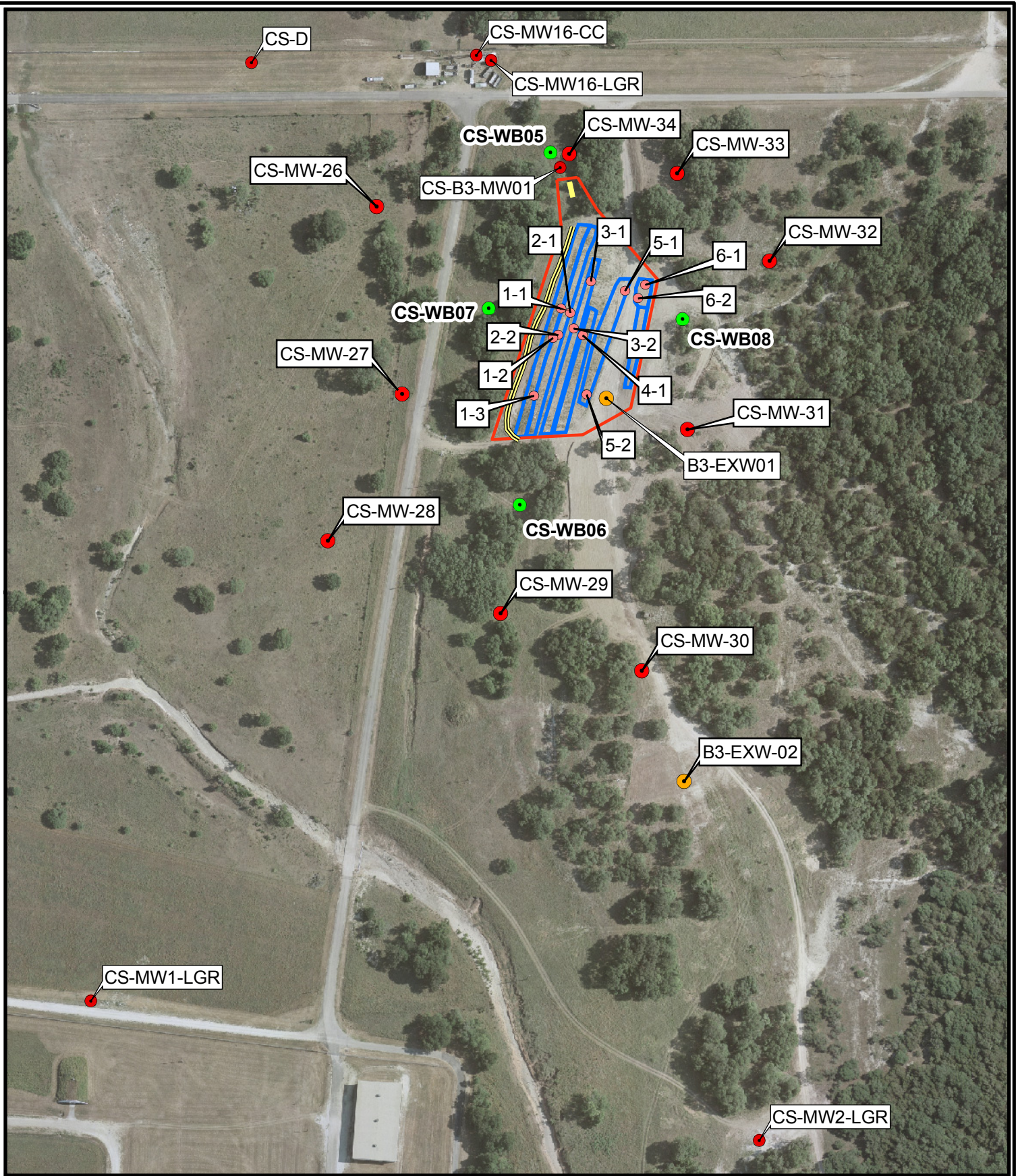


Figure 1

B-3 Bioreactor System  
Camp Stanley Storage Activity

**PARSONS**

Figure 14.1.2T1-1

### B3 Bioreactor Trench 1 Sump 1 VOC Summary Quarter 13 - Quarter 14

Changes in Mole Fraction and Total Molar Concentration at SWMU B3 T1-1

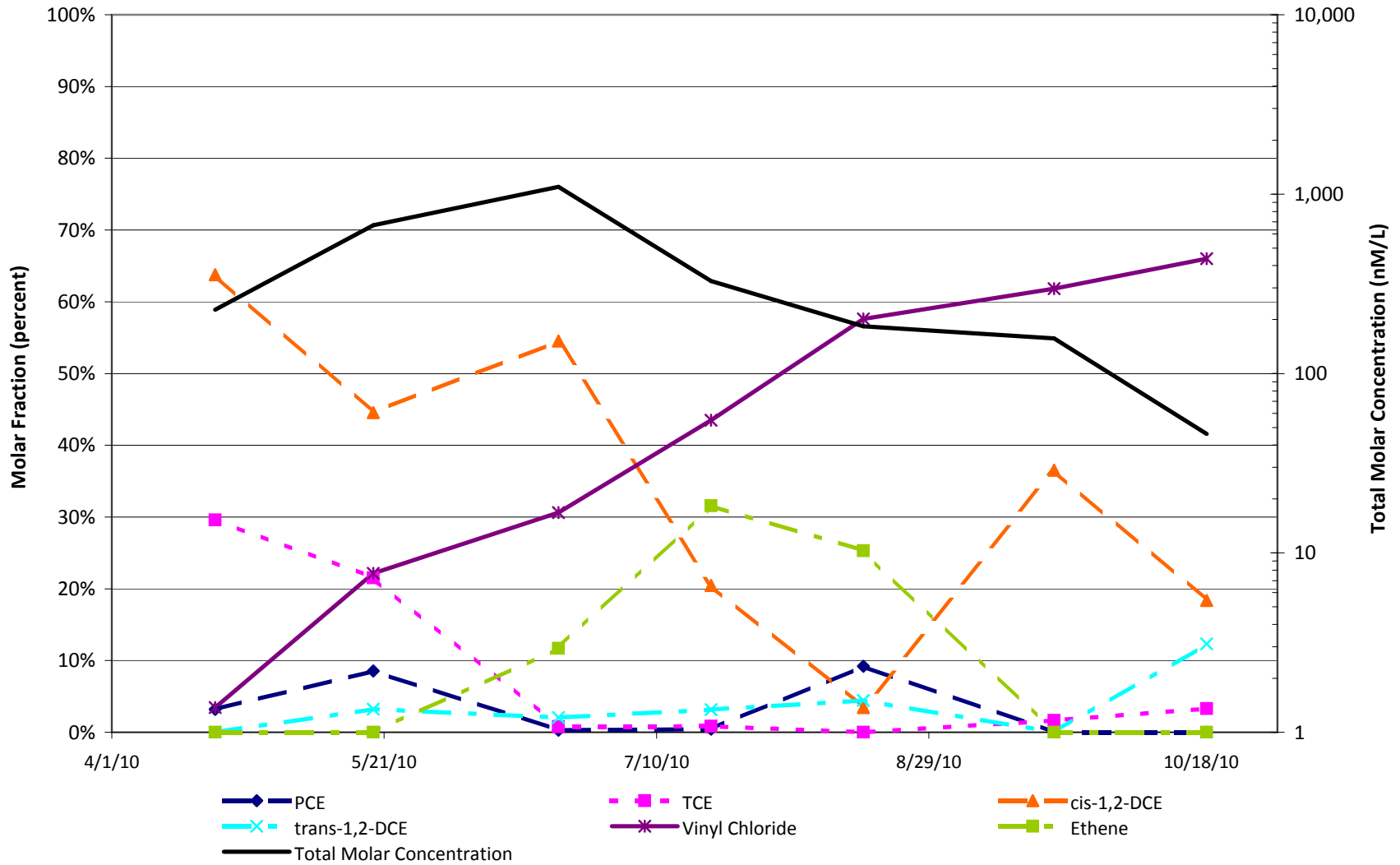


Figure 14.1.2T1-2

### B-3 Bioreactor Trench 1 Sump 2 VOC Summary Quarter 13 - Quarter 14

Changes in Mole Fraction and Total Molar Concentration at SWMU B3 Trench 1-2

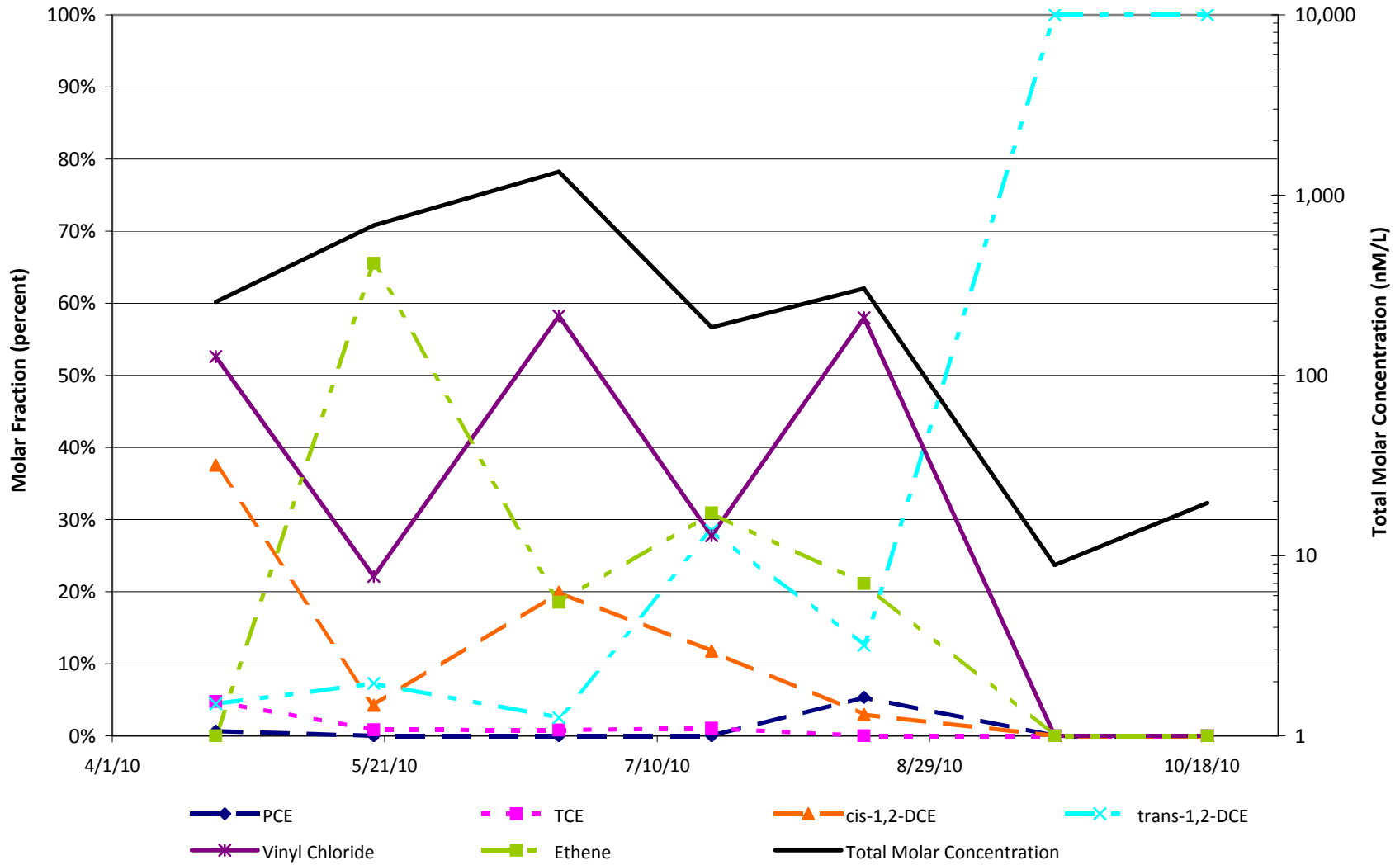


Figure 14.1.2T1-3

### B-3 Bioreactor Trench 1 Sump 3 VOC Summary Quarter 13 - Quarter 14

Changes in Mole Fraction and Total Molar Concentration at SWMU B3 Trench 1-3

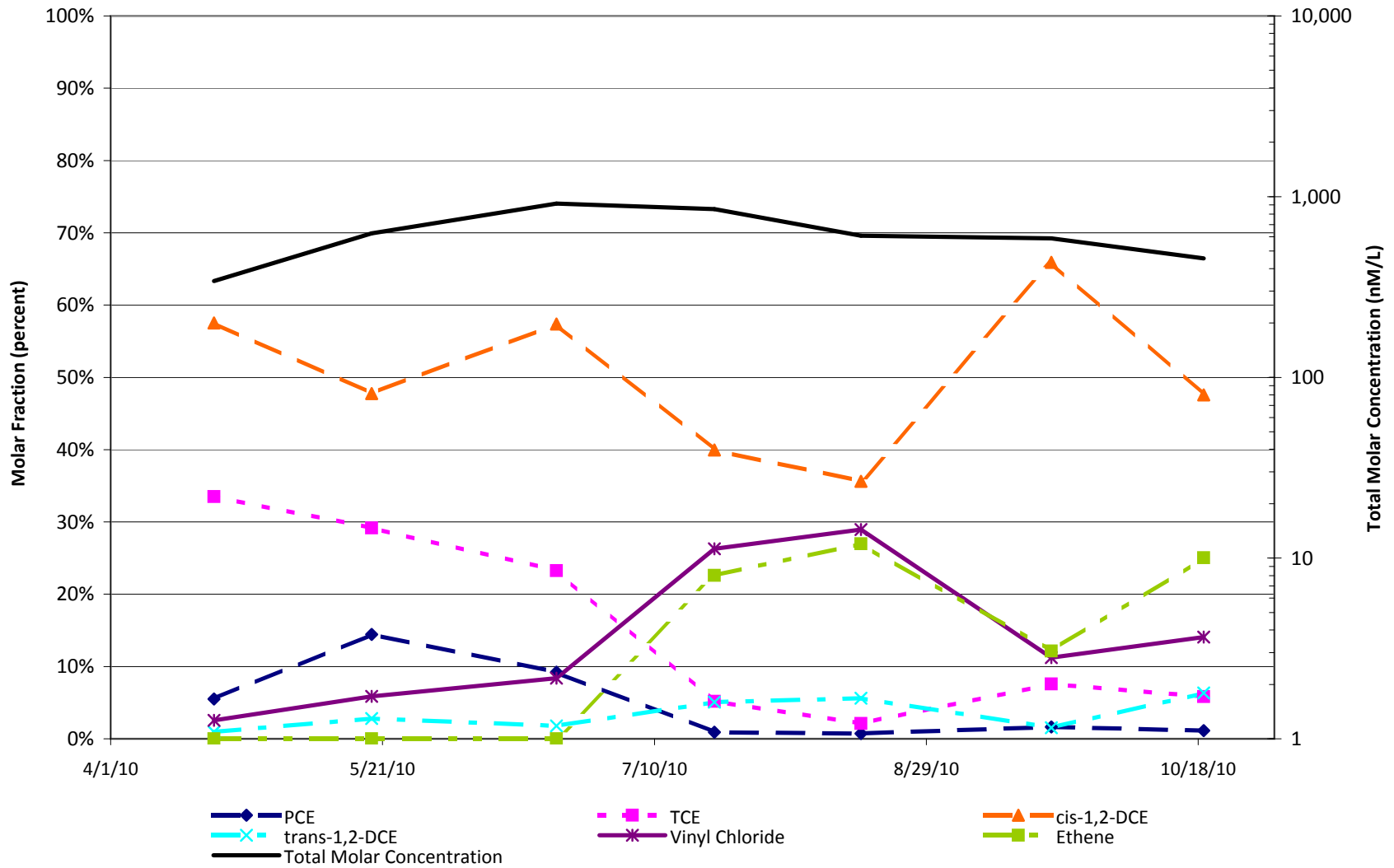


Figure 14.1.2T6-2

### B-3 Bioreactor Trench 6 Sump 2 VOC Summary Quarter 13 - Quarter 14

Changes in Mole Fraction and Total Molar Concentration at SWMU B3 Trench 6-2

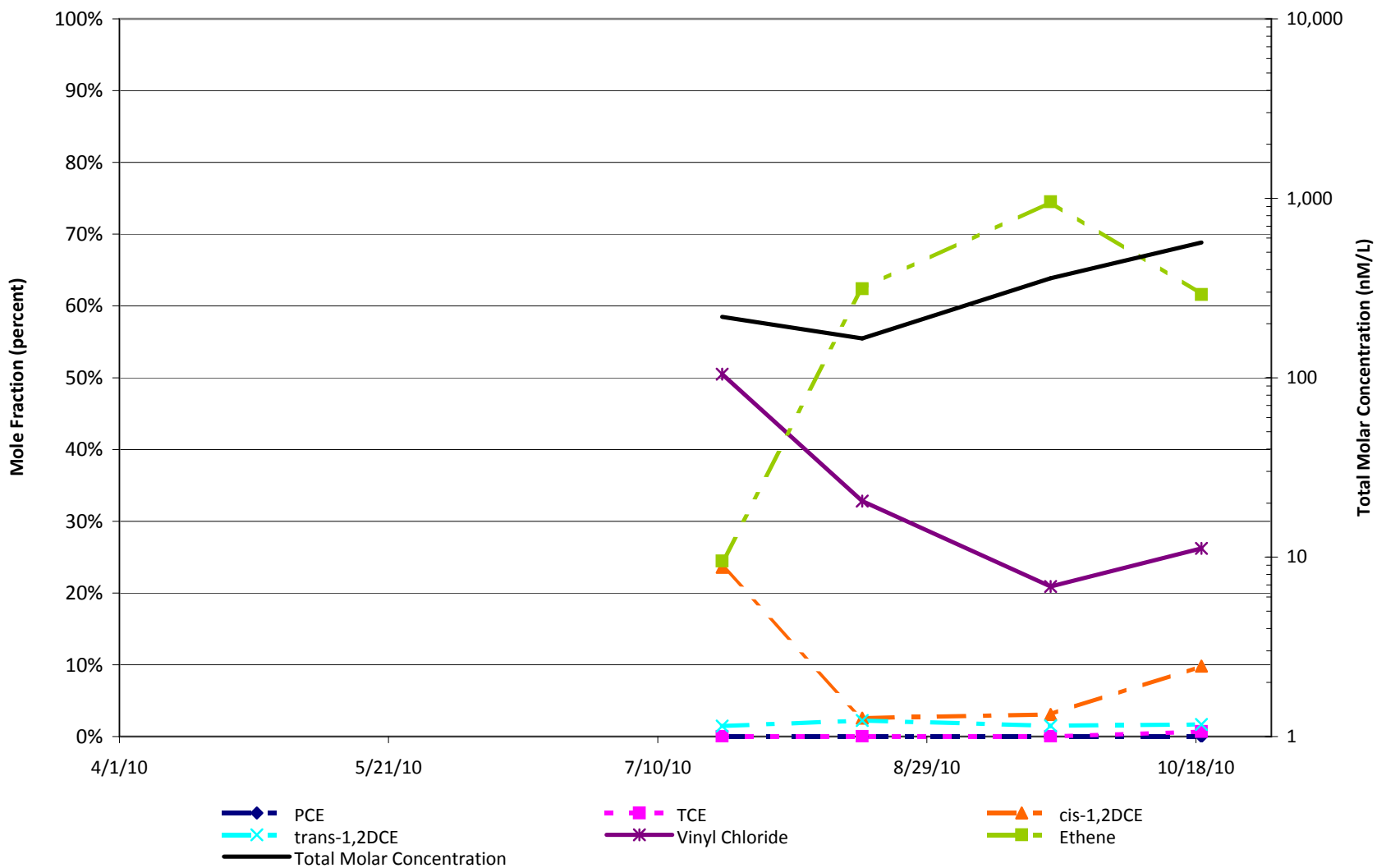


Figure 14.2.2a

Changes in Mole Fraction and Total Molar Concentration at CS-WB05-LGR03B

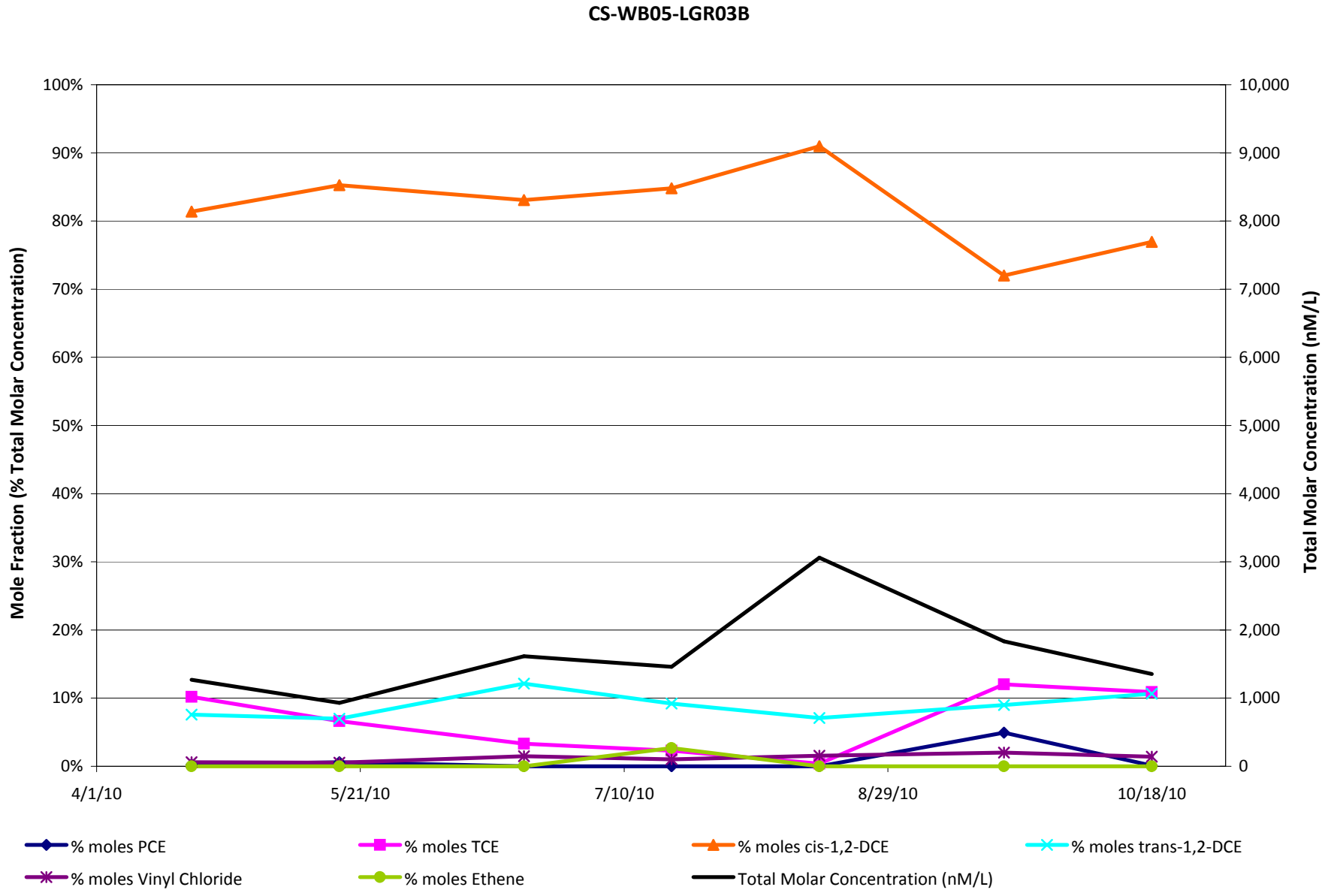


Figure 14.2.2b

### Changes in Mole Fraction and Total Molar Concentration at CS-WB06-LGR03B

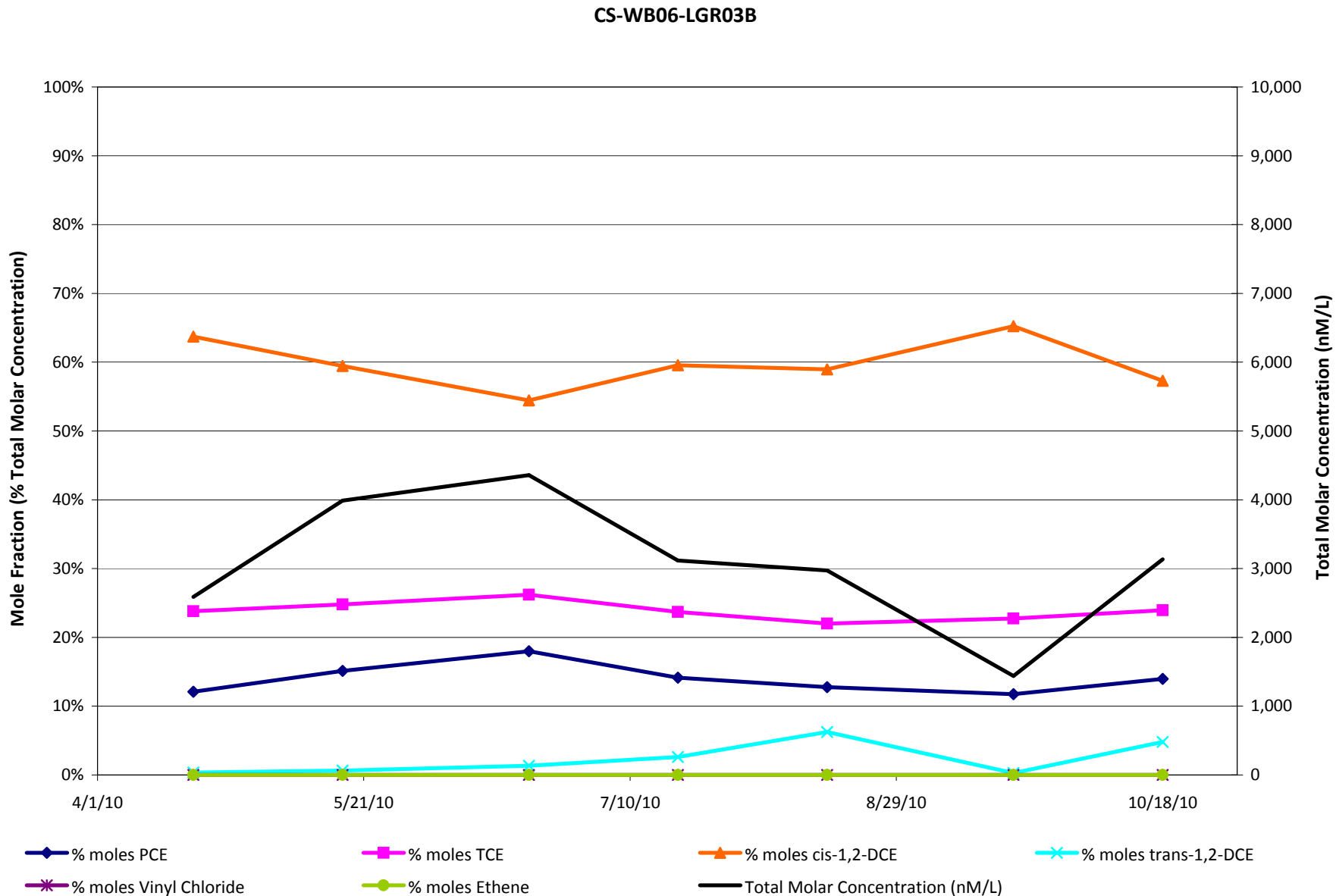


Figure 14.2.2c

### Changes in Mole Fraction and Total Molar Concentration at CS-WB07-LGR03B

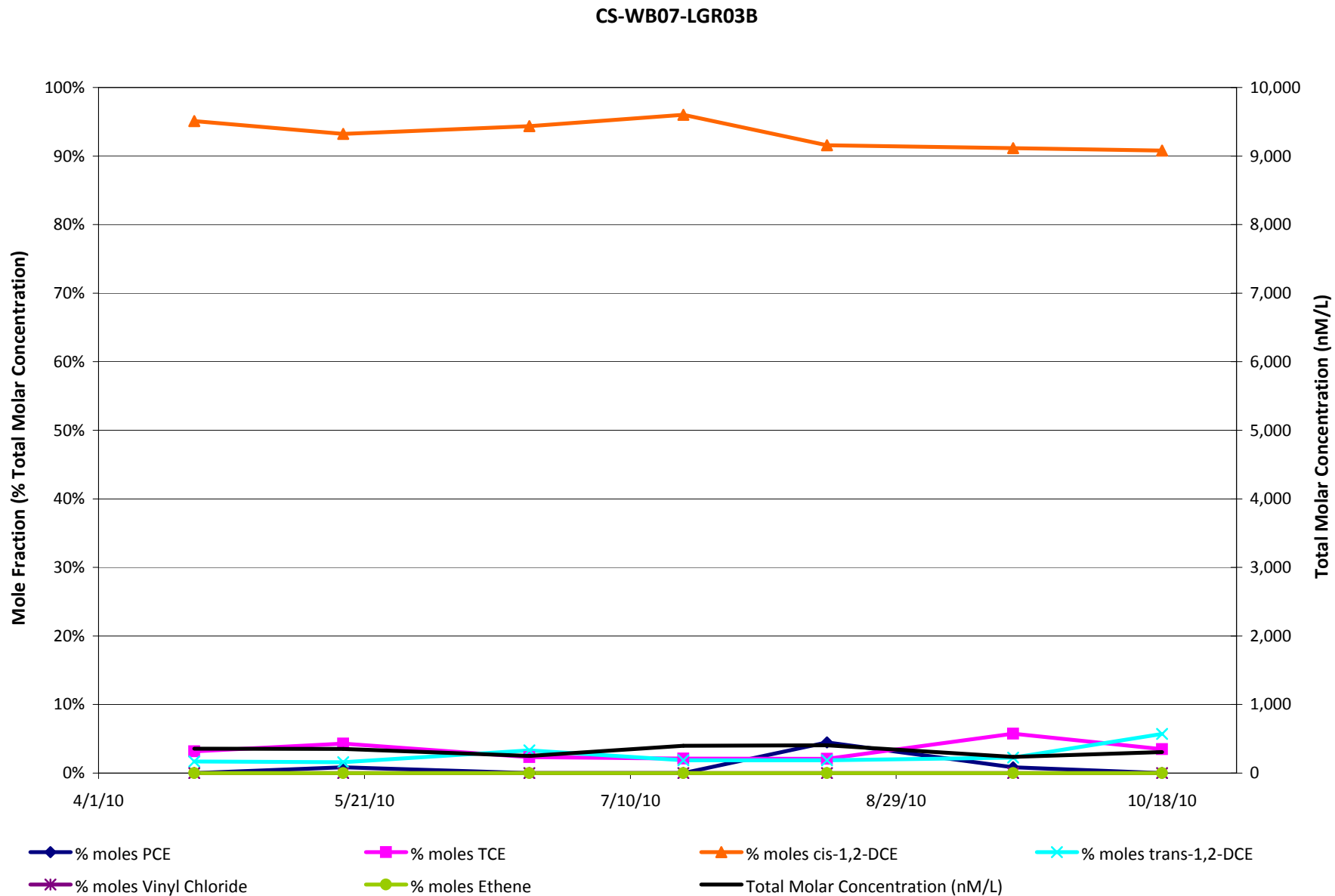




Figure 14.2.2d

Changes in Mole Fraction and Total Molar Concentration at CS-WB08-LGR03B

CS-WB08-LGR03B

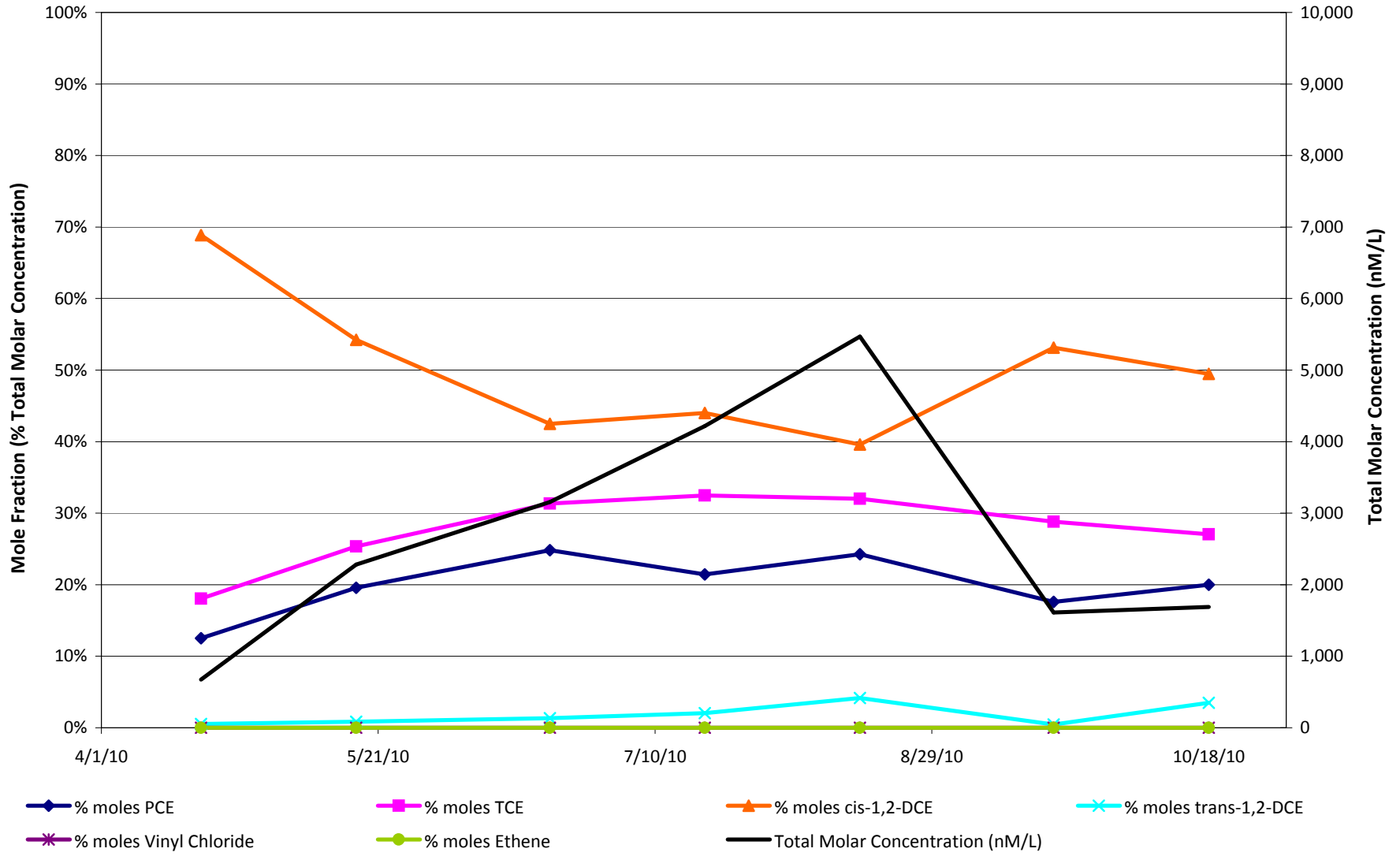


Figure 14.5.5

Cumulative Total Extracted Groundwater Applied to SWMU B3 Trenches

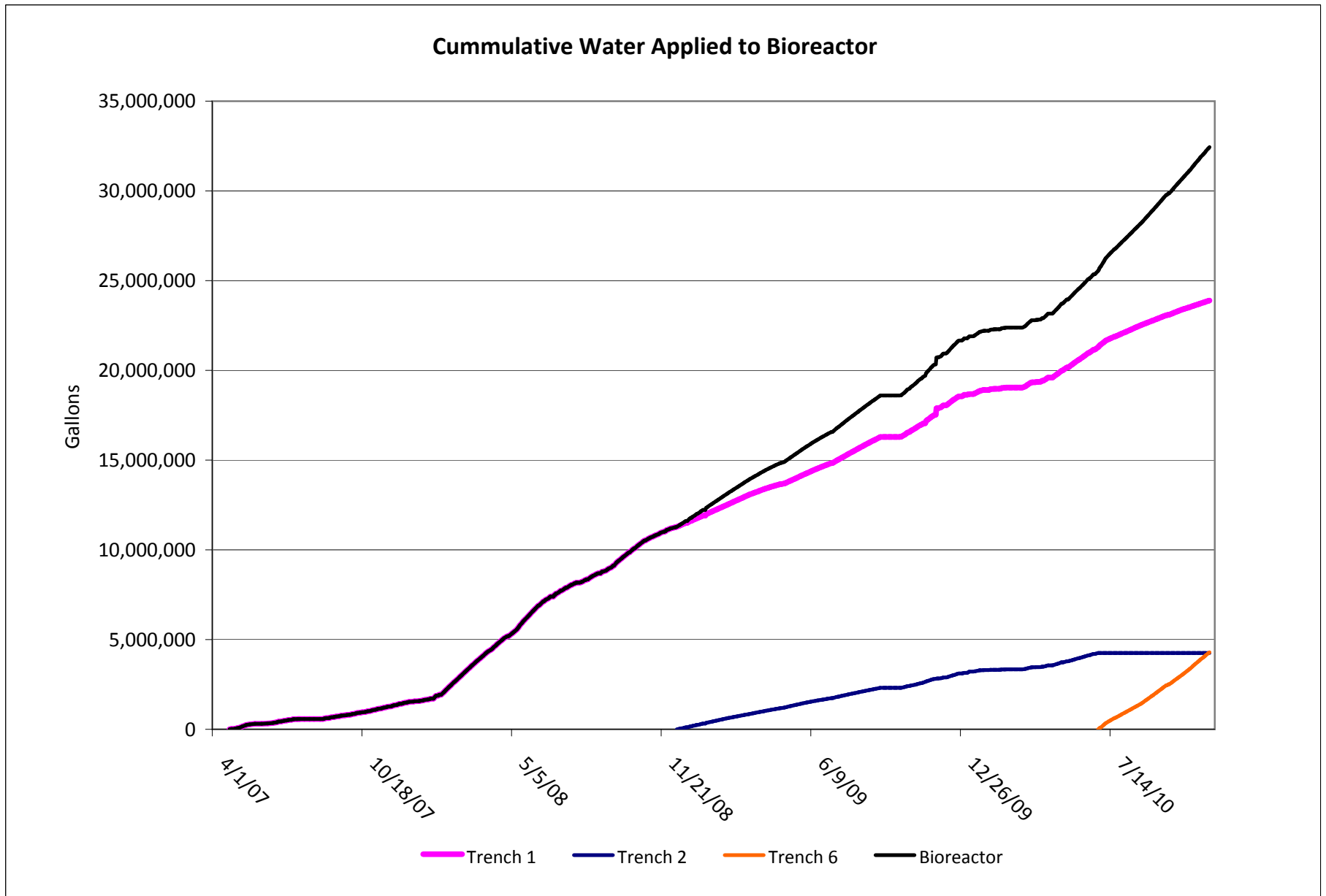


Figure 14.2.5

### Lower Glen Rose Groundwater Elevations (feet above MSL) Measured in Westbay Wells May 2009 - November 2010

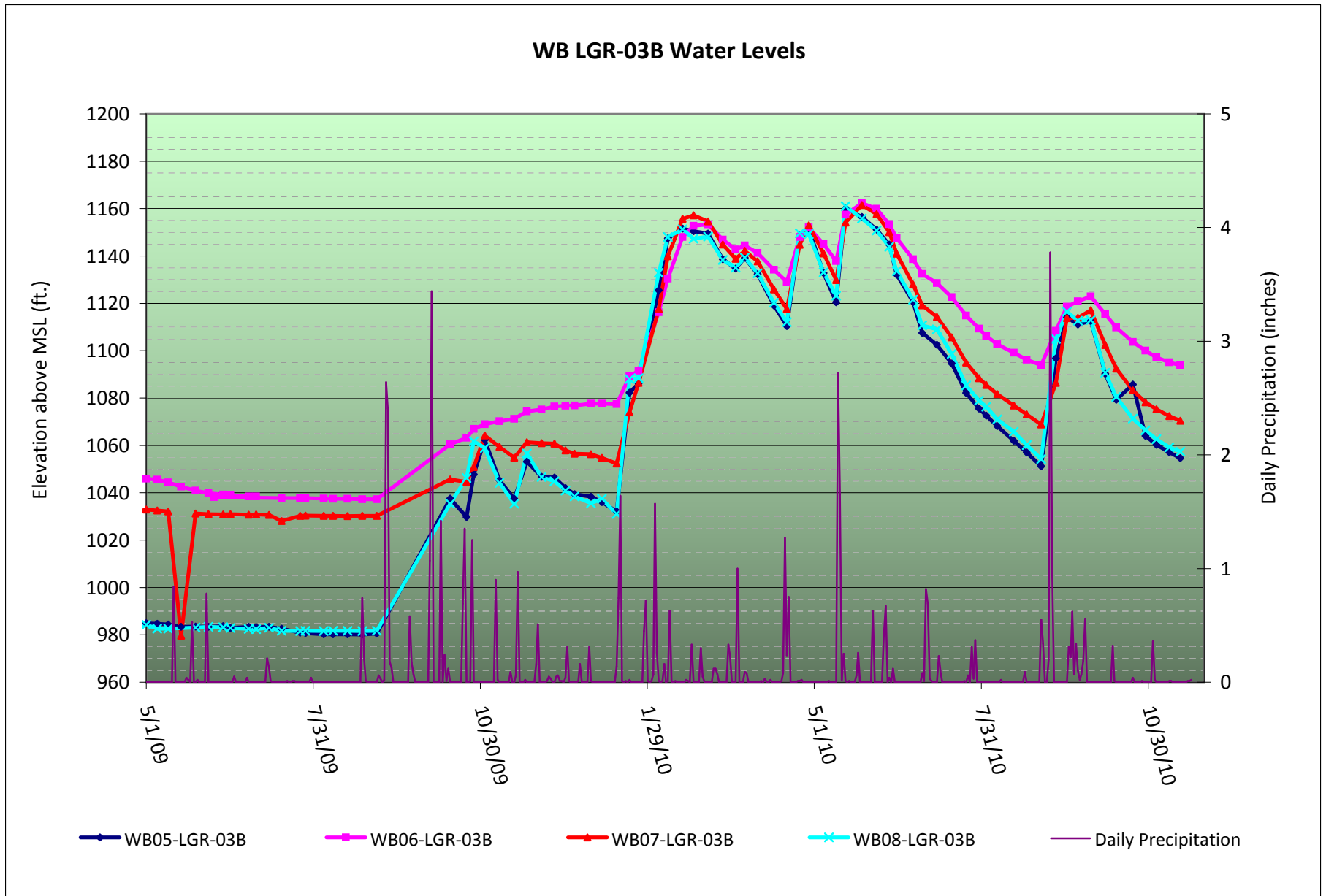
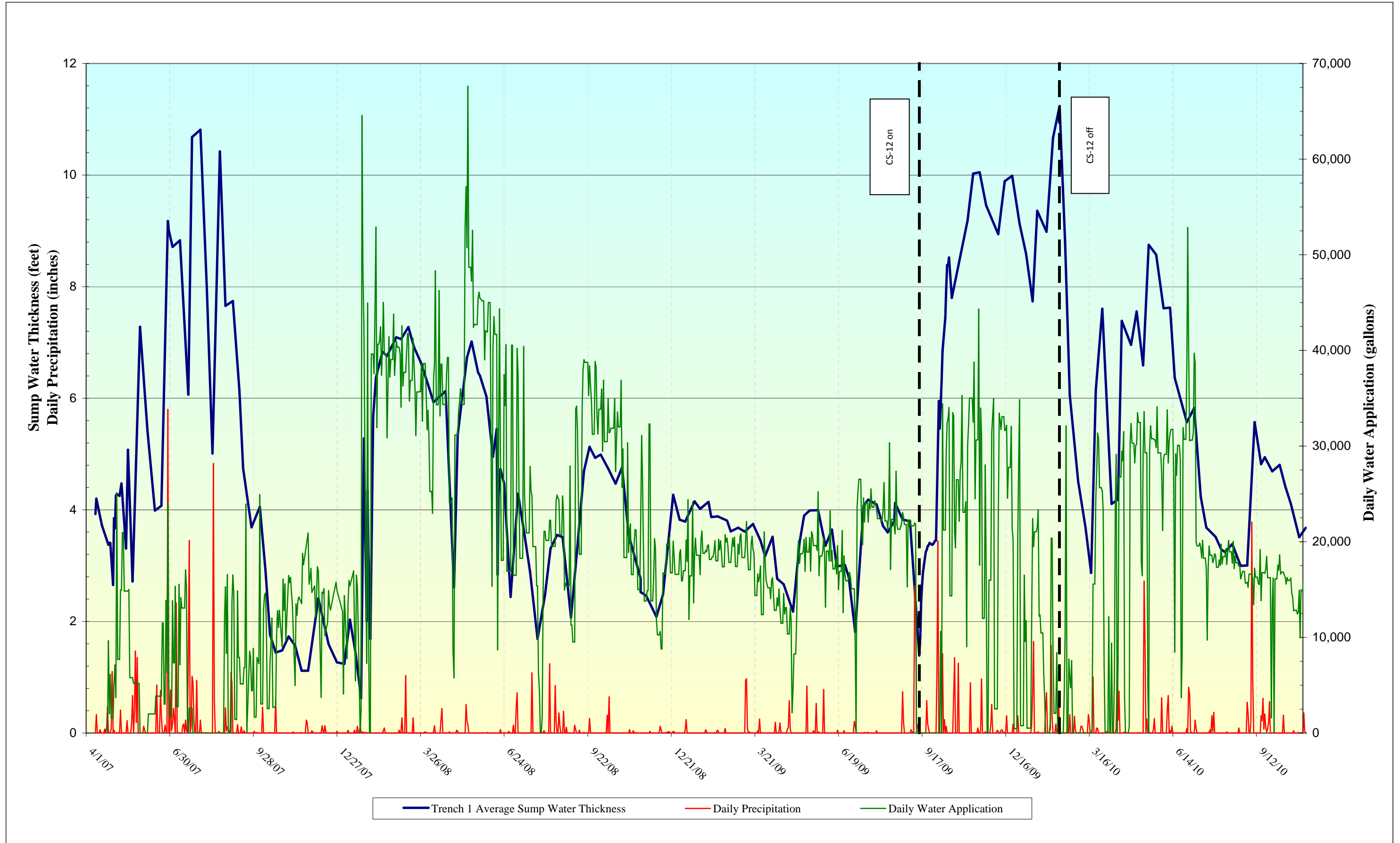


Figure 14.5.6

SWMU B-3 Bioreactor - Trench 1

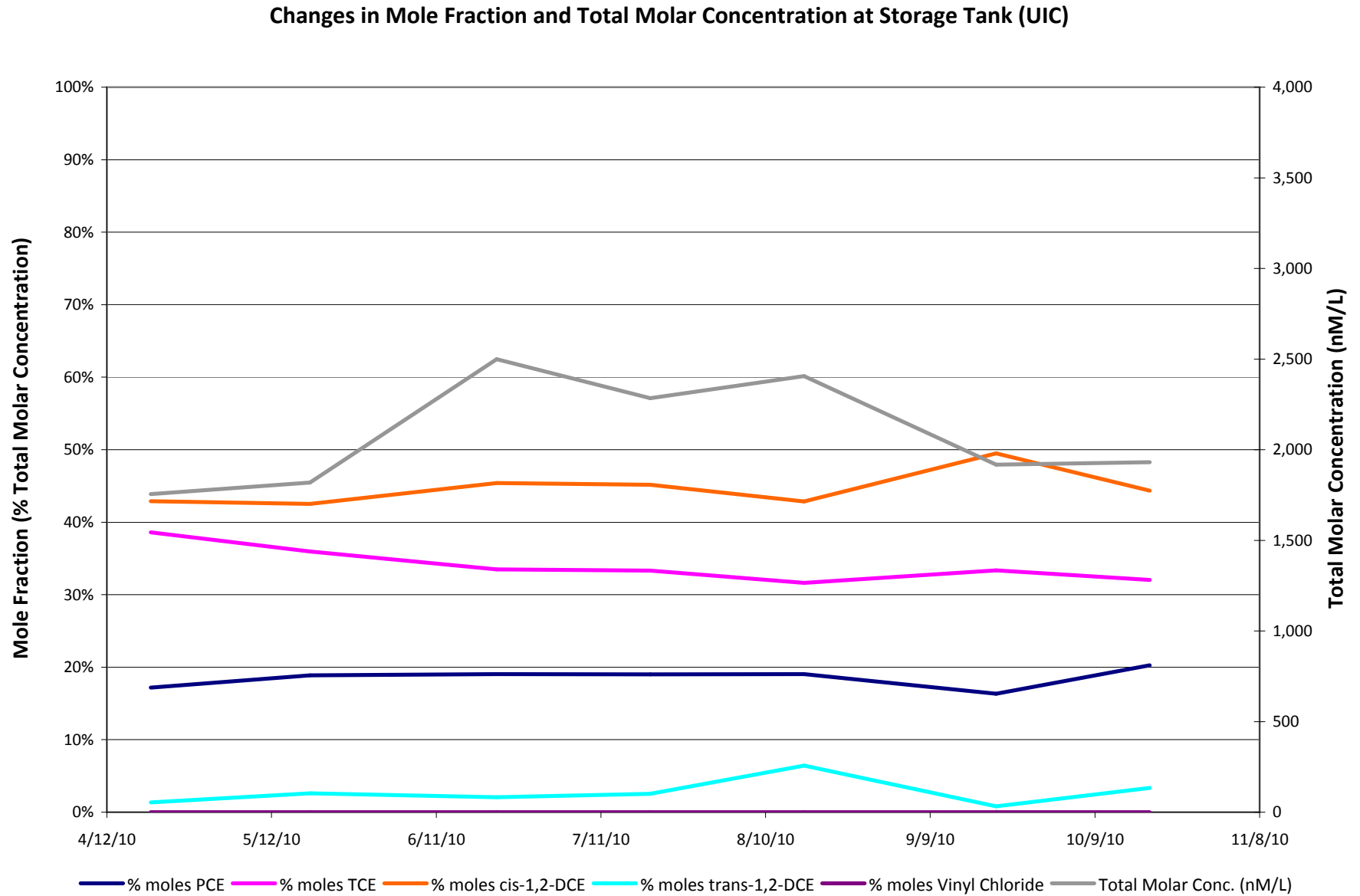
Average Water Thickness, Extraction well CS-MW16 (LGR and CC), B3-EXW (01 and 02) Water Application, and Daily Precipitation



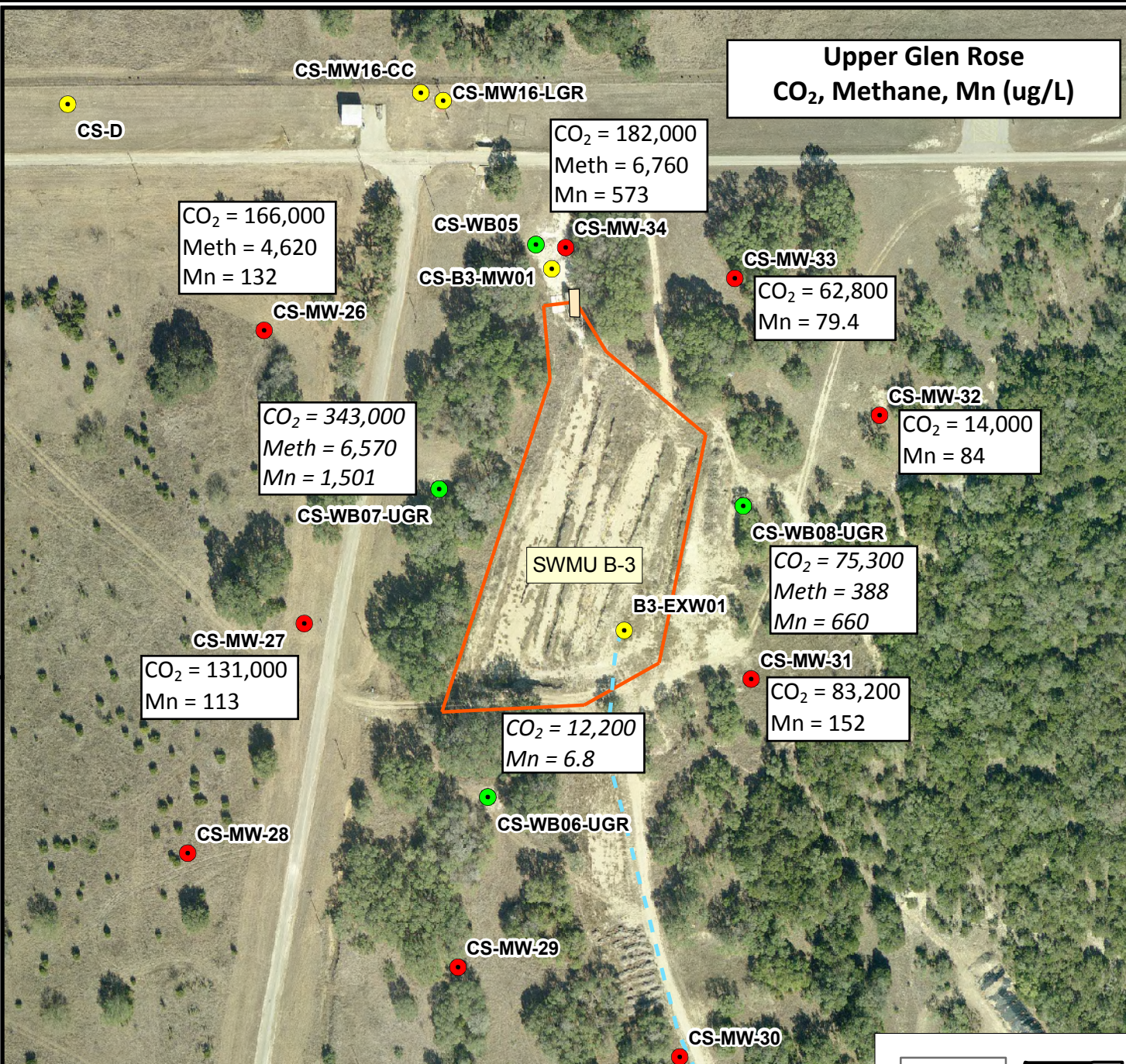
Note: CS-12 extracted groundwater used for flood test operations

Figure 14.5.2

Changes in Mole Fraction and Total Molar Concentration at Storage Tank (UIC)



**Upper Glen Rose  
CO<sub>2</sub>, Methane, Mn (ug/L)**

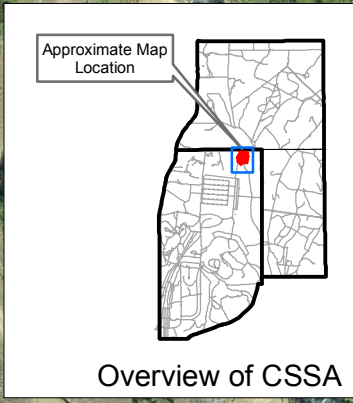


Note: MW-UGR wells sampled 10/20/10 - 10/22/10;  
WB UGR zones sampled 10/27/10 - 10/29/10

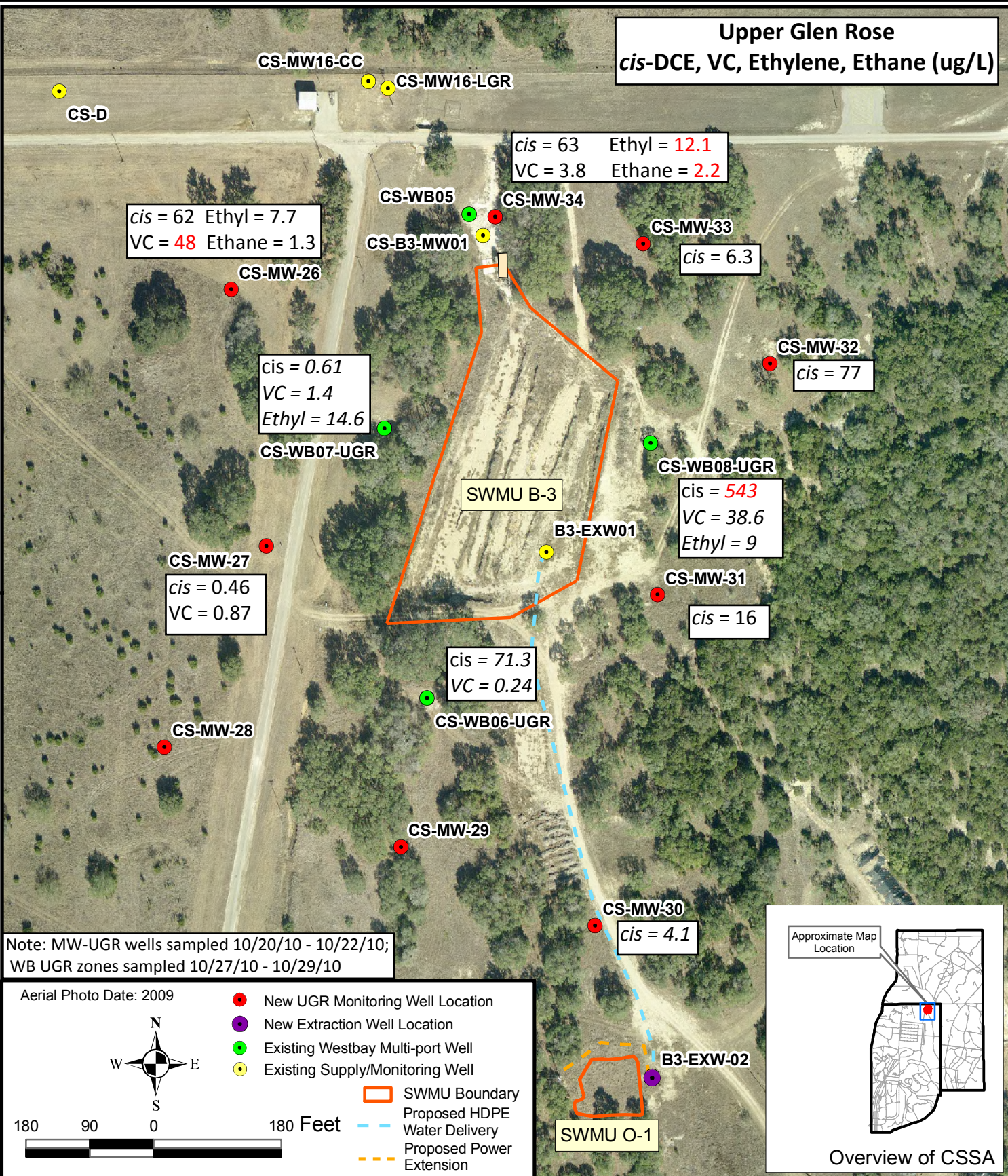
Aerial Photo Date: 2009

- New UGR Monitoring Well Location
- New Extraction Well Location
- Existing Westbay Multi-port Well
- Existing Supply/Monitoring Well
- SWMU Boundary
- Proposed HDPE Water Delivery
- Proposed Power Extension

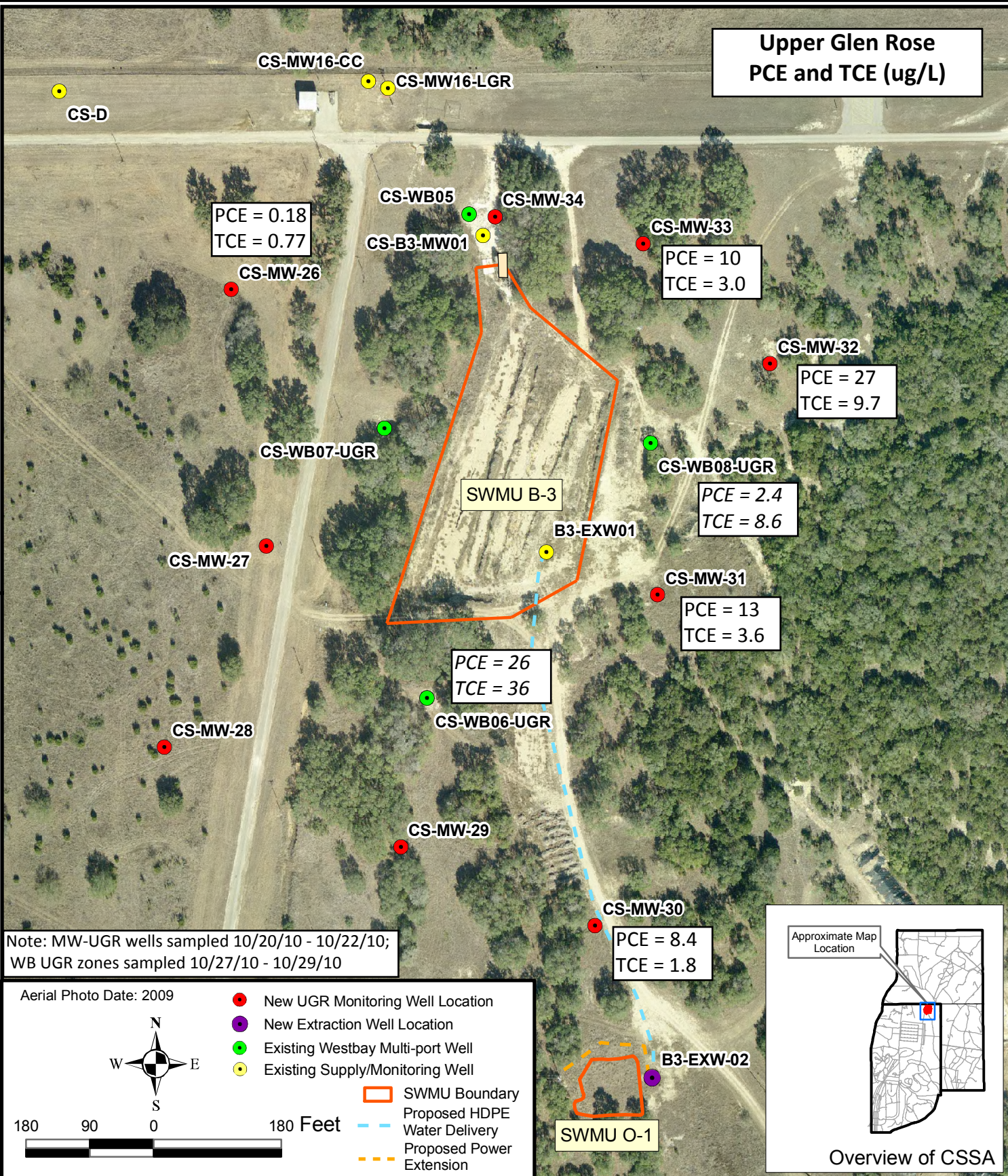
180 90 0 180 Feet



# Upper Glen Rose cis-DCE, VC, Ethylene, Ethane (ug/L)



# Upper Glen Rose PCE and TCE (ug/L)





## Tables



























Table 14.1.2

SWMU B3 Trench 1 and 6 Quarter 14 - VOC Analytical Summary Table

Q14 Date	T1-1			T1-2			T1-3			T6-2	T6-2		
	8/17/10	9/21/10	10/19/10	8/17/10	9/21/10	10/19/10	8/17/10	9/21/10	10/19/10	10/19/10	8/17/10	9/21/10	10/19/10
PCE (µg/L)	2.8	0	0	2.7	0	0	0.74	1.6	0.84	19.20	0	0	0
TCE (µg/L)	0	0.34	0.20	0	0	0	1.7	5.9	3.5	29.0	0	0	0.51
cis-1,2-DCE (µg/L)	0.61	5.6	0.82	0.87	0	0	21	38	21	95	0.41	1.1	5.4
trans-1,2-DCE (µg/L)	0.79	0	0.55	3.7	0.86	1.9	3.3	0.87	2.8	5.3	0.36	0.52	0.93
Vinyl Chloride (µg/L)	6.6	6.1	1.9	11	0	0	11	4.1	4.0	2.7	3.4	4.7	9.3
Ethene (µg/L)	1.3	0	0	1.8	0	0	4.6	2.0	3.2	1.0	2.9	7.5	9.8
PCE (nM/L)	16.88	0.00	0.00	16.28	0.00	0.00	4.46	9.59	5.07	115.78	0.00	0.00	0.00
TCE (nM/L)	0.00	2.59	1.52	0.00	0.00	0.00	12.94	44.60	26.64	220.72	0.00	0.00	3.88
cis-1,2-DCE (nM/L)	6.29	57.35	8.46	8.97	0.00	0.00	216.61	387.21	216.61	979.89	4.23	11.04	55.70
trans-1,2-DCE (nM/L)	8.15	0.00	5.67	38.16	8.87	19.60	34.04	8.97	28.88	54.67	3.71	5.36	9.59
Vinyl Chloride (nM/L)	105.58	97.10	30.40	175.97	0.00	0.00	175.97	65.91	63.99	43.19	54.39	75.03	148.78
Ethene (nM/L)	46.35	0.00	0.00	64.17	0.00	0.00	163.99	71.30	114.08	35.65	103.39	267.38	349.38
<b>Total Molar Conc. (nM/L)</b>	183.3	157.0	46.0	303.6	8.9	19.6	608.0	587.6	455.3	1,449.9	165.7	358.8	567.3
% moles PCE	9.2%	0.0%	0.0%	5.4%	0.0%	0.0%	0.7%	1.6%	1.1%	8.0%	0.0%	0.0%	0.0%
% moles TCE	0.0%	1.6%	3.3%	0.0%	0.0%	0.0%	2.1%	7.6%	5.9%	15.2%	0.0%	0.0%	0.7%
% moles cis-1,2-DCE	3.4%	36.5%	18.4%	3.0%	0.0%	0.0%	35.6%	65.9%	47.6%	67.6%	2.6%	3.1%	9.8%
% moles trans-1,2-DCE	4.4%	0.0%	12.3%	12.6%	100.0%	100.0%	5.6%	1.5%	6.3%	3.8%	2.2%	1.5%	1.7%
% moles Vinyl Chloride	57.6%	61.8%	66.0%	58.0%	0.0%	0.0%	28.9%	11.2%	14.1%	3.0%	32.8%	20.9%	26.2%
% moles Ethene	25.3%	0.0%	0.0%	21.1%	0.0%	0.0%	27.0%	12.1%	25.1%	2.5%	62.4%	74.5%	61.6%
sum % moles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: 0 sample indicates a non-detect analyte value

Table 14.1.3

B-3 Bioreactor Analytical Summary - Quarter 14

Q14 Bioreactor Trench Sumps																											
Well ID		T1-1						T1-2						T1-3						T6-1		T6-2					
Sample Date		8/17/10		9/21/10		10/19/10		8/17/10		9/21/10		10/19/10		8/17/10		9/21/10		10/19/10		10/19/10		8/17/10		9/21/10		10/19/10	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	4.8		30		21.3		6.4		15		8.8		2.4		3.0		2.4		2.1		10		8.5		4.0	
Total Organic Carbon	mg/L	5.1		29		19.6		7.7		13		8.2		2.3		4.0		3.8		1.7		12.4		7.9		4.6	
Methane	µg/L	7,180		1,700		9,690		10,300		21,500		23,500		673		585		2,360		31		17,000		16,300		5,380	
Ethane	µg/L	1.3	J	0		0		1.8	J	0		0		4.6		2.0	F	3.2		1.0	F	2.9	J	7.5		9.8	
Ethane	µg/L	0		0		0		1.9	J	1.1	F	3.6		0.70	J	1.0	F	2.2		0		0		3.7		1.9	F
Carbon Dioxide	µg/L	575,000		234,000		640,000		422,000		810,000	F	589,000		302,000		84,700		180,000		149,000		872,000		479,000		446,000	
Alkalinity, Total (as CaCO3)	mg/L	569		539		900		500		564		490		404		309		313		328		460		466		421	
Nitrate/Nitrite	mg/L	0.011	J	0		0.039	F	0.011	J	0		0.039	F	0.011	J	0.054	F	0.084	F	0.14	B	0.011	J	0		0.095	F
Sulfate	mg/L	7.9		140		37.4		1.1		110		53		24.8		40		38.9		41.9		2.2		1.6		13	
Chloride	mg/L	16		12		15.1		15.3		13		15.3		15.7		15		15.7		15.7		14.8		15		15.7	
Ferrous Iron	mg/L	3.0		5.8		3.1		4.1		4.8		4.0		2.5		1.4		1.1		0.31	F	5.1		4.7		3.8	
Manganese	µg/L	143		375		338.4		421		427		374		82		63		53		17.8		221		206		115	
Hydrogen	nM/L					7.6		9.0		5.4												5.8		5.8		7.6	
Hydrogen Sulfide																											
Total Dissolved Solids	mg/L	579		825		690		569		787		609		502		409		402		420		523		534		458	
Benzene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0		0		0		0		0		0.31		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	0.61	J	5.6		0.82	F	0.87	J	0		0		21		38		21		95		0.41	J	1.1	F	5.4	
Dichloroethene, trans-1,2-	µg/L	0.79		0		0.55	F	3.7		0.86		1.9		3.3		0.87		2.8		5.3		0.36	J	0.52	F	0.93	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	2.8		0		0		2.7		0		0		0.74	J	1.6		0.84	F	19.2		0		0		0	
Toluene	µg/L	0		0.48		0.19	F	0.62	J	0.33	F	0.19	F	0		0		0		0		2		2.0		0.62	F
Trichloroethene	µg/L	0		0.34	F	0.20	F	0		0		0		1.7		5.9		3.5		29		0		0		0.51	F
Vinyl chloride	µg/L	6.6		6.1		1.9		11		0		0		11		4.1		4.0		2.7		3.4		4.7		9.3	
Arsenic	µg/L	4.2	J	0		3.9	F	4.3	J	0		1.7	F	5		2.1	F	1.7	F	1.9	F	7.2		7.2		2.7	F
Barium	µg/L	71.7		121		100		123		95		136		52.8		57		55.4		36.5		80.3		83		71	
Cadmium	µg/L	0		0		0		0		0		0		0.51	J	0		0		0		0		0		0	
Chromium	µg/L	0		2.2	F	0		0		2.6	F	0		0		1.4	F	1.7	F	0		0		1.6	F	0	
Copper	µg/L	10.2		0		0		9.1		0		0		8		0		0		0		20.6		0		0	
Lead	µg/L	0		0		0		0		0		0		0		0		0		0		4.7	J	0		0	
Mercury	µg/L	0.14	J	0		0.19	F	0.11	J	0.050	F	0.14	F	0.089	J	0		0.15	F	0.14	F	0.092	J	0		0.14	F
Nickel	µg/L	0		0		1.1	F	0		0		0		0		0		0		1.5	F	0		1.1	F	1.1	F
Zinc	µg/L	35.3	J	38	F	9.0	F	51.3		0		0		39	J	0		0		43	F	110		29	F	16	F
		Month 40		Month 41		Month 42		Month 40		Month 41		Month 42		Month 40		Month 41		Month 42		Month 42		Month 40		Month 41		Month 42	

Note: 0 sample indicates a non-detect analyte value

Table 14.2.2

**SWMU B-3 Westbay Monitoring Wells  
Upper Saturated Zone (Zone LGR03B) Analytical Results Summary Quarter 14**

Q14 Date	CS-WB05-LGR03B			CS-WB06-LGR03B			CS-WB07-LGR03B			CS-WB08-LGR03B		
	8/16/10	9/20/10	10/18/10	8/16/10	9/20/10	10/18/10	8/16/10	9/20/10	10/18/10	8/16/10	9/20/10	10/18/10
PCE (µg/L)	0	15	0.21	63	28	73	3.0	0.33	0	220	47	56
TCE (µg/L)	1.5	29	19	86	43	99	1.1	1.8	1.4	230	61	60
cis-1,2-DCE (µg/L)	270	128	101	170	91	174	36	21	27	210	83	81
trans-1,2-DCE (µg/L)	21	16	14	18	0.41	15	0.74	0.52	1.7	22	0.71	5.7
Vinyl Chloride (µg/L)	3.0	2.3	1.2	0	0	0	0	0	0	0	0	0
Ethene (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0
PCE (nM/L)	0.00	90.45	1.27	379.91	168.85	437.19	18.09	1.99	0.00	1326.66	283.42	337.70
TCE (nM/L)	11.42	220.72	147.65	654.54	327.27	750.44	8.37	13.70	10.66	1750.51	464.27	456.66
cis-1,2-DCE (nM/L)	2784.94	1320.27	1041.77	1753.48	938.63	1794.74	371.33	216.61	278.49	2166.06	856.11	835.48
trans-1,2-DCE (nM/L)	216.61	165.03	144.40	185.66	4.23	150.59	7.63	5.36	17.53	226.92	7.32	58.79
Vinyl Chloride (nM/L)	47.99	36.79	19.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethene (nM/L)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Molar Conc. (nM/L)	3,061.0	1,833.3	1,354.3	2,973.6	1,439.0	3,133.0	405.4	237.7	306.7	5,470.2	1,611.1	1,688.6
% moles PCE	0.0%	4.9%	0.1%	12.8%	11.7%	14.0%	4.5%	0.8%	0.0%	24.3%	17.6%	20.0%
% moles TCE	0.4%	12.0%	10.9%	22.0%	22.7%	24.0%	2.1%	5.8%	3.5%	32.0%	28.8%	27.0%
% moles cis-1,2-DCE	91.0%	72.0%	76.9%	59.0%	65.2%	57.3%	91.6%	91.1%	90.8%	39.6%	53.1%	49.5%
% moles trans-1,2-DCE	7.1%	9.0%	10.7%	6.2%	0.3%	4.8%	1.9%	2.3%	5.7%	4.1%	0.5%	3.5%
% moles Vinyl Chloride	1.6%	2.0%	1.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% moles Ethene	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
sum % moles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Month 40	Month 41	Month 42	Month 40	Month 41	Month 42	Month 40	Month 41	Month 42	Month 40	Month 41	Month 42

Note: 0 sample indicates a non-detect analyte value



Table 14.2.3a

## SWMU B-3 Bioreactor Multi-port Well CS-WB05 - Q14 Performance Data

Q14		CS-WB05																					
Well ID		CS-WB05-LGR01		CS-WB05-LGR02		CS-WB05-LGR03A		CS-WB05-LGR03B				CS-WB05-LGR04A		CS-WB05-LGR04B		CS-WB05-B5-01		CS-WB05-CC-01		CS-WB05-CC-02			
Sample Date		10/26/2010		10/26/2010		10/26/2010		8/16/2010		9/20/2010		10/18/2010		10/26/2010		10/26/2010		10/25/2010		10/25/2010			
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag		
Dissolved Organic Carbon	mg/L	0.26	F	0.48	F	0.33	F	0.18	J	2.1		1.2		0.90		1.5		0.42	F	0.45	F	0.62	
Total Organic Carbon	mg/L	0		0		0		0		2.6		0.99		0		2.0		0		0		0	
Methane	µg/L	1.8		73.2		95.8		137		47		45.4		1,970		17,700		17.1		1.2		3.6	
Ethene	µg/L	0		0		0		0		0		0		0		7.9		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	38,200		11,900		20,700		20,800		10,200		8,050		51,900		216,000		8,280		9,920		24,300	
Alkalinity, Total (as CaCO3)	mg/L	979		759		1,026		306		313		312		322		345		273		276		269	
Nitrate/Nitrite	mg/L	0.092	F	0		0.15	B	0.011	J	0		0.039	F	0.11	B	0.12	B	0.076	F	0.088	F	0.22	B
Sulfate	mg/L	91.9		71.8		42.3		44.9		46.2		44.8		16.1		2.6		30.2		80.2		94	
Chloride	mg/L	14.1		12.6		10.9		11.2		11.6		11.2		11.9		12.5		11.9		17.1		18.3	
Ferrous Iron	mg/L	0		0		0		0		0.20	F	0		0		2.3		0		0.22	F	0.22	F
Manganese	µg/L	0		0		0		0		0		0		7.1		61.3		0		0		0	
Hydrogen	nM																						
Hydrogen Sulfide																							
Total Dissolved Solids	mg/L	56,300		49,600		41,000		419		393		386		37,200		40,100		360		435		452	
Benzene	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0		0		0		0		0		0.19	F
Dichloroethene, cis-1,2-	µg/L	1.9		52.6		95.7		270		128		101		387		70.7		52.7		2.5		41.3	
Dichloroethene, trans-1,2-	µg/L	0.33	F	4.4		8.4		21		16		14.5		4.1		2.1		0.43	F	0.27	F	2.6	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	0		0		0.52	F	0		15		0.21	F	26.6		17.8		0		1.1	F	0.61	F
Toluene	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	1.2		10.7		18.2		1.5		29		19.4		183		20.9		0.25	F	6.1		56	
Vinyl chloride	µg/L	0		0		1.7		3.0		2.3		1.2		32.6		283		2.8		0		1.7	
Arsenic	µg/L	0.70	F	1.4	F	2.6	F	7.1		4.0	F	3.0	F	3.0	F	18		0.90	F	1.6	F	1.4	F
Barium	µg/L	33.5		48		30.4		26.8		29.5		30.7		32.6		19.4		27.8		21.6		24.9	
Cadmium	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Chromium	µg/L	0		0		0		7.4		1.7	F	0		0		0		1.1	F	0		0	
Copper	µg/L	0		0		0		12.4		0		0		0		0		0		0		0	
Lead	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Mercury	µg/L	0.050	F	0		0		0.081	J	0.050	F	0.14	F	0.060	F	0.060	F	0.070	F	0.10	F	0.050	F
Nickel	µg/L	2.4	F	5.0		3.7	F	5.4		2.7	F	4.2	F	2.3	F	74.8		0		1.7	F	1.3	F
Zinc	µg/L	9.0	F	10	F	11	F	38.4	J	0		9.0	F	10	F	13	F	93		106		108	
		Q14- Month 42		Q14- Month 42		Q14- Month 42		Quarter 14				Q14- Month 42		Q14- Month 42		Q14- Month 42		Q14- Month 42		Q14- Month 42		Q14- Month 42	

Note: 0 sample value indicates a non-detect analyte value

Table 14.2.3b

## SWMU B-3 Bioreactor Multi-port Well CS-WB06 - Q14 Performance Data

Q14		WB06															
Well ID		CS-WB06-UGR01		CS-WB06-LGR01		CS-WB06-LGR02		CS-WB06-LGR03A		CS-WB06-LGR03B		CS-WB06-LGR04					
Sample Date		10/29/2010		10/29/2010		10/29/2010		10/29/2010		8/16/2010		9/20/2010		10/18/2010		10/29/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	0.53		1.2		0.26	F	0.61		0		0.83		0.68		0.68	
Total Organic Carbon	mg/L	0.30	F	0		0		0		0		0.38	F	0.52		0	
Methane	µg/L	0		0		1.2		2.0		1.0		1.0	F	1.8		0	
Ethene	µg/L	0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	12,200		31,300		28,600		41,300		25,900		12,600		24,100		53,700	
Alkalinity, Total (as CaCO3)	mg/L	323		334		293		300		289		296		302		291	
Nitrate/Nitrite	mg/L	0.39		0.21		0		0.064	F	0.011	J	0.053	F	0.039	F	0.96	
Sulfate	mg/L	29.5		26.5		25.2		19.4		19.7		20.6		19.4		10.9	
Chloride	mg/L	14.0		13.6		9.9		12.1		12.3		12.5		12.1		12.8	
Ferrous Iron	mg/L	0		0		0		0		0		0		0		0	
Manganese	µg/L	6.8		7.9		0		0		0		0		0		0	
Hydrogen	nM																
Hydrogen Sulfide																	
Total Dissolved Solids	mg/L	389		397		344		341		362		349		347		347	
Benzene	µg/L	0		0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0		0		0		0.18	F
Dibromochloromethane	µg/L	0		0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0		0		0.32	F
Dichloroethene, cis-1,2-	µg/L	71.3		32.6		19.4		166		170		91		174		344	
Dichloroethene, trans-1,2-	µg/L	0.54	F	0.26	F	0.75		0.90		18		0.41	F	14.6		3.3	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	26		6.4		6.1		47.3		63		28		72.5		209	
Toluene	µg/L	0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	36		9.4		8.1		71.2		86		43		98.6		173	
Vinyl chloride	µg/L	0.24	F	0		0		0		0		0		0		0	
Arsenic	µg/L	0		0		0		0		7.2		9.9		3.2	F	0	
Barium	µg/L	40.7		54.5		76.3		27.8		26.2		27.2		28.1		30.1	
Cadmium	µg/L	0		0		0		0		0.59	J	0		0		0	
Chromium	µg/L	7.5		9.7		4.7	F	0		4.3	J	1.3	F	0		0	
Copper	µg/L	0		0		0		0		13.4		0		0		0	
Lead	µg/L	0		0		0		0		0		0		0		0	
Mercury	µg/L	0		0		0		0		0.084	J	0.050	F	0.14	F	0	
Nickel	µg/L	6.1		7.6		5.1		3.5	F	3.2	J	2.4	F	3.1	F	1.6	F
Zinc	µg/L	0		22	F	17	F	15	F	38.2	J	0		12	F	0	
		Q14- Month 42		Q14- Month 42		Q14- Month 42		Q14- Month 42		Quarter 14						Q14- Month 42	

Note: 0 sample value indicates a non-detect analyte value

Table 14.2.3c

## SWMU B-3 Bioreactor Multi-port Well CS-WB07 - Q14 Performance Data

Q14		WB07															
Well ID		CS-WB07-UGR01		CS-WB07-LGR01		CS-WB07-LGR02		CS-WB07-LGR03A		CS-WB07-LGR03B		CS-WB07-LGR04					
Sample Date		10/27/2010		10/27/2010		10/27/2010		10/27/2010		8/16/2010		9/20/2010		10/18/2010		10/27/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	4.1		0.94		1.1		0.45	F	0.24	J	0.98		0.62		0	
Total Organic Carbon	mg/L	3.2		0		0		0		0		2.5		0.66		0.87	
Methane	µg/L	6,570		0		0		5.1		6.1		4.6		5.8		0	
Ethene	µg/L	14.6		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	343,000		43,300		5,230		24,500		38,200		22,300		27,800		6,460	
Alkalinity, Total (as CaCO3)	mg/L	953		876		750		274		285		295		293		258	
Nitrate/Nitrite	mg/L	0		0		0.15	B	0.084	F	0.011	J	0.030	F	0.039	F	1.2	B
Sulfate	mg/L	1.2		105		35.2		19.3		21		21.0		19.8		8.6	
Chloride	mg/L	16.2		16.8		12.8		10.0		10.4		10.6		10.4		11.9	
Ferrous Iron	mg/L	5.6		0		0.20	F	0		0		0		0		0	
Manganese	µg/L	1,501		0		0		0		0		0		0		0	
Hydrogen	nM																
Hydrogen Sulfide																	
Total Dissolved Solids	mg/L	42,200		62,000		40,400		35,800		362		329		337		34,800	
Benzene	µg/L	0		0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0		0		0		0.26	F
Dibromochloromethane	µg/L	0		0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0		0		0.21	F
Dichloroethene, cis-1,2-	µg/L	0.61	F	0		0		25.6		36		21		27.4		389	
Dichloroethene, trans-1,2-	µg/L	1.3		0		0		0		0.74		0.52	F	1.7		3.6	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	0		0.24	F	0		3.3		3.0		0.33	F	0		189	
Toluene	µg/L	0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	0		0.39	F	0		4.2		1.1		1.8		1.4		254	
Vinyl chloride	µg/L	1.4		0		0		0		0		0		0		0	
Arsenic	µg/L	4.8	F	0.60	F	0.90	F	0		4.8	J	7.8		2.3	F	0	
Barium	µg/L	108		116		102		34.2		27		31.8		31.9		29.5	
Cadmium	µg/L	0		0		0		0		0		0		0		0	
Chromium	µg/L	3.6	F	0		0		0		3.7	J	1.3	F	2.4	F	3.4	F
Copper	µg/L	0		0		0		0		13.3		0		0		0	
Lead	µg/L	0		0		0		0		0		0		0		0	
Mercury	µg/L	0.050	F	0.050	F	0.060	F	0		0.096	J	0.050	F	0.13	F	0.050	F
Nickel	µg/L	3.6	F	5.3		0		1.2	F	0		0		1.8	F	2.9	F
Zinc	µg/L	10	F	22	F	12	F	12	F	28.9	J	0		0		11	F
		Q14- Month 42		Q14- Month 42		Q14- Month 42		Q14- Month 42		Quarter 14		Quarter 14		Quarter 14		Q14- Month 42	

Note: 0 sample value indicates a non-detect analyte value

Table 14.2.3d

## SWMU B-3 Bioreactor Multi-port Well CS-WB08 - Q14 Performance Data

Q14		WB08															
Well ID		CS-WB08-UGR01		CS-WB08-LGR01		CS-WB08-LGR02		CS-WB08-LGR03A		CS-WB08-LGR03B		CS-WB08-LGR04					
Sample Date		10/28/2010		10/28/2010		10/28/2010		10/28/2010		8/16/2010		9/20/2010		10/18/2010		10/28/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	1.3		0.96		0.45	F	0.55		0.63		1.2		1.1		1.3	
Total Organic Carbon	mg/L	1.1		0		0		0		0.74		0.38	F	0.61		0.99	
Methane	µg/L	388		0		0		0		0		0		0		0	
Ethene	µg/L	9.0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	75,300		11,300		7,210		7,540		36,300		30,400		30,400		69,300	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	944		1,181		735		685		298		311		286		315	
Nitrate/Nitrite	mg/L	0		0.054	F	0		0.64		0.59		0.71		0.71	B	0.20	
Sulfate	mg/L	20.1		91.4		105		15.6		15.4		17.7		15.8		27.2	
Chloride	mg/L	16.6		12.0		12.4		12.7		12.3		13.5		12.9		14.8	
Ferrous Iron	mg/L	0.20	F	0		0		0		0		0		0		0	
Manganese	µg/L	660		0		0		0		0		0		0		16.1	
Hydrogen	nM																
Hydrogen Sulfide																	
Total Dissolved Solids	mg/L	421		508		553		345		382		372		350		391	
Benzene	µg/L	0		0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0.19	J	0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0.89	F	0		0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	543		76		2.5		187		210		83		81		57.2	
Dichloroethene, trans-1,2-	µg/L	3.2		6.1		0		2.7		22		0.71		5.7		0	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	2.4		0		1.4		196		220		47		56		7.6	
Toluene	µg/L	0.33	F	0		0		0		0		0		0		0	
Trichloroethene	µg/L	8.6		0.46	F	1.8		203		230		61		60		13.6	
Vinyl chloride	µg/L	38.6		0		0		0		0		0		0		0	
Arsenic	µg/L	0		1.4	F	1.6	F	0.70	F	4.6	J	1.6	F	1.2	F	0	
Barium	µg/L	47.9		102		71.7		34.4		32.9		34.1		34.8		46.2	
Cadmium	µg/L	0		0		0		0		0.71	J	0		0		0	
Chromium	µg/L	1.8	F	0		1.6	F	0		4.2	J	1.9	F	1.5	F	0	
Copper	µg/L	33		29		29		28		12.5		0		0		32	
Lead	µg/L	0		0		0		0		0		0		0		0	
Mercury	µg/L	0.060	F	0.050	F	0.070	F	0		0.092	J	0.050	F	0.13	F	0.050	F
Nickel	µg/L	16.7		2.2	F	1.7	F	4.1	F	8.1		2.2	F	3.1	F	3.0	F
Zinc	µg/L	44	F	36	F	43	F	43	F	48.9	J	0		22	F	54	
		Q14- Month 42		Q14- Month 42		Q14- Month 42		Q14- Month 42		Quarter 14						Q14- Month 42	

Note: 0 sample value indicates a non-detect analyte value

Table 14.6.3

## B-3 Bioreactor Extraction Well Analytical Summary - Quarter 14

Q14		Extraction Wells					
Well ID		CS-MW16-LGR		CS-MW16-CC		B3-EXW01	
Sample Date		10/20/2010		10/20/2010		10/20/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	0.39	F	0.49	F	0.42	F
Total Organic Carbon	mg/L	0		0.38	F	0	
Methane	µg/L	5.0		4.6		0	
Ethene	µg/L	0		0		0	
Ethane	µg/L	0		0		0	
Carbon Dioxide	µg/L	35,600		20,800		39,700	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	269		273		278	
Nitrate/Nitrite	mg/L	1.2		0.066	F	1.2	
Sulfate	mg/L	17.8		65.8		10.3	
Chloride	mg/L	11.2		17.7		11.8	
Ferrous Iron	mg/L	0		0.29	F	0	
Manganese	µg/L	0		0		0	
Hydrogen	nM	6.9		6.9		7.1	
Hydrogen Sulfide							
Total Dissolved Solids	mg/L	344		391		345	
Benzene	µg/L	0		0		0	
Bromodichloromethane	µg/L	0		0		0	
Bromoform	µg/L	0		0		0	
Chloroform	µg/L	0		0		0.20	F
Dibromochloromethane	µg/L	0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0	
Dichloroethene, cis-1,2-	µg/L	156		26		138	
Dichloroethene, trans-1,2-	µg/L	0.20	F	3.4		1.1	
Methylene chloride	µg/L	0		0		0	
Naphthalene	µg/L	0		0		0	
Tetrachloroethene	µg/L	155		3.0		196	
Toluene	µg/L	0		0		0	
Trichloroethene	µg/L	166		30		116	
Vinyl chloride	µg/L	0		0		0	
Arsenic	µg/L	0.80	F	2.4	F	1.8	F
Barium	µg/L	36.4		22.8		29.9	
Cadmium	µg/L	0.36	F	0.43	F	0	
Chromium	µg/L	0		0		0	
Copper	µg/L	6.0		0		0	
Lead	µg/L	0		0		0	
Mercury	µg/L	0.070	F	0.050	F	0.050	F
Nickel	µg/L	0		3.9	F	0	
Zinc	µg/L	19	F	9.0	F	390	

Note : 0 sample value indicates a non-detect analyte value

Table 14.6.2

## B-3 Bioreactor Extraction Well VOC Summary - Quarter 14

Q14	16 LGR	16 CC	EXW 01
Date	10/20/10	10/20/10	10/20/10
PCE (µg/L)	155	3.0	196
TCE (µg/L)	166	30	116
cis-1,2-DCE (µg/L)	156	26	138
trans-1,2-DCE (µg/L)	0.20	3.4	1.1
Vinyl Chloride (µg/L)	0	0	0
Ethene (µg/L)	0	0	0
PCE (nM/L)	934.69	18.09	1181.93
TCE (nM/L)	1263.41	228.33	882.87
cis-1,2-DCE (nM/L)	1609.08	268.18	1423.41
trans-1,2-DCE (nM/L)	2.06	35.07	11.35
Vinyl Chloride (nM/L)	0.00	0.00	0.00
Ethene (nM/L)	0.00	0.00	0.00
Total Molar Conc. (nM/L)	3,809.2	549.7	3,499.6
% moles PCE	24.5%	3.3%	33.8%
% moles TCE	33.2%	41.5%	25.2%
% moles cis-1,2-DCE	42.2%	48.8%	40.7%
% moles trans-1,2-DCE	0.1%	6.4%	0.3%
% moles Vinyl Chloride	0.0%	0.0%	0.0%
% moles Ethene	0.0%	0.0%	0.0%
sum % moles	100.0%	100.0%	100.0%

Note: 0 sample indicates a non-detect analyte value

Table 14.3.3

## B-3 Bioreactor Monitoring Well Analytical Summary - Quarter 14

Q14		Monitoring Wells					
Well ID		CS-MW1-LGR		CS-D		CS-B3-MW01	
Sample Date		10/20/2010		10/20/2010		10/20/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	0.66		0.34	F	6.7	
Total Organic Carbon	mg/L	0		0		4.0	
Methane	µg/L	0		0		147,000	
Ethene	µg/L	0		0		0	
Ethane	µg/L	0		0		0	
Carbon Dioxide	µg/L	35,600		32,700		702,000	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	266		276		566	
Nitrate/Nitrite	mg/L	0.77		1.0		0.065	F
Sulfate	mg/L	13.4		14.3		1.2	
Chloride	mg/L	9.3		11.0		13.3	
Ferrous Iron	mg/L	0		0		6.2	
Manganese	µg/L	0		0		150	
Hydrogen	nM	7.2		8.9		6.7	
Hydrogen Sulfide							
Total Dissolved Solids	mg/L	311		332		612	
Benzene	µg/L	0		0		0	
Bromodichloromethane	µg/L	0		0		0	
Bromoform	µg/L	0		0		0	
Chloroform	µg/L	0.13	F	0.16	F	0	
Dibromochloromethane	µg/L	0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0	
Dichloroethene, cis-1,2-	µg/L	20.1		154		0.34	F
Dichloroethene, trans-1,2-	µg/L	0.22	F	1.1		1.1	
Methylene chloride	µg/L	0		0		0	
Naphthalene	µg/L	0		0		0	
Tetrachloroethene	µg/L	16.0		147		0.33	F
Toluene	µg/L	0		0		0	
Trichloroethene	µg/L	30.3		175		0.22	F
Vinyl chloride	µg/L	0		0.30	F	187	
Arsenic	µg/L	0		1.3	F	3.2	F
Barium	µg/L	34.4		35		99.7	
Cadmium	µg/L	0		0		0	
Chromium	µg/L	0		0		0	
Copper	µg/L	0		0		0	
Lead	µg/L	0		0		0	
Mercury	µg/L	0.060	F	0.060	F	0.050	F
Nickel	µg/L	4.7	F	0		2.9	F
Zinc	µg/L	0		0		0	

Note : 0 sample value indicates a non-detect analyte value

Table 14.4.4

**SWMU B-3 Supm Microbial Data**  
**Quarter 14**

Q14	Sample Location	B3 T1-2	B3 T6-1
Analysis	Sample date:	10/19/2010	10/19/2010
<b>Dechlorinating Bacteria</b>	units		
<i>Dehalococcoides spp (1)</i>	(cells/mL)	9.01E+01	6.32E+03
<b>Functional Genes</b>	units		
TCE R-Dase (1)	(cells/mL)	1.05E+01	1.04E+03
BAV1 VC R-Dase (1)	(cells/mL)	<5.00E-01	1.64E+03
VC R-Dase	(cells/mL)	3.22E+01	1.93E+03



Table 14.5.2

B3 - UIC Analytical Results  
August - October 2010

Sample ID Sample Date Sample Type Sampling Method Lab ID	B3-UIC			B3-UIC			B3-UIC			B3-UIC			B3-UIC									
	05/19/10			06/22/10			07/20/10			08/17/10			09/21/10			10/29/10						
	N1			N1			N1			N1			N1			N1						
Grab			Grab			Grab			Grab			Grab			Grab							
AY15780			AY17148			AY18286			AY19940			AY22083			AY24744							
Lab MDL	Lab PQL	B-3 UIC Criteria (RCRA Haz.)	Results			Results			Results			Results			Results							
			Flags	Dilution		Flags	Dilution		Flags	Dilution		Flags	Dilution		Flags	Dilution						
<b>SW8260B (µg/L)</b>																						
Cis-DCE	0.16	1.2	--	75		1	110		1	100		1	100		1	92		1	83		1	
Trans-DCE	0.19	0.6	--	4.6		1	5.0		1	5.6		1	15		1	1.5		1	6.3		1	
TCE	0.16	1.0	500.	86		1	110		1	100		1	100		1	84		1	81.3		1	
PCE	0.15	1.4	700.	57		1	79		1	72		1	76		1	52		1	64.9		1	
Toluene	0.17	1.1	--	0.17	U	1	0.17	U	1	0.17	U	1	0.17	U	1	0.06	U	1	0.06	U	1	
Vinyl Chloride	0.23	1.1	200.	0.23	U	1	0.23	U	1	0.23	U	1	0.23	U	1	0.08	U	1	0.08	U	1	
<b>EPA 160.1 (mg/L)</b>																						
TDS	4.4	10.	--	308		1	363		1	364		1	392		1	377		1	364		1	
<b>Field measured</b>																						
pH				7.22			7.21			7.35			7.44			7.26			6.89			

Tables present all laboratory results for analytes.  
Data packages for laboratory results are presented in Attachment 1.  
All samples were analyzed by APPL Laboratory Services.  
pH results reported were field measured.  
UIC criteria specified in 40 CFR 261.24 Table 1

**Data Quantifiers:**  
J - The analyte was positively identified, the quantitation is an estimate  
U - The analyte was analyzed for, but not detected. The associated numerical value is the MDL.

**Abbreviations:**  
PQL Practical Quantitation Limit  
MDL Method Detection Limit  
N1 Environmental Sample  
SQL Sample Quantitation Limit  
UIC Underground Injection Control























Table 14.7.3

## B-3 Bioreactor UGR Well Analytical Summary - Quarter 14

Q14		Shallow UGR Wells													
Well ID		B3-MW26-UGR		B3-MW27-UGR		B3-MW30-UGR		B3-MW31-UGR		B3-MW32-UGR		B3-MW33-UGR		B3-MW34-UGR	
Sample Date		10/20/2010		10/22/2010		10/22/2010		10/22/2010		10/22/2010		10/22/2010		10/20/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	2.6		2.7				1.4		1.2		1.1		2.5	
Total Organic Carbon	mg/L	2.0		1.2				1.7		0.90		0.74		2.2	
Methane	µg/L	4,620		0				0		0		0		6,760	
Ethene	µg/L	7.7		0				0		0		0		12.1	
Ethane	µg/L	1.3	F	0				0		0		0		2.2	
Carbon Dioxide	µg/L	166,000		131,000				83,200		14,000		62,800		182,000	
Alkalinity, Total (as CaCO3)	mg/L	421		884				397		331		367		388	
Nitrate/Nitrite	mg/L	0.079	F	0.13	B			0.99	B	0.64	B	0.48	B	0.080	F
Sulfate	mg/L	15.6		13.5				60		21		22.3		15.7	
Chloride	mg/L	15.4		17.3				10.8		10.0		10.5		15.9	
Ferrous Iron	mg/L	1.4		0.22	F			0.60	F	1.0		0.24	F	1.3	
Manganese	µg/L	132		113		278		152		84		79.4		573	
Hydrogen	nM														
Hydrogen Sulfide															
Total Dissolved Solids	mg/L	473		511				527		306		423		464	
Benzene	µg/L	0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	62		0.46	F	4.1		16		77		6.3		63	
Dichloroethene, trans-1,2-	µg/L	2.1		0.90		0		0.66		0.81		0		4.0	
Methylene chloride	µg/L	0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	0.18	F	0		8.4		13		27		10		0	
Toluene	µg/L	0.26	F	0.42	F	0.80	F	1.0	F	0		0.57	F	0	
Trichloroethene	µg/L	0.77	F	0		1.8		3.6		9.7		3.0		0	
Vinyl chloride	µg/L	48		0.87	F	0		0		0		0		3.8	F
Arsenic	µg/L	1.8	F	0		5.7		0.6	F	0.30	F	0		2.8	F
Barium	µg/L	88.9		81.1		170		62		39.8		67.1		92.6	
Cadmium	µg/L	0		0		0		0		0		0		0	
Chromium	µg/L	0		0		5.4		0		1.4	F	0		0	
Copper	µg/L	0		0		9.0		0		0		0		0	
Lead	µg/L	0		0		4.6	F	0		0		0		0	
Mercury	µg/L	0.060	F	0.070	F	0.080	F	0		0.060	F	0.050	F	0.060	F
Nickel	µg/L	1.3	F	4.4	F	9.2		4.8	F	2.5	F	1.4	F	4.9	F
Zinc	µg/L	0		99		235		99		136		113		24	F

- Notes: - 0 sample value indicates a non-detect analyte value  
- No sample was collected from dry wells B3-MW28-UGR and B3-MW29-UGR  
- B3-MW30-UGR went dry during sampling, thus several analyses could not be performed.