

**CSSA B-3 BIOREACTOR OPERATIONS  
PERFORMANCE STATUS REPORT  
(QUARTER 13, MONTHS 37 – 39, MAY – JULY, 2010)**

**SEPTMEBER 23, 2010**

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This status report summarizes the operation of a bioreactor at Solid Waste Management Unit (SWMU) B-3 from May 1, 2010 through July 31, 2010, comprising the thirteenth 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 July 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 9.6 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 27,154,800 gallons of groundwater extracted from CS-MW16-LGR, CS-MW16-CC, and B3-EXW01 have been injected into bioreactor trenches 1, 2, and 6 since the start of normal operations. During quarter 13, a total of 3,903,696 gallons of extracted groundwater from wells CS-MW16-LGR, CS-MW16-CC, and B3-EXW01 were injected into the bioreactor. The majority of extracted groundwater, ~1,831,000 gallons, was from CS-MW16-CC, while ~1,089,000 gallons was extracted from CS-MW16-LGR, and 983,000 gallons were extracted from CS-B3-EXW01.

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 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 2 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 trench 1. 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***

During the quarter, a change in the injection operations at the bioreactor was initiated to take advantage of the preferred flow paths identified from flood test data. Injection of extracted groundwater into trench 2 ceased and injection into trench 6 was initiated on June 28, 2010. During this transition, approximately 840 gallons of water from T1-3 were pumped into T6-2 and 84 gallons from T1-3 were pumped into T6-1 to “seed” trench 6 with microorganisms that would be favor reductive dechlorination.

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 (0.47 – 58 µg/L – Quarter 13) as well as concentrations of other dechlorination products (e.g., VC, ethene). Sump samples for Quarter 13 came from Trenches 1, 2 and 6. Over this reporting period, VOC levels in Trenches 1 and 2 were generally higher than seen in Trench 6. In addition, minor amounts of toluene, and other fuel related compounds were identified during monitoring of sumps sampled during the quarter. A summary of the analytical data collected for the reporting period is included in Table 1. A summary of monthly and quarter 13 monitoring results from the bioreactor trench sumps are attached, analytical results of the surrounding SWMU B-3 multi-port monitoring wells (MPMW or Westbay®) and monitoring wells are also attached.

Results of VOC analyses indicate that groundwater from the uppermost saturated zone (LGR-03B) of Westbay® wells CS-WB05 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. Wells CS-WB06 and CS-WB08 both contain 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 an increase in contaminant mass (total molar concentration) in all sumps in trenches 1 and 2 from the previous 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 0.37 mg/L, ORP has fallen since the previous quarter, averaging -160.1 mV, pH ~ 6.82, temperatures range from 22.4 °C to 29.43 °C, and specific conductivity ranges from 0.441 to 1.023 millisiemens per centimeter (mS/cm). The reductions of average DO and ORP values may be attributed to an improvement in field parameter monitoring equipment. Observed field measurements of DO and ORP in trenches 1 and 6 were less than readings from prior weeks after a new probe was put into service on 7/14/10. Other observations regarding the data collected during this reporting period are listed below

Water quality field measurements from trench 2 include: average DO, pH, and ORP ~0.45 mg/L, ~6.58, and ~ -119.76 mV, respectively; temperature ranges from 23.29 °C to 29.59 °C; and specific conductivity ranges from 0.547 to 1.686 mS/cm.

Water quality field measurements from trench 6 include: average DO, pH, and ORP ~0.44 mg/L, ~6.62, and ~ -220.38 mV, respectively; temperature ranges from 25.85 °C to 27.34 °C; and specific conductivity ranges from 0.529 to 1.230 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 0 to 47 ppb, with the highest levels found north and west of the bioreactor. UGR wells located south and east of the bioreactor found no vinyl chloride. MW-28, located southwest of the bioreactor has been consistently dry. 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-29 and 33 showed fair reducing conditions and MW-30 and 32 showed poor reducing conditions.

Through the 13<sup>th</sup> quarter of bioreactor operation, 9.6 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 6.33 feet. Average water thickness in Trench 2 during this period was approximately 2.51 feet. Average water thickness in Trench 6 during this period was approximately 1.2 feet. Although, water is injected in trench 6 at approximately 25 gallons per minute, water thicknesses in sump 6-1 are minimal (on average 0.286 feet), thus trench 6 average water quality field parameters and water thicknesses are derived from sump 6-2. 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 detected in concentrations exceeding the MCL (10 µg/L) in trench samples collected at T2-2 (10.5 µg/L) during quarter 13. Manganese (Mn) was reported in bioreactor trench water samples at concentrations ranging from 88.9 to 1,560 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 69.2 to 595 µg/L. One of the shallow UGR wells did not produce enough water to sample and the Mn concentration in the other well ranged from 19.8 to 31.4 µg/L. An elevated level of Mn was reported in CS-B3-MW01 (198 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-WB06-UGR01 (129 µg/L), CS-WB07-UGR01 (1,310 µg/L), CS-WB08-UGR01 (250 µg/L) and CS-WB05-LGR-04B (67.7 µg/L), and elevated levels of As were reported in CS-WB05-LGR04B (19.3 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 sumps in trenches 1 and 2 increased from the previous quarter, however over the operational period of the bioreactor, total molar concentrations are on a downward trend. The trans-DCE isomer in trenches 1 and 2 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 ( $1.0E +03$ ) in trenches 1 and 6.
6. Saturated conditions within the bioreactor are maintained (while groundwater injection activities were sustained) through the quarter with average water thicknesses of approximately 6.33 feet and 2.51 feet trenches 1 and 2, respectively. Saturated conditions in trench 6 are questionable as the average water thickness in sump T6-2 was only 1.17 feet and T6-1 was on average a mere 0.29 feet. However, data collected within trench 6 is maintaining appropriate geochemical conditions for effective anaerobic dechlorination of CAHs.
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 300 and 220 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 (August, 2010 – October, 2010):***

- Continue monitoring and maintenance activities for delivery of groundwater to the bioreactor trenches.
- Conduct monthly monitoring events in August and September (Months 40 and 41), and quarterly monitoring event in October (Month 42) for bioreactor system.
- Continue UIC monthly monitoring with semi-annual reporting due December 2010.
- Complete the construction of a fourth extraction well to deliver groundwater to the bioreactor including the integration of system controls with SCADA.
- 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 13.1.2, present data from quarter 13 sampling events.
- Table 13.1.1 indicates a water thickness of approximately 6.33 feet in trench 1, 2.51 feet in trench 2, and 1.17 feet in T6-2 was maintained.

- Table 11.1.2 indicates that VC was present at moderate to high concentrations in trench sumps, ranging from 3.2 to 49  $\mu\text{g/L}$  in trench 1 and from non-detect to 64  $\mu\text{g/L}$  in trench 2, and 6.9  $\mu\text{g/L}$  in T6-2. Ethene was observed in concentrations ranging from ND to 12.5  $\mu\text{g/L}$  in trench 1 and non-detect to 3.5  $\mu\text{g/L}$  in trench 2, and was observed in T6-2 (1.5  $\mu\text{g/L}$ ).
- Table 13.1.3 indicates that Mn(II) and Fe(II) were present at concentrations consistent with alternative degradation pathways. Additionally, Table 13.1.3 provides evidence of the biotic anaerobic degradation pathway with the elevated concentrations of Mn and  $\text{CO}_2$ . Ethane was observed in trench 1 for the first time during the quarter.
- Table 13.3.3 indicates that VC was present (220  $\mu\text{g/L}$ ) in the sample collected from monitoring well CS-B3-MW01, which is a marked increase from samples collected through the previous 38 months. Table 13.2.3a indicates a significant deviation from the normal VC concentrations in WB05-LGR04B (300  $\mu\text{g/L}$ ) suggesting a connection between this zone and CS-B3-MW01. Ethene was observed in WB05-LGR03B for the first time as reported in Table 13.2.3a.
- Table 13.4.4 indicates that the *Dehalococcoides* (DHC) bacteria populations are moderate in trenches 1 and 6.
- The changes in molar fraction and total molar concentrations shown in graphs of quarter 13 trenches 1 and 2 sumps indicate a continued reduction in contaminant mass to end products VC and ethene.
- Figure 13.2.5 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 13.7.3 indicates the presence of VC in several of the shallow UGR wells with concentrations ranging from non-detect to 47  $\mu\text{g/L}$ . Additionally, Table 13.7.3 provides evidence of the biotic anaerobic degradation pathway with the elevated concentrations of Mn and  $\text{CO}_2$ .

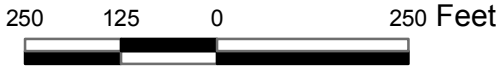
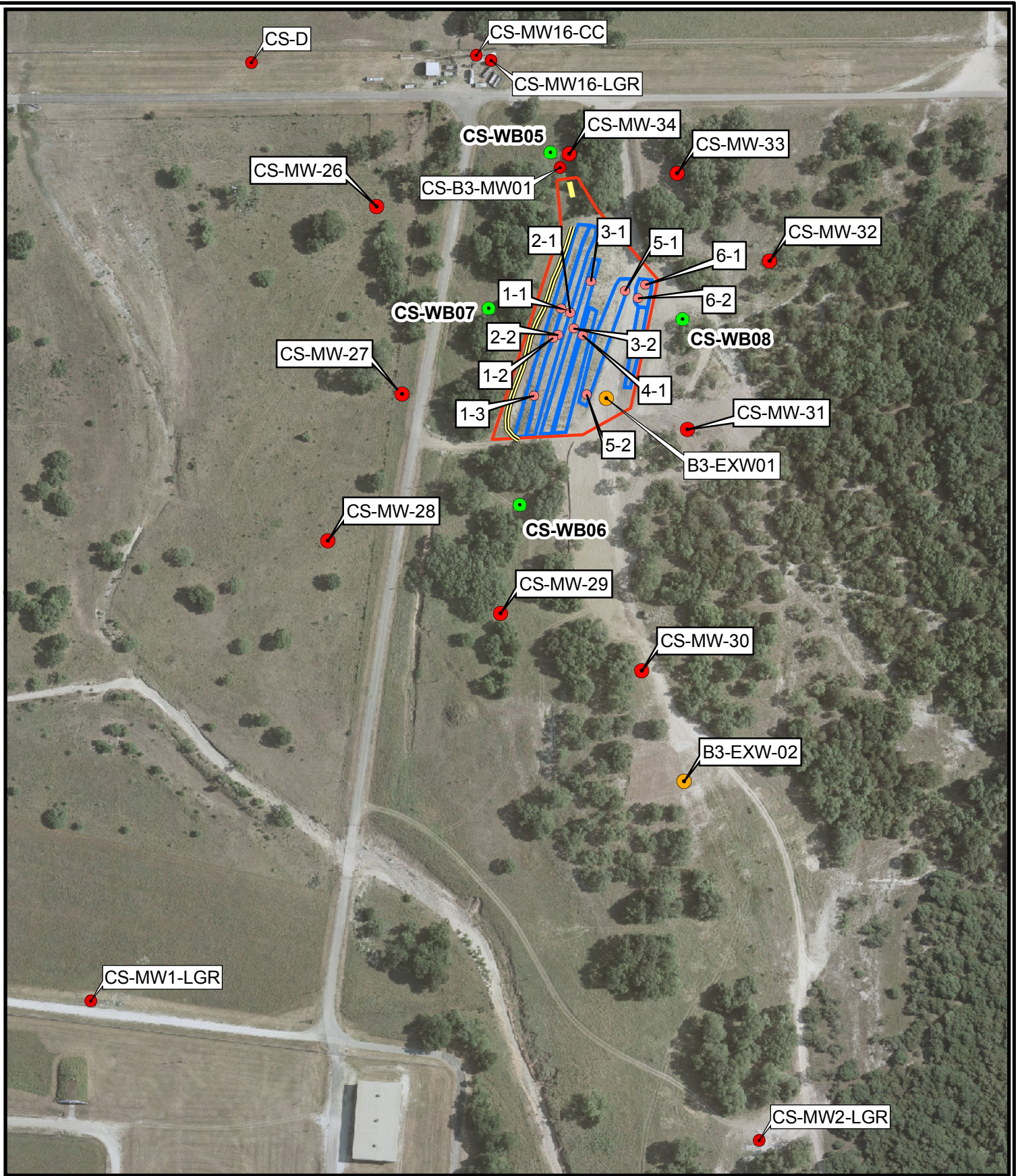
## Analytical Summary Data

**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.



- New Extraction Well
- Bioreactor Trench Sumps
- B-3 Monitoring Wells
- Westbay Wells
- B-3 Boundary
- Berm Location
- Tank
- Former Trench Locations

Figure 1

B-3 Bioreactor System  
Camp Stanley Storage Activity

**PARSONS**

**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
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	



## Figures

Figure 13.1.2T1-1

B-3 Bioreactor Trench 1 Sump 1 VOC Summary  
Quarter 8 - Quarter 13

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

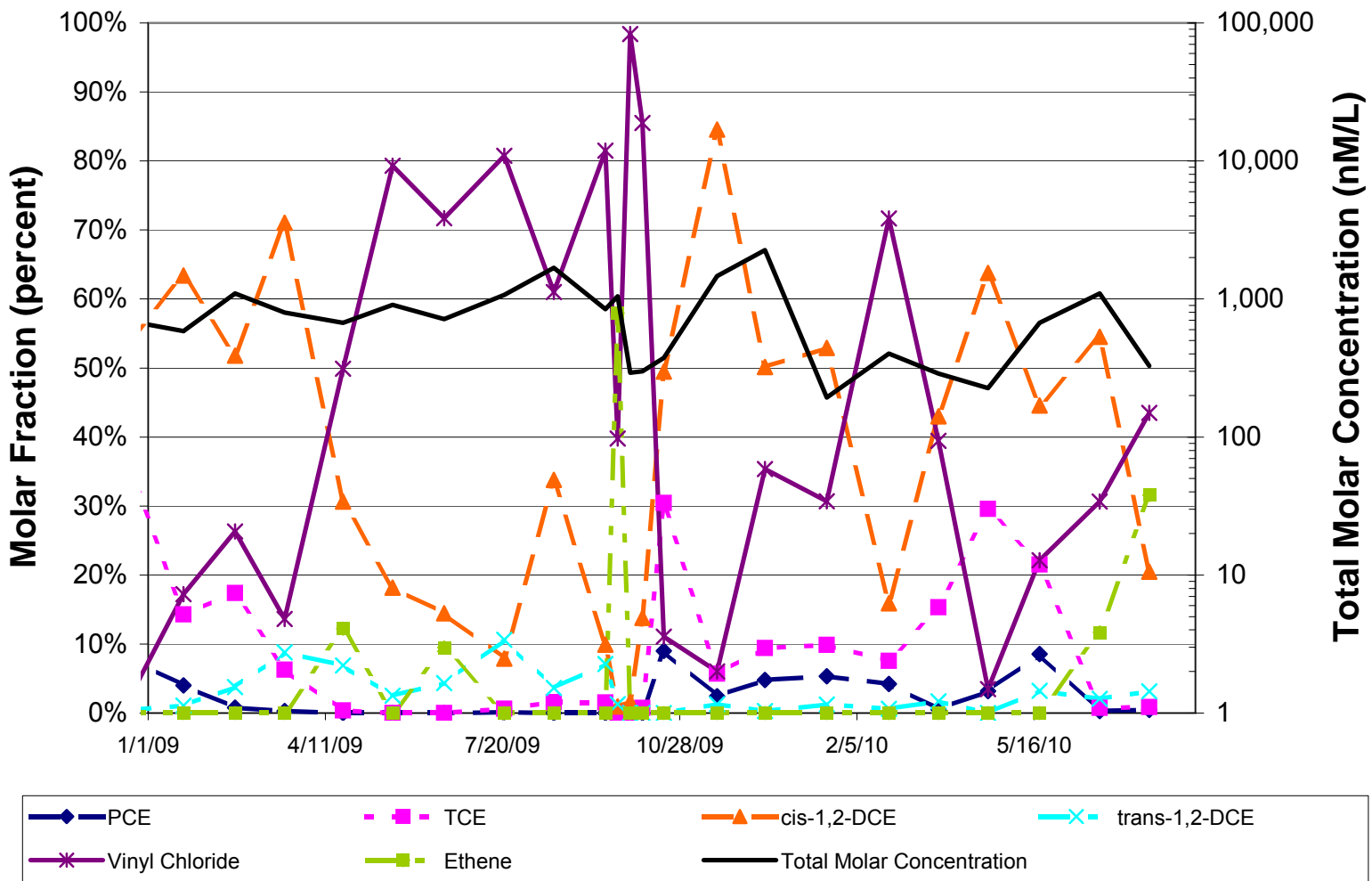


Figure 13.1.2T1-2

B-3 Bioreactor Trench 1 Sump 2 VOC Summary  
 Quarter 8 - Quarter 13

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

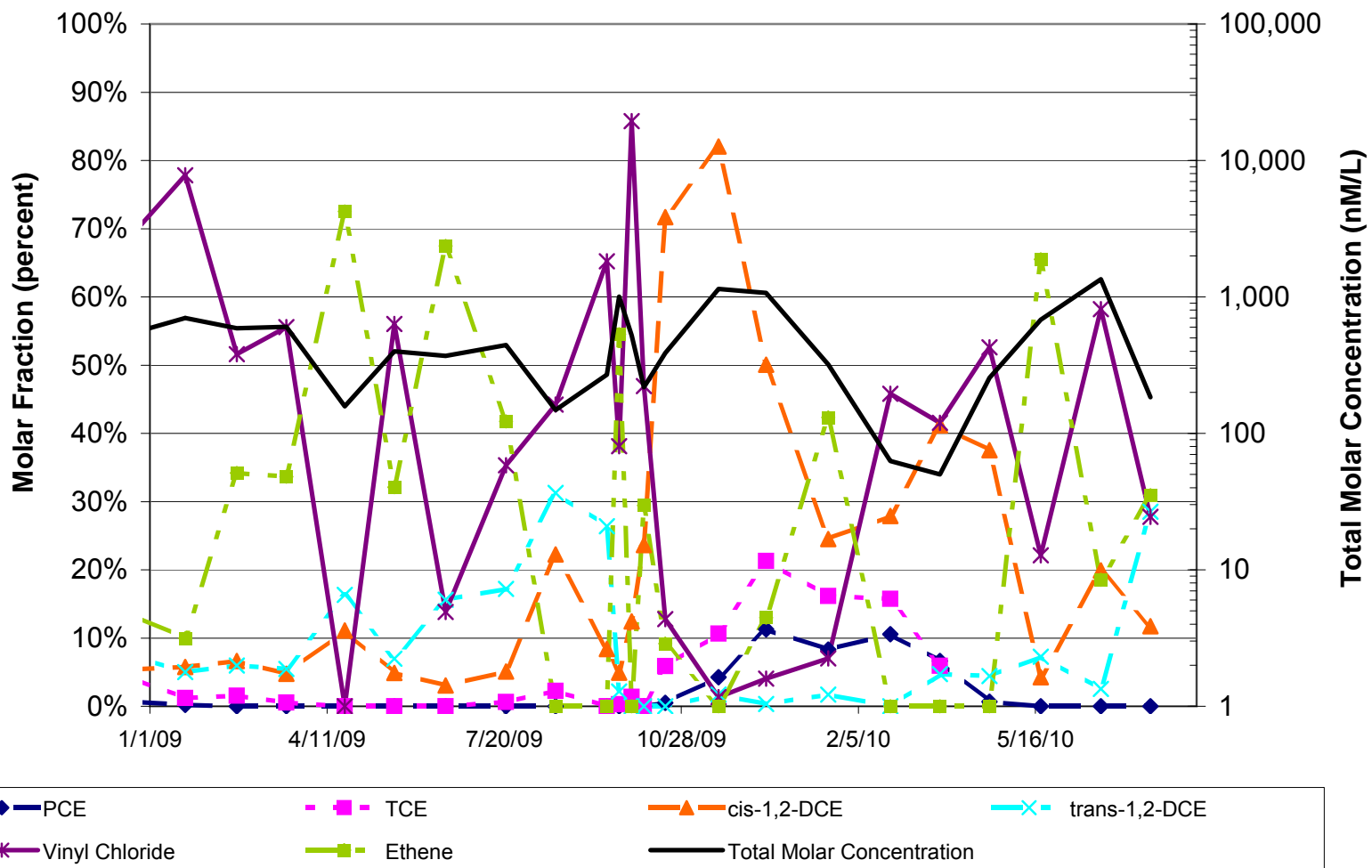


Figure 13.1.2T1-3

B-3 Bioreactor Trench 1 Sump 3 VOC Summary  
Quarter 8 - Quarter 13

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

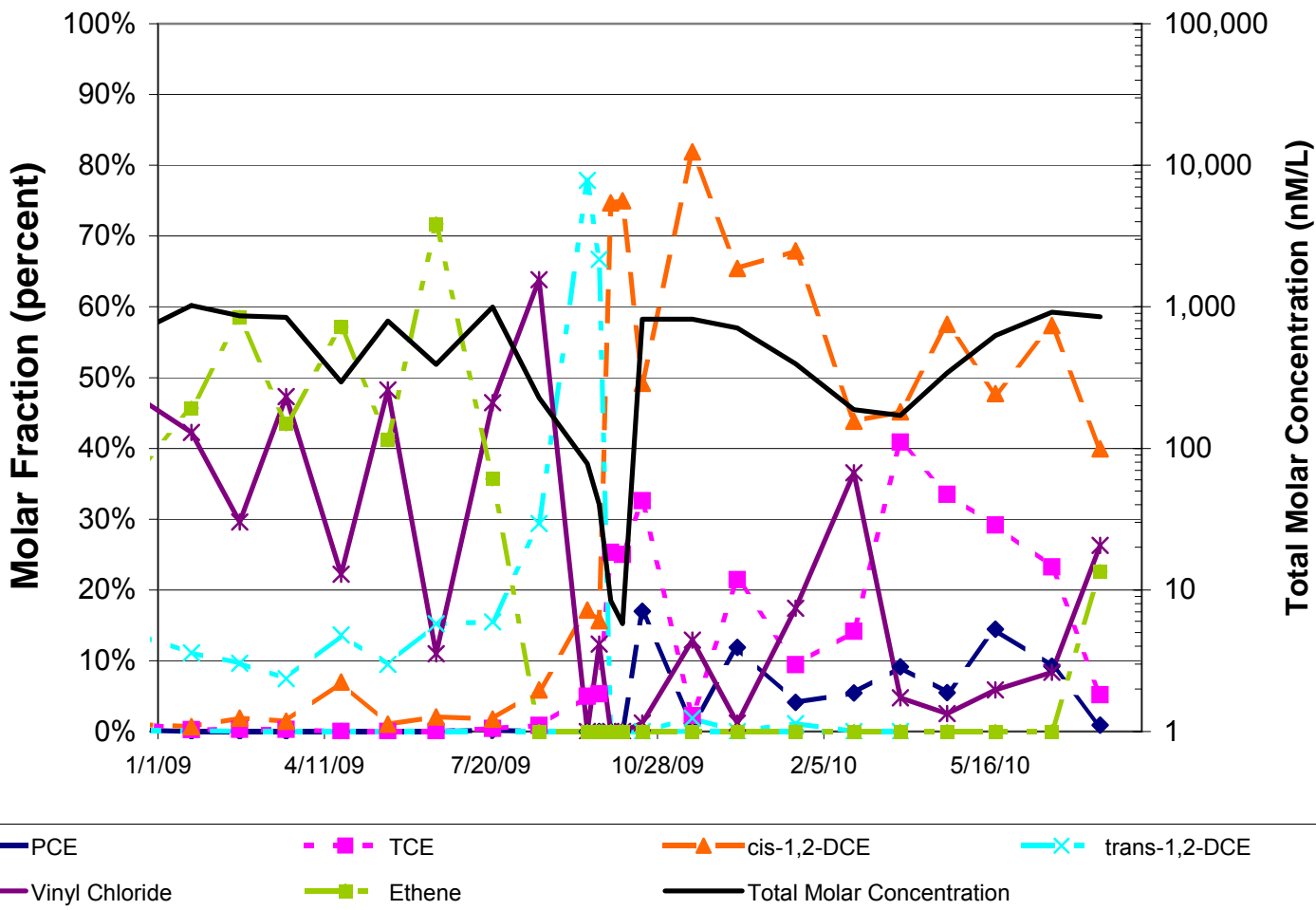


Figure 13.1.2T2-1

B-3 Bioreactor Trench 2 Sump 1 VOC Summary  
Quarter 8 - Quarter 13

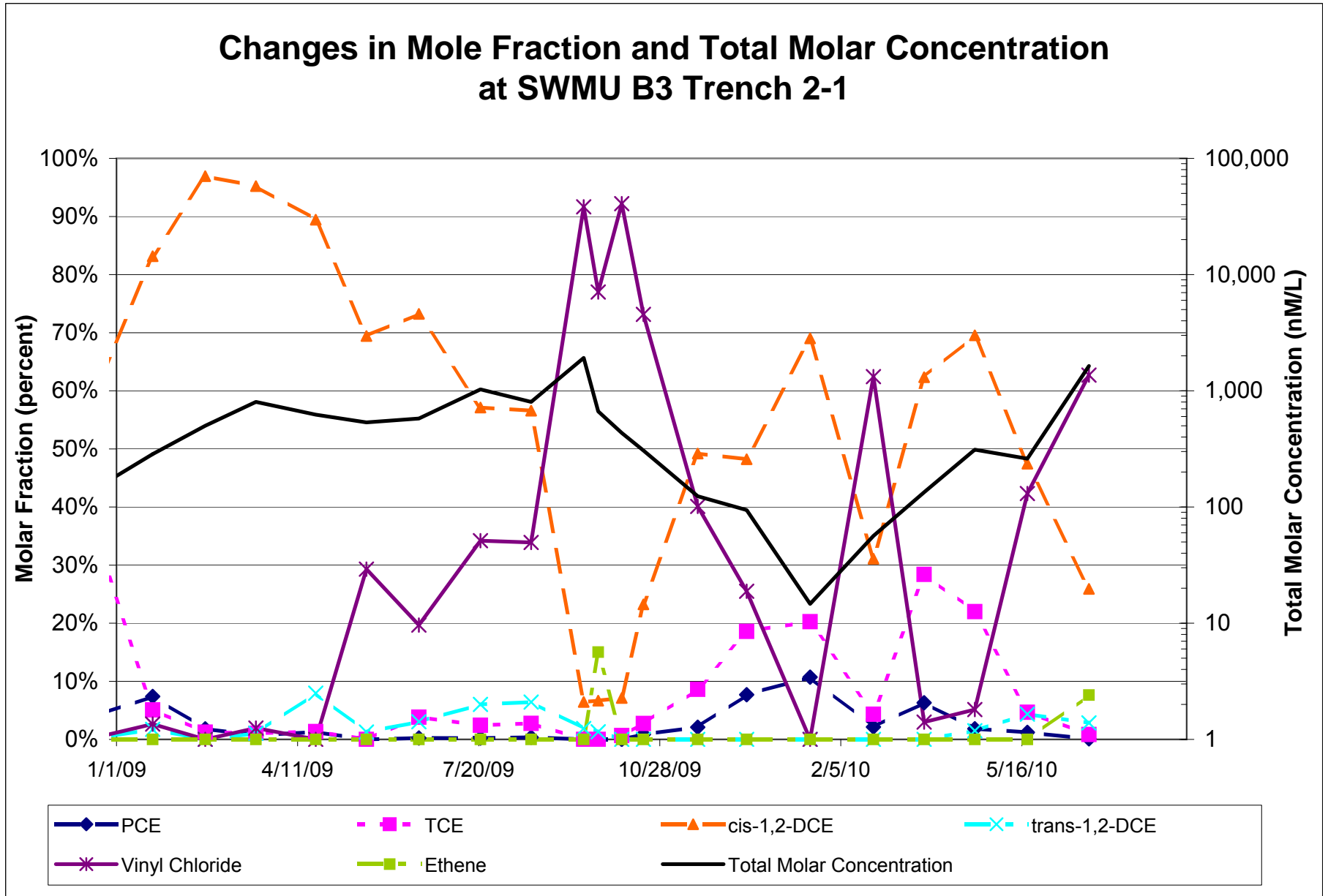


Figure 13.1.2T2-2

B-3 Bioreactor Trench 2 Sump 2 VOC Summary  
 Quarter 10 - Quarter 13

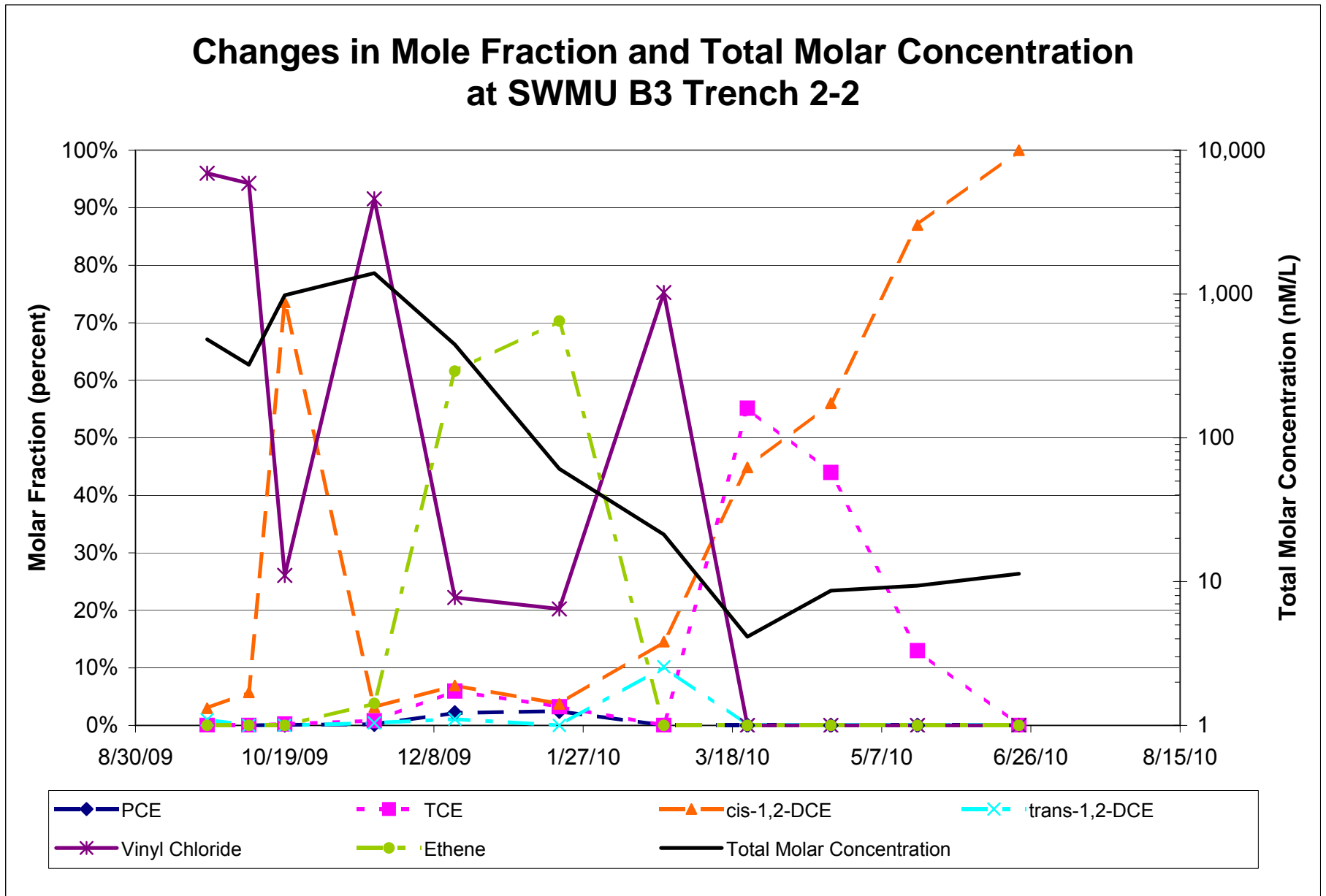


Figure 13.2.2a

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

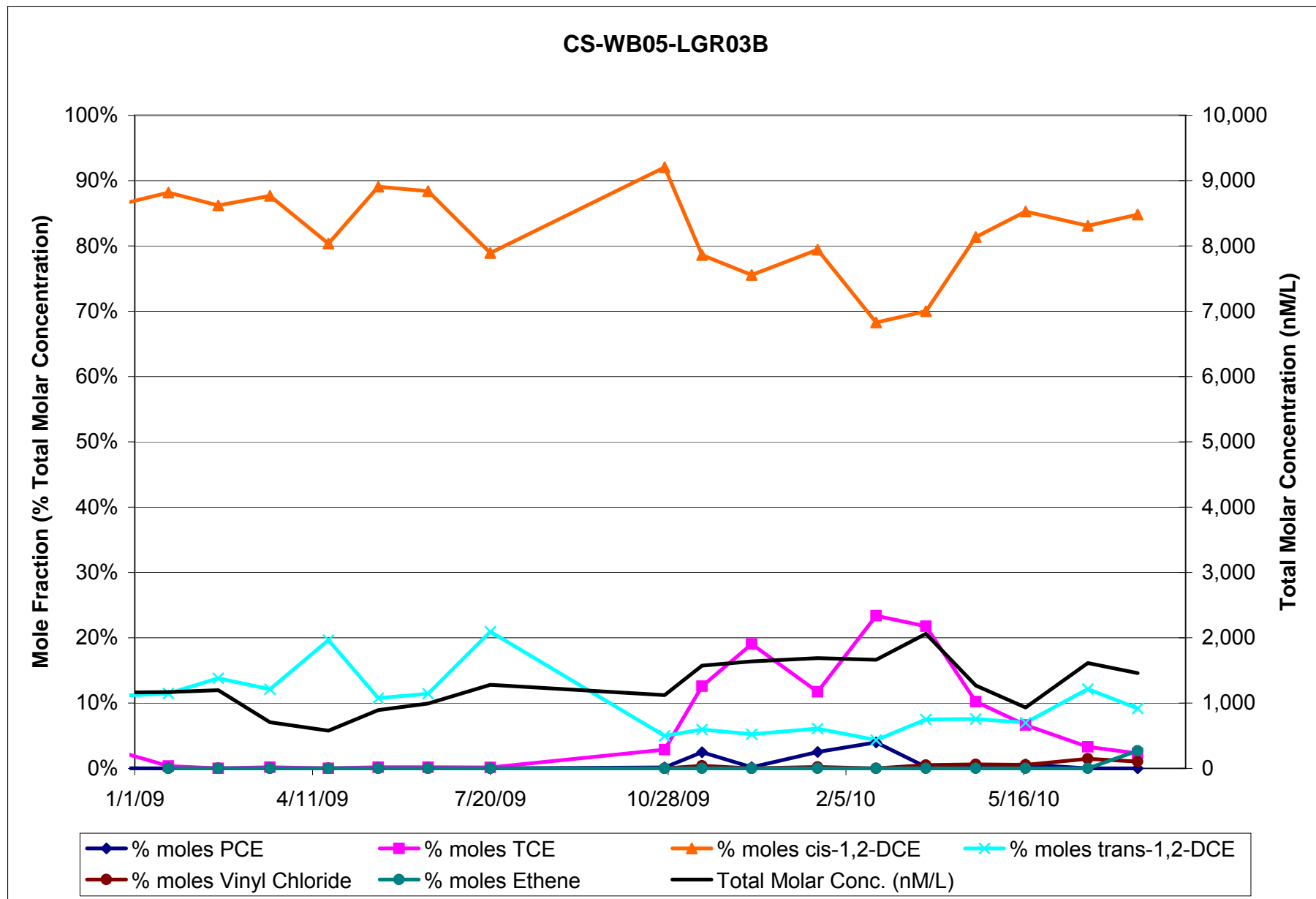


Figure 13.2.2b

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

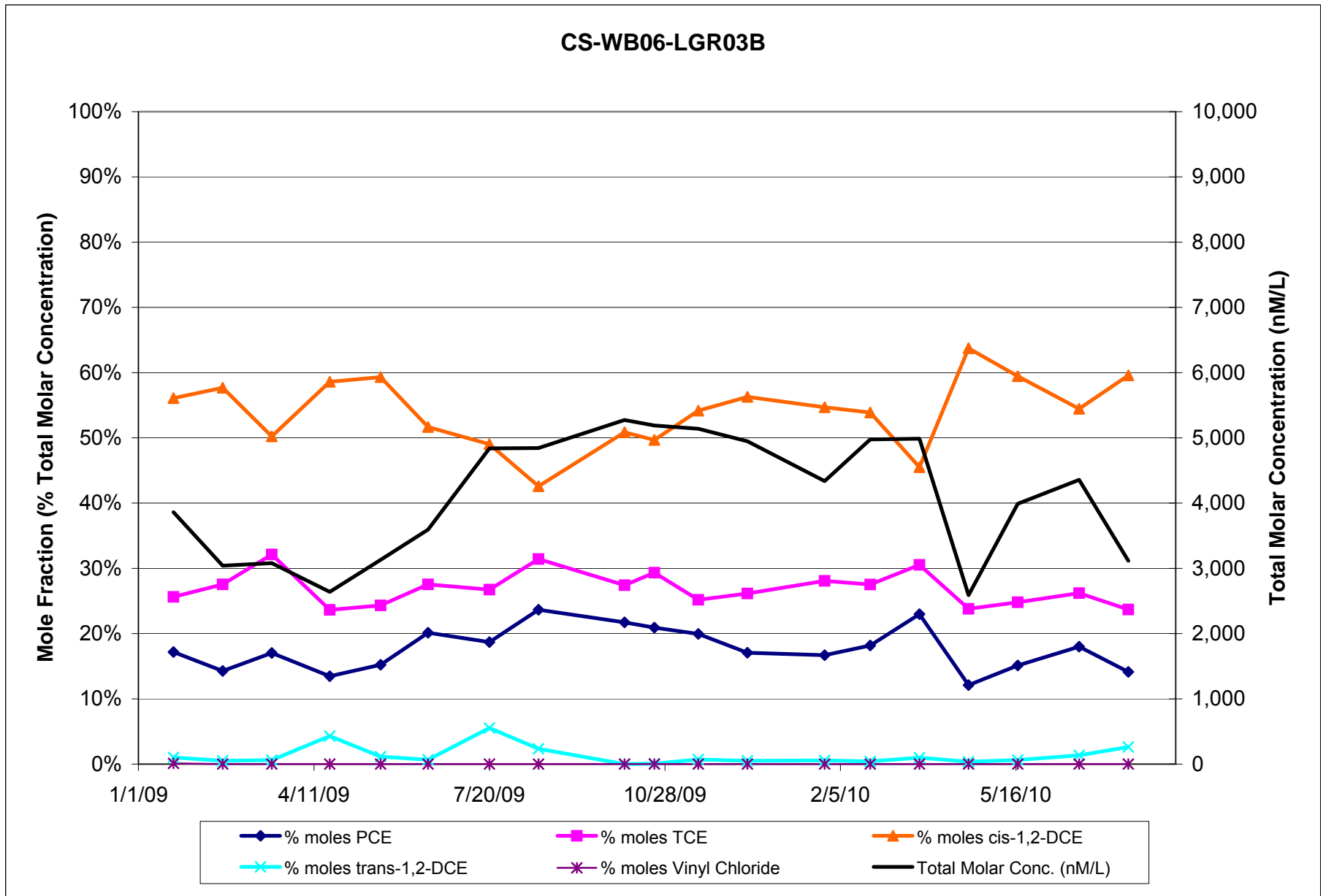




Figure 13.2.2c

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

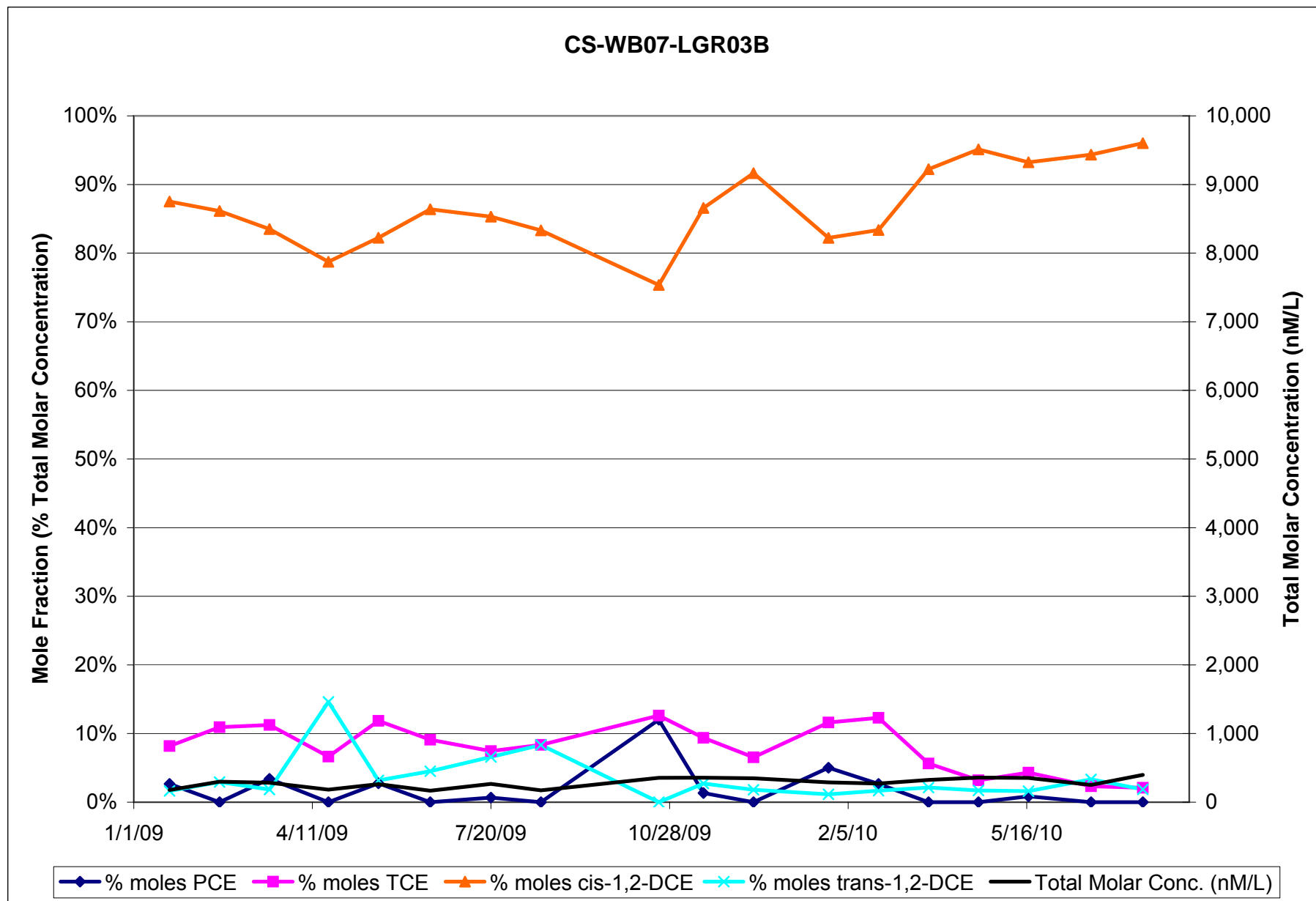


Figure 13.2.2d

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

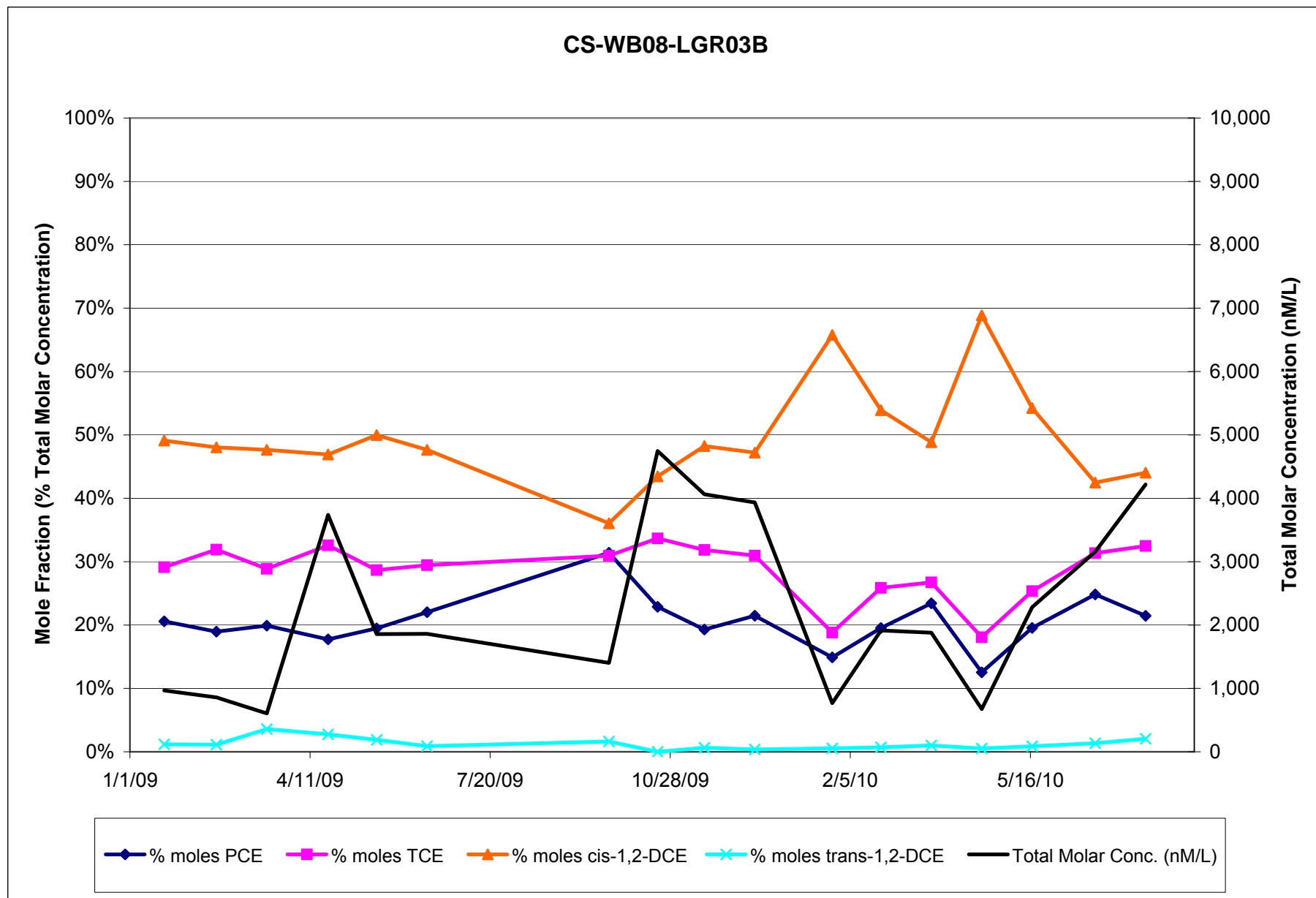


Figure 13.2.5

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

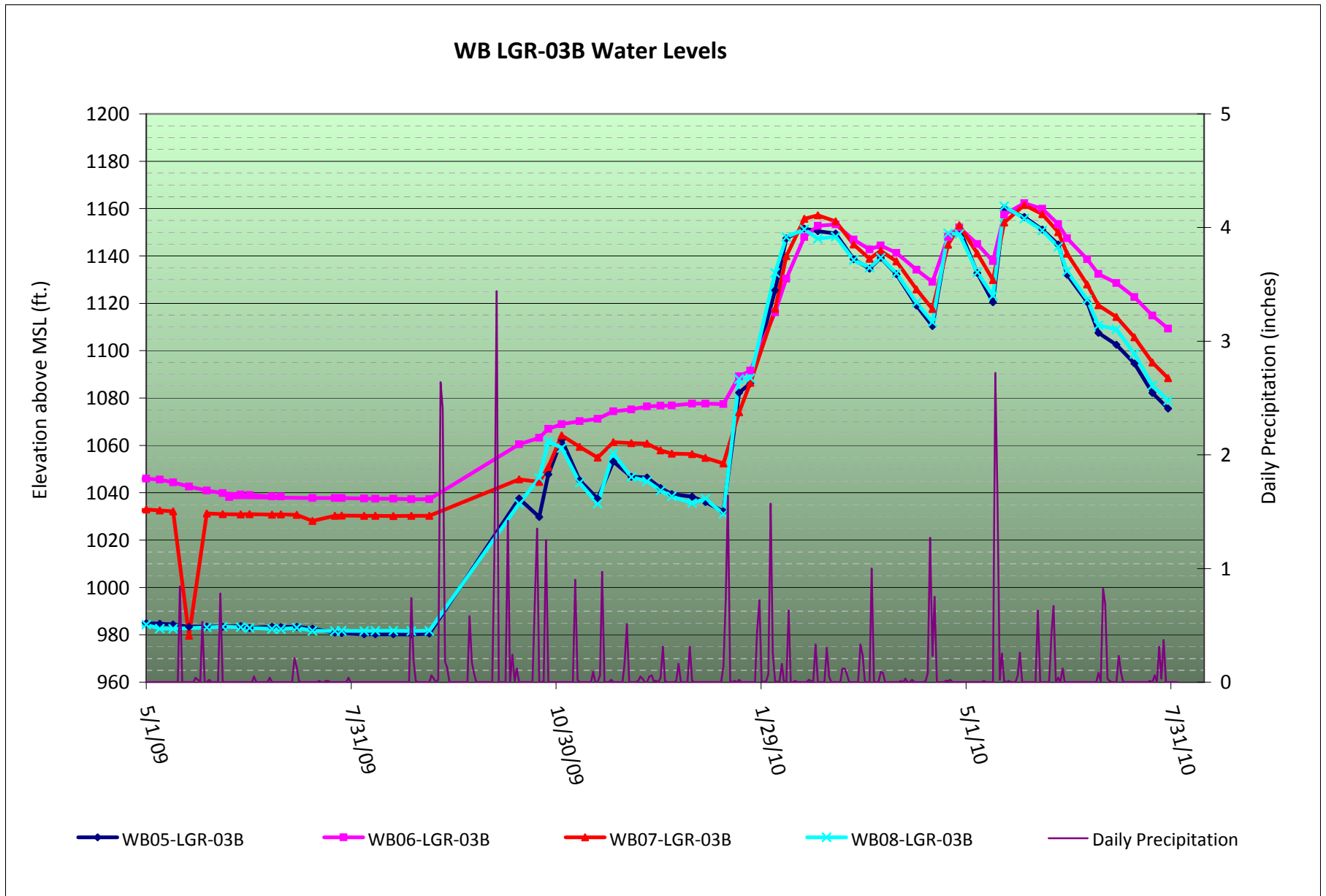


Figure 13.5.2

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

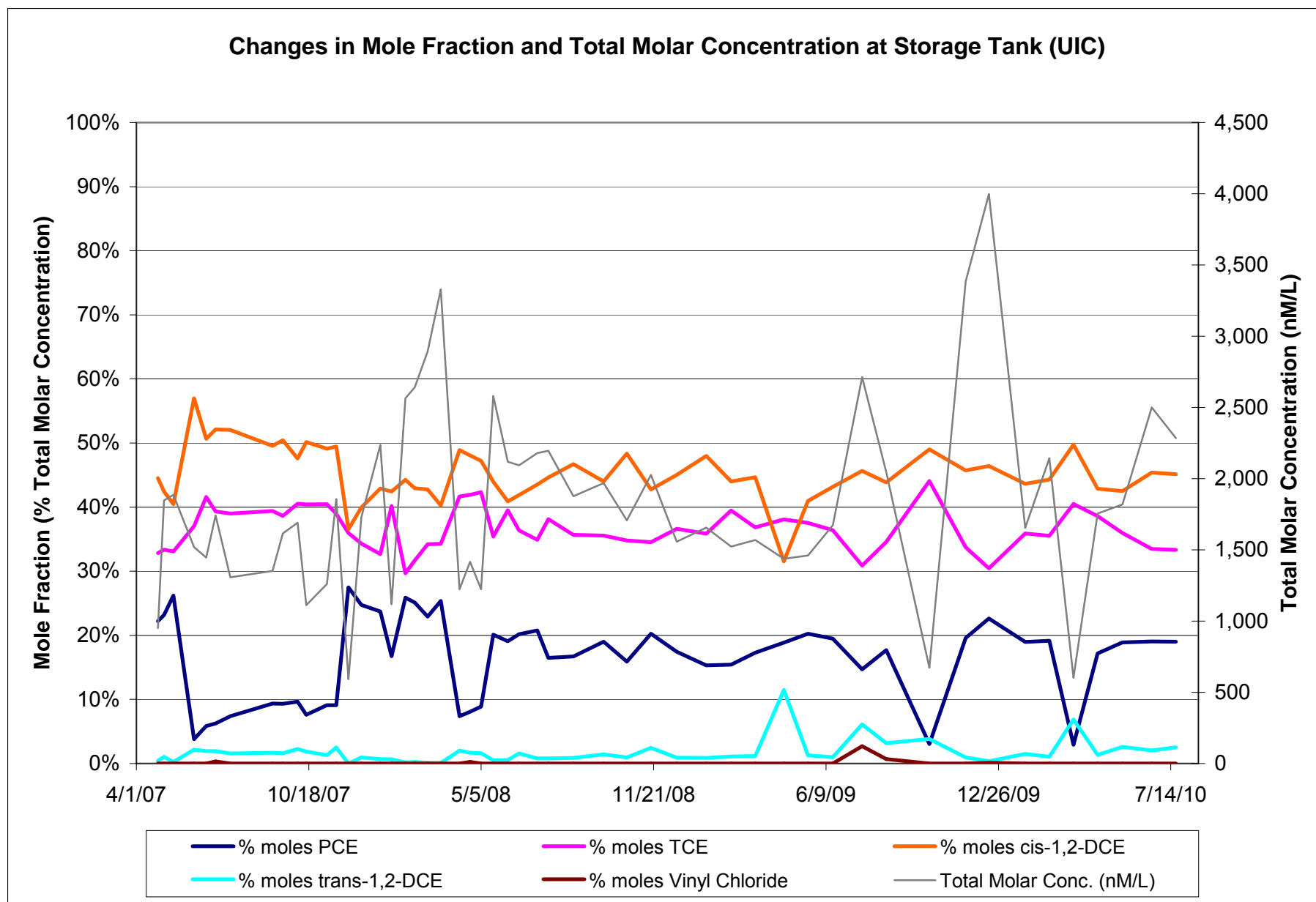


Figure 13.5.5

Cumulative Total Extracted Groundwater Applied to SWMU B3 Trenches  
May 2007 - July 2010

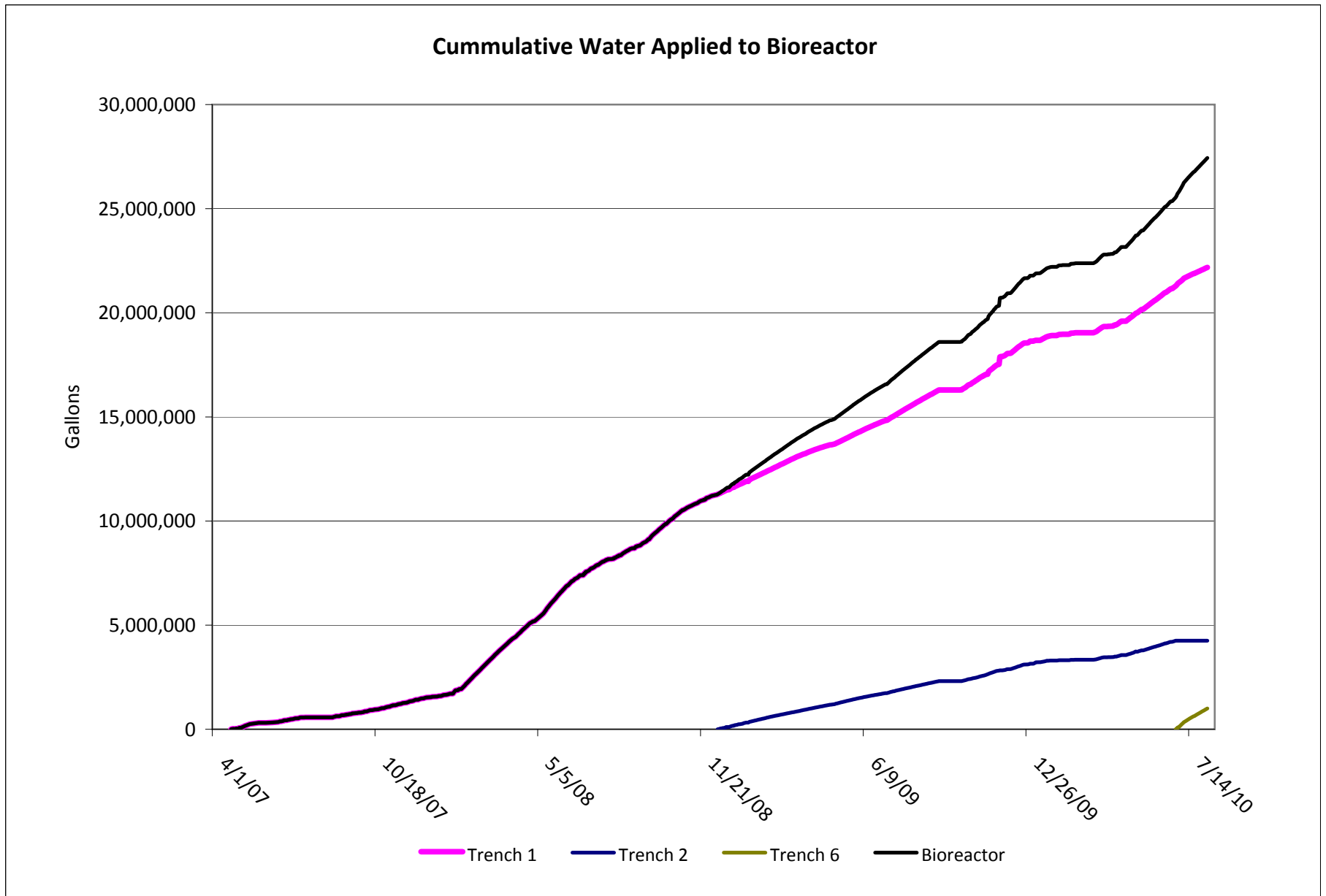
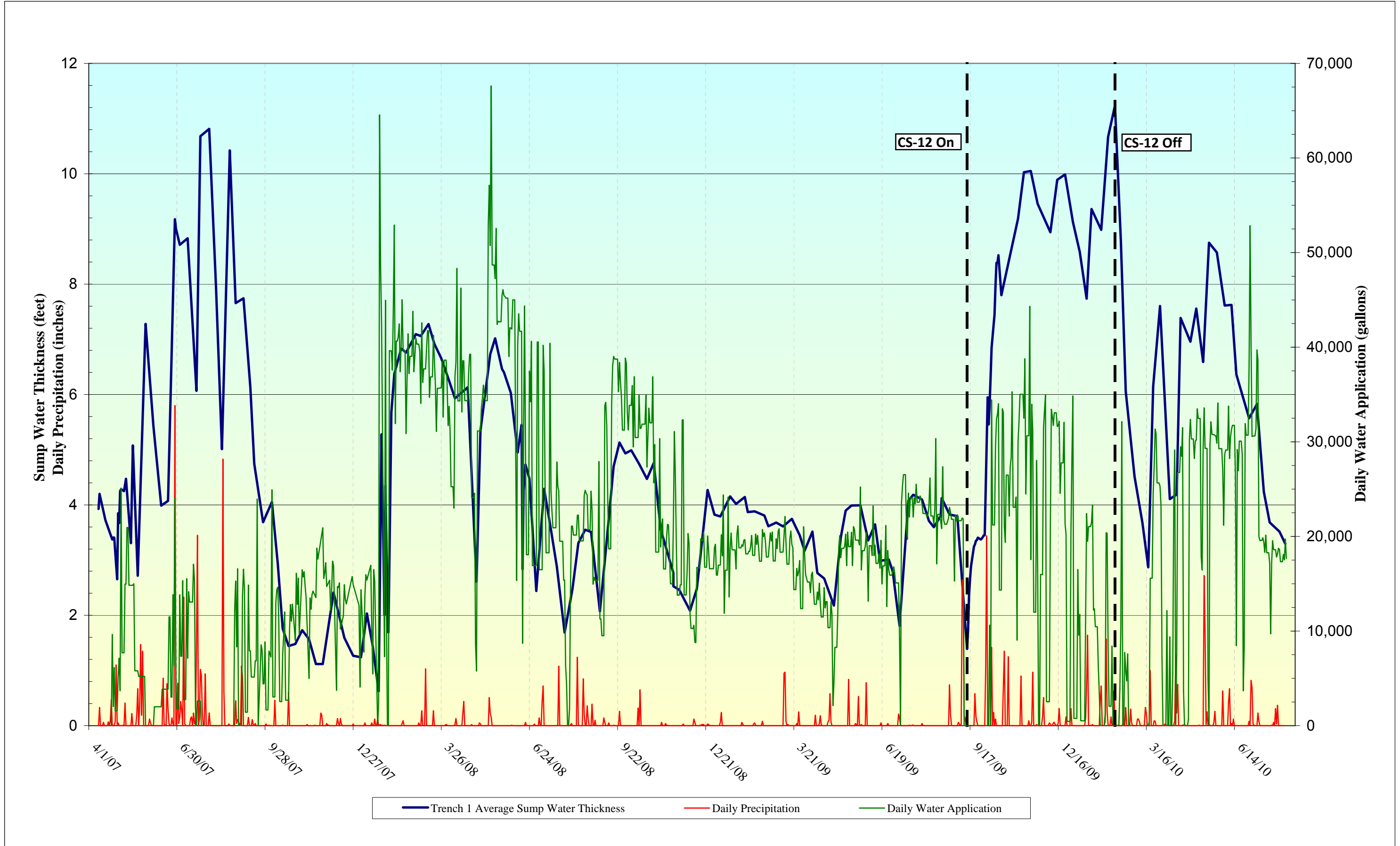


Figure 13.5.6

### SWMU B-3 Bioreactor - Trench 1 Average Water Thickness, CS-16 and CS-B3EXW01 Water Application, and Daily Precipitation



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

Figure 13.6.2EX1

CS-B3-EXW01 VOC summary through Quarter 13

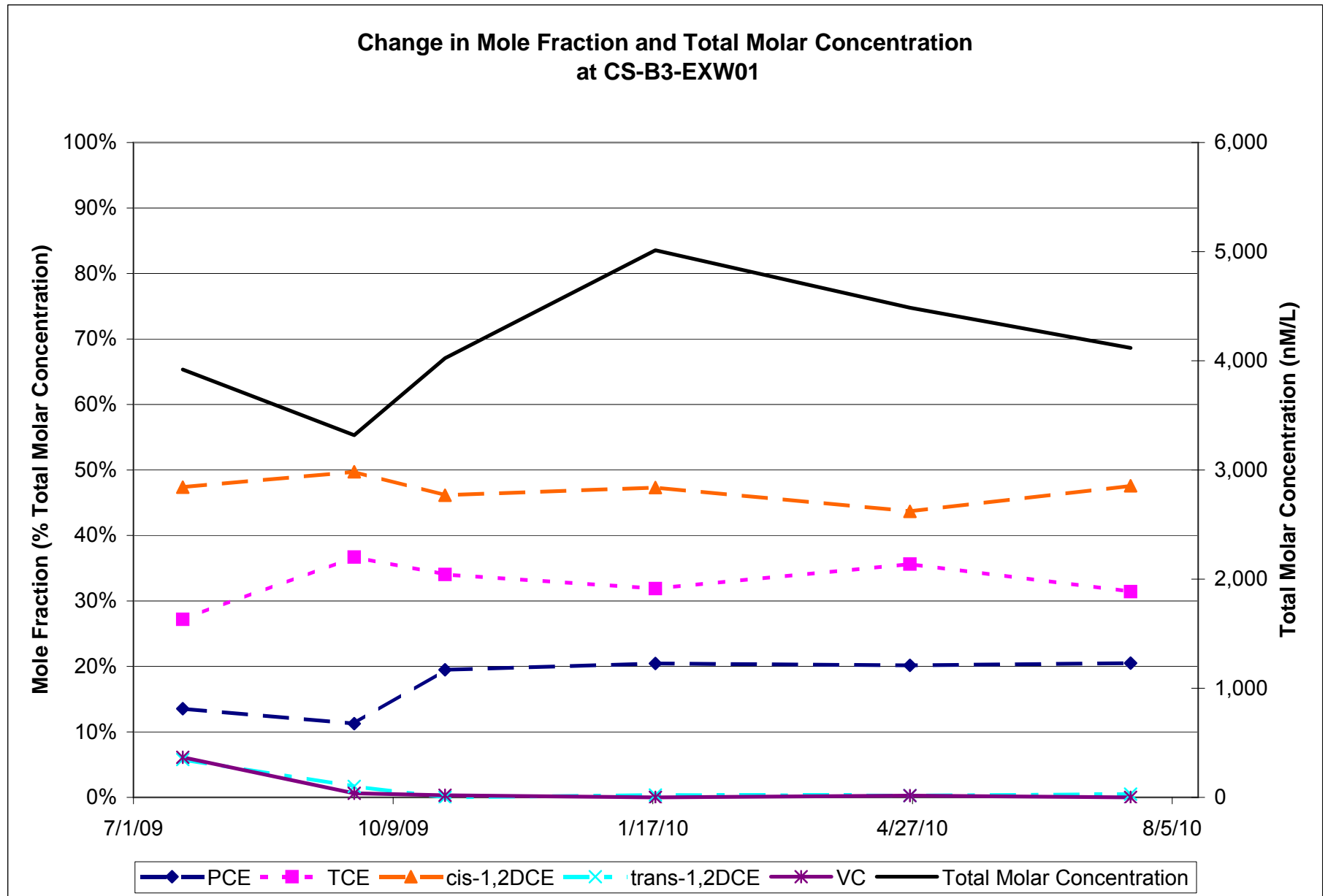


Figure 13.6.2LGR

CS-MW16-LGR VOC summary through Quarter 13

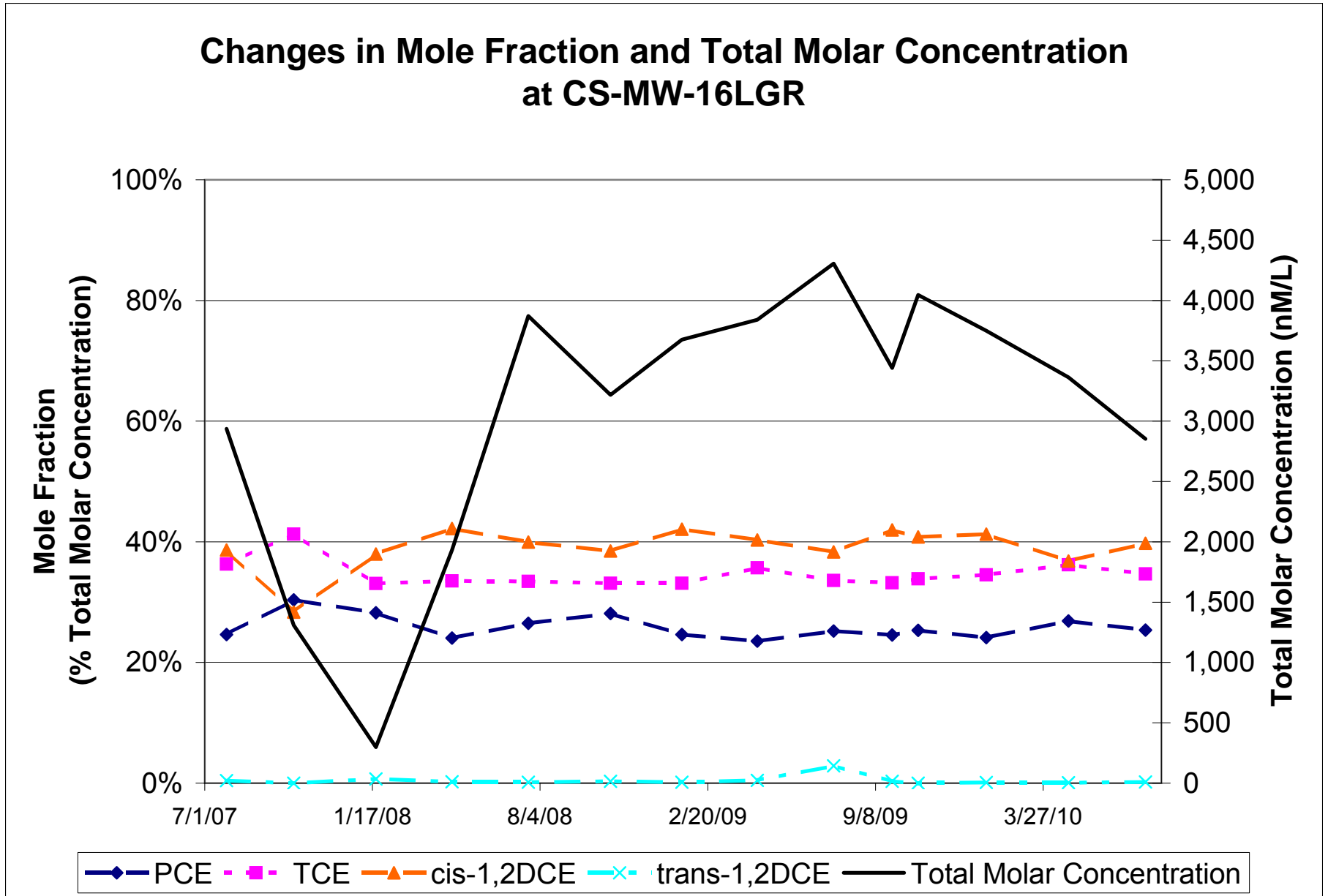
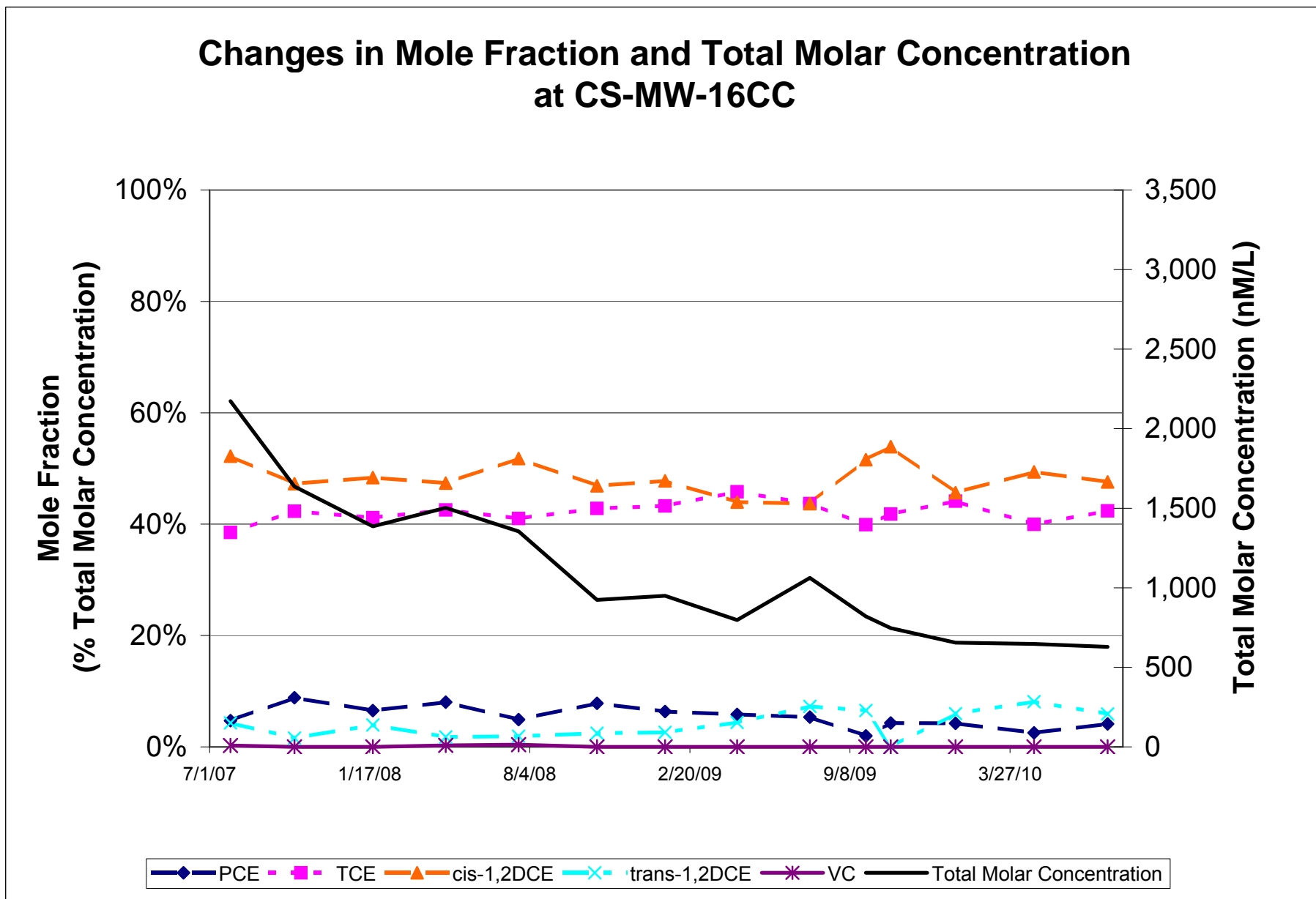


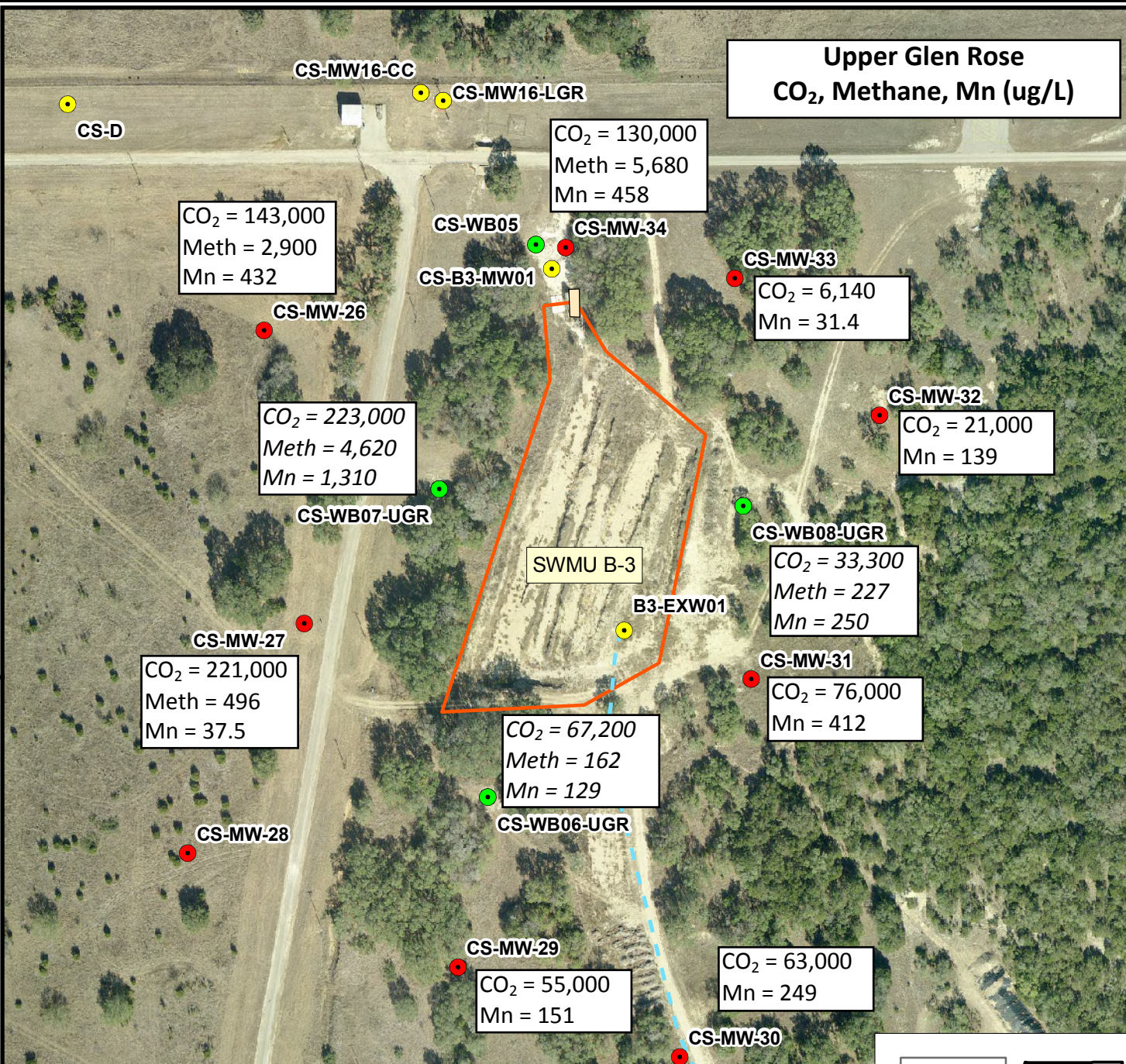


Figure 13.6.2CC

CS-MW16-CC VOC summary through Quarter 13



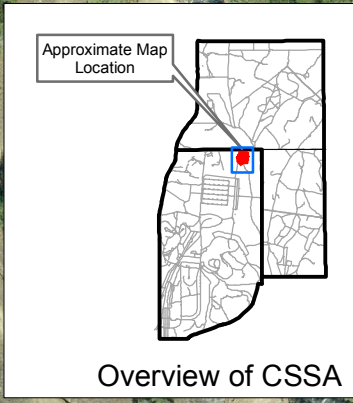
**Upper Glen Rose  
CO<sub>2</sub>, Methane, Mn (ug/L)**



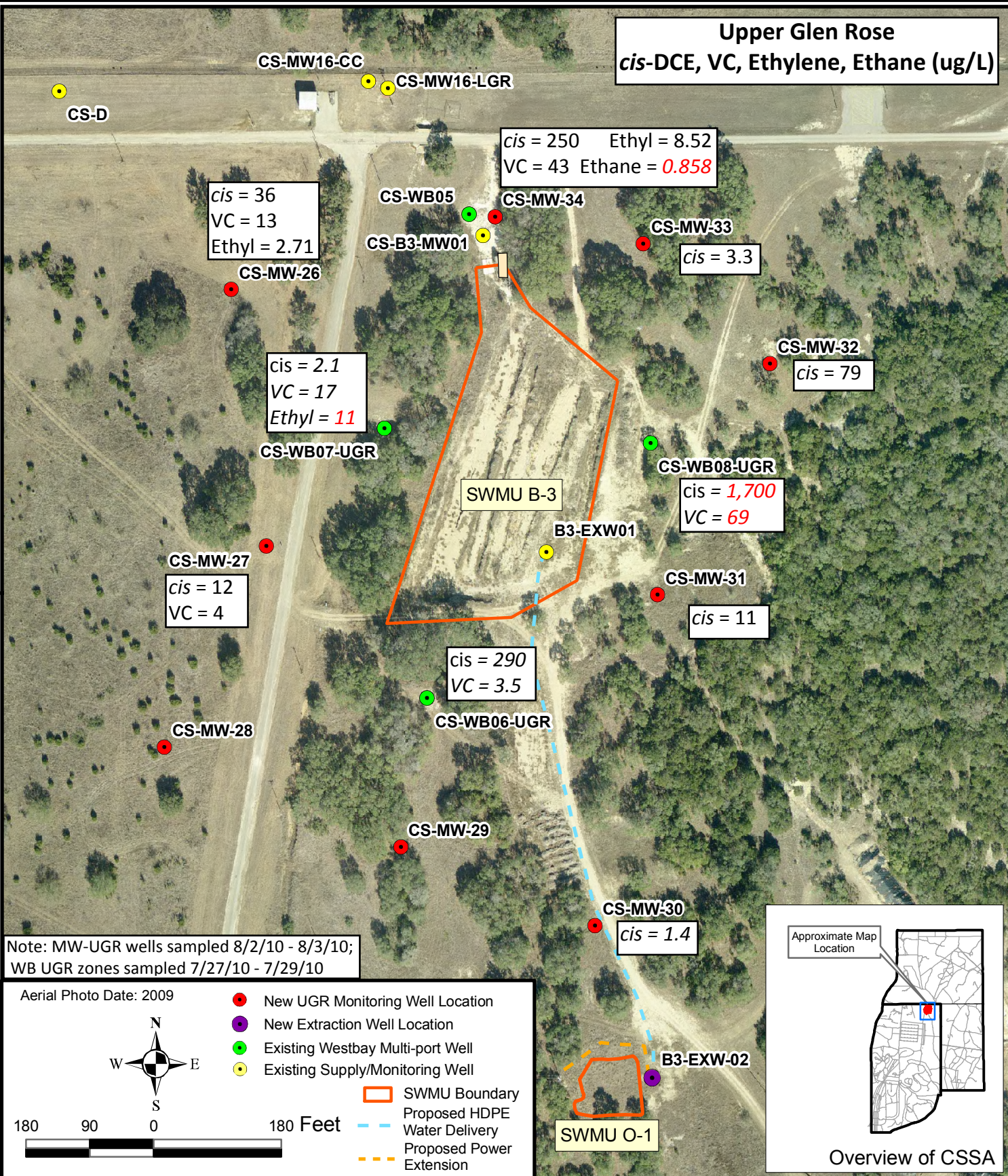
Note: MW-UGR wells sampled 8/2/10 - 8/3/10;  
WB UGR zones sampled 7/27/10 - 7/29/10

Aerial Photo Date: 2009

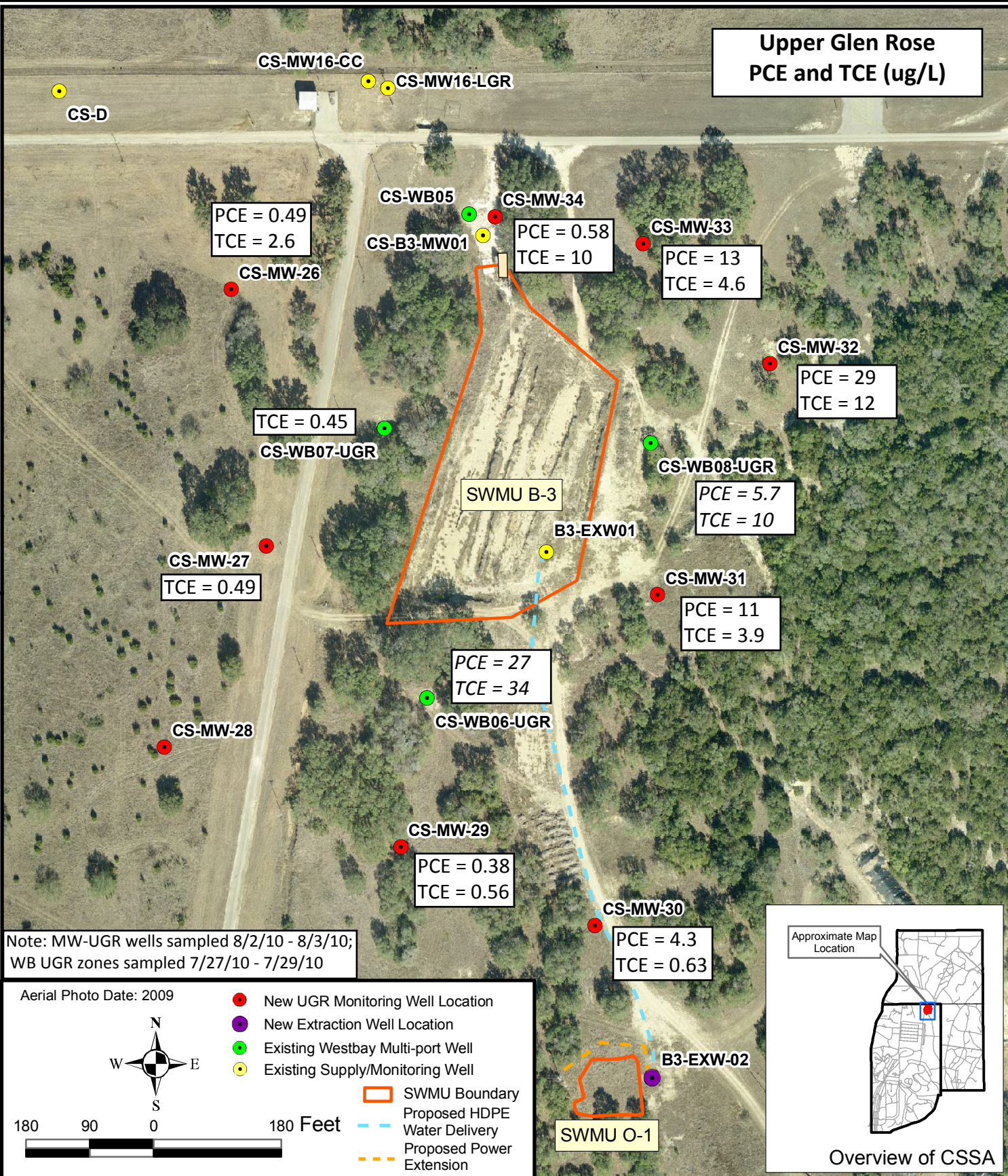
- New UGR Monitoring Well Location
- New Extraction Well Location
- Existing Westbay Multi-port Well
- Existing Supply/Monitoring Well
- SWMU Boundary
- Proposed HDPE Water Delivery
- Proposed Power Extension



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



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



## Tables





























Table 13.1.2

SWMU B-3 Trench 1 through 6 Quarter 13 - VOC Analytical Summary Table

Q13	B3 T1-1			B3 T1-2			B3 T1-3			B3 T2-1		B3 T2-2		B3T6-2
	Date	5/19/10	6/22/10	7/20/10	5/19/10	6/22/10	7/20/10	5/19/10	6/22/10	7/21/10	5/19/10	6/22/10	5/19/10	6/22/10
PCE (µg/L)	9.5	0.54	0.24	0	0	0	15	14	1.3	0.52	0.26	0	0	0
TCE (µg/L)	19	1.1	0.37	0.74	1.4	0.26	24	28	5.8	1.6	1.8	0.16	0	0
cis-1,2-DCE (µg/L)	29	58	6.5	2.8	26	2.1	29	51	33	12	41	0.79	1.1	5.0
trans-1,2-DCE (µg/L)	2.1	2.2	1.0	4.8	3.3	5.1	1.7	1.6	4.2	1.1	4.5	0	0	0.31
Vinyl Chloride (µg/L)	9.3	21	8.9	9.4	49	3.2	2.3	4.8	14	6.9	64	0	0	6.9
Ethene (µg/L)	0	3.6	2.9	12.5	7.0	1.6	0	0	5.4	0	3.5	0	0	1.5
PCE (nM/L)	57.288	3.256	1.447	0.000	0.000	0.000	90.454	84.424	7.839	3.136	1.568	0.000	0.000	0.000
TCE (nM/L)	144.608	8.372	2.816	5.632	10.655	1.979	182.662	213.106	44.143	12.177	13.700	1.218	0.000	0.000
cis-1,2-DCE (nM/L)	299.123	598.247	67.045	28.881	268.179	21.661	299.123	526.044	340.382	123.775	422.898	8.149	11.346	51.573
trans-1,2-DCE (nM/L)	21.661	22.692	10.315	49.510	34.038	52.604	17.535	16.503	43.321	11.346	46.416	0.000	0.000	3.198
Vinyl Chloride (nM/L)	148.776	335.946	142.377	150.376	783.875	51.192	36.794	76.788	223.964	110.382	1023.836	0.000	0.000	110.382
Ethene (nM/L)	0.000	128.342	103.387	445.633	249.554	57.041	0.000	0.000	192.513	0.000	124.777	0.000	0.000	53.476
Total Molar Conc. (nM/L)	671.455	1,096.855	327.387	680.032	1,346.302	184.477	626.569	916.865	852.163	260.817	1,633.195	9.366	11.346	218.629
% moles PCE	8.532%	0.297%	0.442%	0.000%	0.000%	0.000%	14.436%	9.208%	0.920%	1.202%	0.096%	0.000%	0.000%	0.000%
% moles TCE	21.536%	0.763%	0.860%	0.828%	0.791%	1.073%	29.153%	23.243%	5.180%	4.669%	0.839%	13.001%	0.000%	0.000%
% moles cis-1,2-DCE	44.548%	54.542%	20.479%	4.247%	19.920%	11.742%	47.740%	57.374%	39.943%	47.457%	25.894%	86.999%	100.000%	23.589%
% moles trans-1,2-DCE	3.226%	2.069%	3.151%	7.281%	2.528%	28.515%	2.799%	1.800%	5.084%	4.350%	2.842%	0.000%	0.000%	1.463%
% moles Vinyl Chloride	22.157%	30.628%	43.489%	22.113%	58.224%	27.750%	5.872%	8.375%	26.282%	42.322%	62.689%	0.000%	0.000%	50.488%
% moles Ethene	0.000%	11.701%	31.579%	65.531%	18.536%	30.920%	0.000%	0.000%	22.591%	0.000%	7.640%	0.000%	0.000%	24.460%
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%	100.0%
	Month 37	Month 38	Month 39	Month 37	Month 38	Month 39	Month 37	Month 38	Month 39	Month 37	Month 38	Month 37	Month 38	Month 39

Table 13.1.3

B-3 Analytical Summary - Quarter 13

Q13		B3																											
Well ID		T1-1						T1-2						T1-3						T2-1				T2-2				T6-2	
Sample Date		5/19/2010		6/22/2010		7/20/2010		5/19/2010		6/22/2010		7/20/2010		5/19/2010		6/22/2010		7/21/2010		5/19/2010		6/22/2010		5/19/2010		6/22/2010		7/22/2010	
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	Value	Flag
Dissolved Organic Carbon	mg/L	4.5		6.3		11.1		13.1		11		9.1		8.2		2.7		2.4		22.2		4.8		33.1		44.7		6.2	
Total Organic Carbon	mg/L	4.6		5.8		13.2		11.9		9.9		9.8		5.8		2.4		2.9		18.5		4.1		30.1		49.6		9.4	
Methane	µg/L	2,190		1,260		3,550		18,200		11,900		10,500		8.4		20.5		717		78.5		1,180		65,200		16,000		1,400	
Ethene	µg/L	0		3.6		2.9	J	12.5		7.0		1.6	J	0		0		5.4		0		3.5		0		0		1.5	J
Ethane	µg/L	0		0		0		0		0		5.0		0		0		0.90	J	0		0		0		0		0	
Carbon Dioxide	µg/L	103,000		87,300		359,000		427,000		190,000		238,000		12,300		40,600		207,000		79,100		119,000		3,280,000		1,200,000		383,000	
Alkalinity, Total (as CaCO3)	mg/L	395		350		470		497		586		413		275		295		391		443		383		823		1,040		489	
Nitrate/Nitrite	mg/L	0.509		0		0		0		0		0		0.239		0		0		0.52		0.031	J	0		0		0.036	J
Sulfate	mg/L	39.2		30.2		21.1		16		12.8		3.9		28.7		48.9		33.1		66.1		30		4.3	J	4.1	J	8.7	
Chloride	mg/L	13.5		14.5		15.4		9.9		14		15		9.5		14.7		15.7		7.4		14.6		15.7		16.2		16.1	
Ferrous Iron	mg/L	2.0		2.3		4.9		4.7		3.0		2.8		0.36	J	0		1.9		1.4		3.5		9.7		15.8		5.6	
Manganese	µg/L	451		231		299		340		292		330		106		88.9		138		463		418		1,560		1,490		212	
Hydrogen	nM/L					4.0		2.8		2.8		6.6						4.5		2.4		3.4						6.2	
Hydrogen Sulfide																													
Total Dissolved Solids	mg/L	400		392		570		494		407		495		279		388		476		559		436		886		1,090		544	
Benzene	µg/L	0		0		0		0		0		0		0		0		0.18	J	0		0		0		0		0	
Bromodichloromethane	µg/L	0		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		0	
Chloroform	µg/L	0		0		0		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		0		0		0	
Dichlorodifluoromethane	µg/L	0		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		0	
Dichloroethene, cis-1,2-	µg/L	29		58		6.5		2.8		26		2.1		29		51		33		12		41		0.79	J	1.1	J	5	
Dichloroethene, trans-1,2-	µg/L	2.1		2.2		1.0		4.8		3.3		5.1		1.7		1.6		4.2		1.1		4.5		0		0		0.31	J
Methylene chloride	µg/L	0		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		0	
Tetrachloroethene	µg/L	9.5		0.54	J	0.24	J	0		0		0		15		14		1.3	J	0.52	J	0.26	J	0		0		0	
Toluene	µg/L	0		0		0		0.23	J	0.19	J	0.28	J	0		0		0		0		0		1.1		3.0		1.0	J
Trichloroethene	µg/L	19		1.1		0.37	J	0.74	J	1.4		0.26	J	24		28		5.8		1.6		1.8		0.16	J	0		0	
Vinyl chloride	µg/L	9.3		21		8.9		9.4		49		3.2		2.3		4.8		14		6.9		64		0		0		6.9	
Arsenic	µg/L	0		0		7.1		0		2.7	J	6.1		0		0		6.4		0		0		7.2		10.5		0	
Barium	µg/L	259		118		112		133		104		109		296		65		70.8		152		135		902		345		79	
Cadmium	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Chromium	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Copper	µg/L	1.2	J	1.5	J	0		7.2		1.3	J	0		11.6		1.1	J	0		12.2		1.9	J	7.2		0		1.1	J
Lead	µg/L	0		0		0		0		0		0		1.6	J	0		0		0		0		0		0		0	
Mercury	µg/L	0		0.062	J	0		0		0		0		0		0		0		0		0		0		0		0	
Nickel	µg/L	0		0		0		0		0		0		3.5	J	0		0		1.8	J	0		2.7	J	2.1	J	0	
Zinc	µg/L	20.5	J	26.1	J	21.6	J	16.4	J	26.8	J	9.8	J	64.9		16.7	J	4.7	J	18.1	J	5.5	J	35	J	11.7	J	49.2	J
		Month 37		Month 38		Month 39		Month 37		Month 38		Month 39		Month 37		Month 38		Month 39		Month 37		Month 38		Month 37		Month 38		Month 39	

Note: 0 sample indicates a non-detect analyte value

Table 13.2.2

SWMU B-3 Westbay Monitoring Wells  
Upper Saturated Zone (Zone LGR03B) Analytical Results Summary Quarter 13

Q13	CS-WB05-LGR03B			CS-WB06-LGR03B			CS-WB07-LGR03B			CS-WB08-LGR03B		
	Date	5/17/10	6/21/10	7/19/10	5/17/10	6/21/10	7/19/10	5/17/10	6/21/10	7/20/10	5/17/10	6/21/10
PCE (µg/L)	0.94	0	0	100	130	73	0.5	0	0	74	130	150
TCE (µg/L)	8.1	7.0	4.4	130	150	97	2.0	0.77	1.1	76	130	180
cis-1,2-DCE (µg/L)	77	130	120	230	230	180	32	23	37	120	130	180
trans-1,2-DCE (µg/L)	6.3	19	13	2.4	5.7	7.9	0.55	0.81	0.72	1.9	4.1	8.4
Vinyl Chloride (µg/L)	0.31	1.5	0.94	0	0	0	0	0	0	0	0	0
Ethene (µg/L)	0	0	1.1	0	0	0	0	0	0	0	0	0
PCE (nM/L)	5.668	0.000	0.000	603.027	783.935	440.210	3.015	0.000	0.000	446.240	783.935	904.541
TCE (nM/L)	61.649	53.277	33.488	989.421	1141.639	738.260	15.222	5.860	8.372	578.431	989.421	1369.967
cis-1,2-DCE (nM/L)	794.224	1340.897	1237.751	2372.357	2372.357	1856.627	330.067	237.236	381.640	1237.751	1340.897	1856.627
trans-1,2-DCE (nM/L)	64.982	195.977	134.090	24.755	58.793	81.485	5.673	8.355	7.427	19.598	42.290	86.643
Vinyl Chloride (nM/L)	4.959	23.996	15.038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Ethene (nM/L)	0.000	0.000	39.216	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Molar Conc. (nM/L)</b>	931.48	1,614.15	1,459.58	3,989.56	4,356.72	3,116.58	353.98	251.45	397.44	2,282.02	3,156.54	4,217.78
% moles PCE	0.609%	0.000%	0.000%	15.115%	17.994%	14.125%	0.852%	0.000%	0.000%	19.555%	24.835%	21.446%
% moles TCE	6.618%	3.301%	2.294%	24.800%	26.204%	23.688%	4.300%	2.331%	2.106%	25.347%	31.345%	32.481%
% moles cis-1,2-DCE	85.265%	83.072%	84.802%	59.464%	54.453%	59.573%	93.245%	94.347%	96.025%	54.239%	42.480%	44.019%
% moles trans-1,2-DCE	6.976%	12.141%	9.187%	0.620%	1.349%	2.615%	1.603%	3.323%	1.869%	0.859%	1.340%	2.054%
% moles Vinyl Chloride	0.532%	1.487%	1.030%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
% moles Ethene	0.000%	0.000%	2.687%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%	0.000%
<b>sum % moles</b>	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 37	Month 38	Month 39	Month 37	Month 38	Month 39	Month 37	Month 38	Month 39	Month 37	Month 38	Month 39

Note: 0 sample indicates a non-detect analyte value

Table 13.2.3a

## SWMU B-3 Bioreactor Multi-port Well CS-WB05 - Q13 Performance Data

Q13		WB05																					
Well ID		CS-WB05-LGR01		CS-WB05-LGR02		CS-WB05-LGR03A		CS-WB05-LGR03B						CS-WB05-LGR04A		CS-WB05-LGR04B		CS-WB05-BS-01		CS-WB05-CC-01		CS-WB05-CC-02	
Sample Date		7/26/2010		7/26/2010		7/26/2010		5/17/2010		6/21/2010		7/19/2010		7/22/2010		7/22/2010		7/22/2010		7/21/2010		7/21/2010	
Compound	Units	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	1.4		1.4		1.4		1.8		1.0		1.1		1.2		3.2		1.4		3.5		1.0	
Total Organic Carbon	mg/L	0.65		1.2		2.6		0.34	J	1.0		1.8		1.6		3.4		2.7		2.6		1.6	
Methane	µg/L	3.5		448		225		214		632		847		585		16,300		15.2		14.4		2.7	
Ethene	µg/L	0		0		0		0		0		1.1	J	0		2.0	J	0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	61,800		66,900		26,600		34,600		56,700		52,800		17,700		81,700		10,900		33,500		19,700	
Alkalinity, Total (as CaCO3)	mg/L	370		330		316		326		320		315		316		380		285		278		277	
Nitrate/Nitrite	mg/L	0		0		0		0.10	B	0		0		0.046	J	0.054	J	0		0		0	
Sulfate	mg/L	90		86.3		45.1		42.6		41		44		17.6		2.1		30		79.8		91.7	
Chloride	mg/L	13.9		12.1		11.2		11.2		12.3		11.4		12.5		12.8		11.9		17.9		19	
Ferrous Iron	mg/L	0		0		0		0		0		0		0		2.8		0		0.16	J	0	
Manganese	µg/L	0		0		0		0		0		0		8.3		67.7		0		0		0	
Hydrogen	nM																						
Total Dissolved Solids	mg/L	528		482		395		364		395		395		368		411		348		431		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	
Dichloroethene, cis-1,2-	µg/L	1.1	J	33		130		77		130		120		470		260		54		3		37	
Dichloroethene, trans-1,2-	µg/L	0		5.4		18		6.3		19		13		16		13		2.1		0.28	J	1.3	
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		0.16	J	0.94	J	0		0		25		15		0		0.62	J	0	
Toluene	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	1		2.3		5.7		8.1		7.0		4.4		150		19		0		5.6		39	
Vinyl chloride	µg/L	0		0		1.3		0.31	J	1.5		0.94	J	16		300		2.1		0.74	J	1.1	
Arsenic	µg/L	0		0		0		0		4.6	J	6.8		0		19.3		0		6.1		7.1	
Barium	µg/L	31.5		49.2		30.9		30.4		30.2		28.3		30.9		22.6		30.9		21.2		20.4	
Cadmium	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Chromium	µg/L	6.5		2.7	J	1.6	J	2	J	0		0		0		0		1.4	J	1.6	J	0	
Copper	µg/L	0		0		0		1.3	J	2.4	J	0		4.3	J	2.2	J	4.2	J	0		0	
Lead	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Mercury	µg/L	0		0		0		0		0		0		0		0		0		0		0	
Nickel	µg/L	5.8		5.5		4.2	J	4.2	J	2.3	J	1.2	J	2.1	J	90		0		0.48	J	0	
Zinc	µg/L	41.1	J	19.1	J	74.3		19.6	J	22.5	J	43.5	J	45.5	J	43.3	J	40.8	J	22.7	J	44.3	J
		Q13- Month 39		Q13- Month 39		Q13- Month 39		Quarter 13						Q13- Month 39		Q13- Month 39		Q13- Month 39		Q13- Month 39		Q13- Month 39	

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

Table 13.2.3b

SWMU B-3 Bioreactor Multi-port Well CS-WB06 - Q13 Performance Data

Q13		WB06															
Well ID		CS-WB06-UGR01		CS-WB06-LGR01		CS-WB06-LGR02		CS-WB06-LGR03A		CS-WB06-LGR03B		CS-WB06-LGR04					
Sample Date		7/28/2010		7/28/2010		7/28/2010		7/28/2010		5/17/2010		6/21/2010		7/19/2010		7/28/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	5.2		1.8		1.3		1.5						0.94		1.6	
Total Organic Carbon	mg/L	3.5		2.7		1.9		2.1						1.2		2.4	
Methane	µg/L	162		0		1.1		0.50	J					0.80	J	0	
Ethene	µg/L	0		0		0		0						0		0	
Ethane	µg/L	0		0		0		0						0		0	
Carbon Dioxide	µg/L	67,200		36,500		24,700		9,140						15,500		23,100	
Alkalinity, Total (as CaCO3)	mg/L	328		340		294		303						299		298	
Nitrate/Nitrite	mg/L	0.36		0.37		0.039	J	0.047	J					0		0.97	
Sulfate	mg/L	25.8		22.6		26.6		19.8						19.4		11	
Chloride	mg/L	14.1		12.5		10		12.1						12.1		13	
Ferrous Iron	mg/L	0		0		0		0						0		0	
Manganese	µg/L	129		0		0		0						0		0	
Hydrogen	nM																
Total Dissolved Solids	mg/L	398		391		320		319		313		334		335		340	
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	
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	
Dichloroethene, cis-1,2-	µg/L	290		49		18		190		230		230		180		260	
Dichloroethene, trans-1,2-	µg/L	1.5		0.64		1.0		1.9		2.4		5.7		7.9		3.4	
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	27		27		5.4		75		100		130		73		150	
Toluene	µg/L	0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	34		27		7.6		100		130		150		97		140	
Vinyl chloride	µg/L	3.5		0.35	J	0		0		0		0		0		0	
Arsenic	µg/L	0		0		7.5		6.7						6.8		6.5	
Barium	µg/L	49.5		55.1		71.4		26.2						26.9		28	
Cadmium	µg/L	0		0		0		0.53	J					0		1.1	J
Chromium	µg/L	8.6		6.3		1.8	J	2.1	J					2.5	J	2.7	J
Copper	µg/L	13.7	B	15.7	B	0		4.0	J					0		0	
Lead	µg/L	0		0		0		0						0		0	
Mercury	µg/L	0		0		0		0						0		0	
Nickel	µg/L	11.7		7		0.66	J	2.7	J					1.9	J	0	
Zinc	µg/L	14.4	J	75.9		19.2	J	40.3	J					22.7	J	46.3	J
		Q13- Month 39		Q13- Month 39		Q13- Month 39		Q13- Month 39		Quarter 13				Q13- Month 39			

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

Table 13.2.3c

SWMU B-3 Bioreactor Multi-port Well CS-WB07 - Q13 Performance Data

Q13		WB07															
Well ID		CS-WB07-UGR01		CS-WB07-LGR01		CS-WB07-LGR-02		CS-WB07-LGR-03A		CS-WB07-LGR-03B						CS-WB07-LGR-04	
Sample Date		7/29/2010		7/29/2010		7/29/2010		7/29/2010		5/17/2010		6/21/2010		7/20/2010		7/29/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	4.7		1.8		1.1		1.4		0.61		1.1		1.2		1.0	
Total Organic Carbon	mg/L	4.8		0.70		0.27	J	0.57		0		1.6		1.4		0.87	
Methane	µg/L	4,620		0		0.70	J	15.7		1.9		4.2		5.9		0	
Ethene	µg/L	11		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	223,000		38,700		8,570		43,800		11,100		29,200		21,100		70,900	
Alkalinity, Total (as CaCO3)	mg/L	431		394		311		301		311		313		295		287	
Nitrate/Nitrite	mg/L	0.043	J	0.055	J	0		0		0.059	BJ	0		0		1.1	
Sulfate	mg/L	5.2		100		37.7		20.7		19.4		19.6		20.4		9.4	
Chloride	mg/L	16.3		18.5		13.4		10.3		10.1		11.1		10.3		12.3	
Ferrous Iron	mg/L	3.8		0.17	J	0.40	J	0.21	J	0		0.19	J	0		0	
Manganese	µg/L	1,310		0		0		0		0		0		0		0	
Hydrogen	nM																
Total Dissolved Solids	mg/L	486		560		383		325		304		337		336		340	
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	
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		0.38	J
Dichloroethene, cis-1,2-	µg/L	2.1		0		0		29		32		23		37		500	
Dichloroethene, trans-1,2-	µg/L	4.5		0		0		0.41	J	0.55	J	0.81		0.72		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	0		0.24	J	0		0.40	J	0.50	J	0		0		380	
Toluene	µg/L	0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	0.45	J	0.40	J	0		0.91	J	2.0		0.77	J	1.1		440	
Vinyl chloride	µg/L	17		0		0		0		0		0		0		0	
Arsenic	µg/L	7.5		4.8	J	4.1	J	6.3		0		3.3	J	7.9		5.5	
Barium	µg/L	94.7		101		98.8		32.5		32.5		35.7		31.9		30.2	
Cadmium	µg/L	0.69	J	0		0		0		0		0		0		1.1	J
Chromium	µg/L	7.1		24		11.1		2	J	2.8	J	3.9	J	1.7	J	2.2	J
Copper	µg/L	0		0		0		0		1.3	J	3.3	J	0		0	
Lead	µg/L	0		0		0		0		0		0		0		0	
Mercury	µg/L	0		0		0		0		0		0		0		0	
Nickel	µg/L	4.1	J	17.4		4.5	J	0		1.7	J	1.6	J	0		0.61	J
Zinc	µg/L	25.2	J	30.5	J	61.9		17	J	12.6	J	26.9	J	15.9	J	24.4	J
		Q13 - Month 39		Q13 - Month 39		Q13 - Month 39		Q13 - Month 39		Quarter 13						Q13 - Month 39	

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

Note: Dry zones including UGR-01 were not sampled during the quarterly sampling event.

Table 13.2.3d

SWMU B-3 Bioreactor Multi-port Well CS-WB08 - Q13 Performance Data

Q13		WB08															
Well ID		CS-WB08-UGR01		CS-WB08-LGR01		CS-WB08-LGR02		CS-WB08-LGR03A		CS-WB08-LGR03B						CS-WB08-LGR04	
Sample Date		7/27/2010		7/27/2010		7/27/2010		7/27/2010		5/17/2010		6/21/2010		7/19/2010		7/27/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	2.3		1.2		0.96		1.3						1.5		2.3	
Total Organic Carbon	mg/L	2.2		1.0		0.79		2.3						2.3		2.9	
Methane	µg/L	227		0		1.2		0						0		0	
Ethene	µg/L	0		0		0		0						0		0	
Ethane	µg/L	0		0		0		0						0		0	
Carbon Dioxide	µg/L	33,300		24,000		27,300		9,680						5,710	J	29,800	
Alkalinity, Total (as CaCO3)	mg/L	422		345		352		313						313		341	
Nitrate/Nitrite	mg/L	0.11		0		0		0.67						0.60		0.19	
Sulfate	mg/L	19.7		93		104		15						15.2		22.5	
Chloride	mg/L	16.5		11.5		12.4		12.5						13.1		14.7	
Ferrous Iron	mg/L	0		0		0.18	J	0						0		0	
Manganese	µg/L	250		3.2	J	0		0						0		11.4	
Hydrogen	nM																
Total Dissolved Solids	mg/L	479		514		536		359		357		370		370		416	
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		0.15	J	0.11	J	0.12	J	0.14	J	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	0.81	J	0		0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	1,700		87		4.2		150		120		130		180		120	
Dichloroethene, trans-1,2-	µg/L	10		4.4		0		1.9		1.9		4.1		8.4		0.71	
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	5.7		3.3		2.7		95		74		130		150		11	
Toluene	µg/L	0.19	J	0		0		0		0		0		0		0	
Trichloroethene	µg/L	10		6.3		2.9		120		76		130		180		20	
Vinyl chloride	µg/L	69		0.33	J	0		0		0		0		0		0.40	J
Arsenic	µg/L	6.7		0		0		0						4.6	J	0	
Barium	µg/L	43.3		106		68.9		36.6						36.7		45.1	
Cadmium	µg/L	0.76	J	0		0		0						0.57	J	0	
Chromium	µg/L	5.8		11.6		0		1.8	J					3.9	J	5.2	
Copper	µg/L	0		18.7	B	19.9	B	24.2	B					0		36.6	B
Lead	µg/L	0		0		0		1.6	J					0		2.4	J
Mercury	µg/L	0		0		0		0						0		0	
Nickel	µg/L	12.6		10.4		3.5	J	5.5						2.2	J	6.6	
Zinc	µg/L	81.2		15.1	J	22.8	J	21.3	J					33.9	J	19.7	J
		Q13- Month 39		Q13- Month 39		Q13- Month 39		Q13- Month 39		Quarter 13						Q13- Month 39	

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



Table 13.3.3

B-3 Bioreactor Monitoring Well Analytical Summary - Quarter 13

Q13		Monitoring Wells											
Well ID		CS-MW16-LGR		CS-MW1-LGR		CS-D		CS-B3-MW01		CS-MW16-CC		B3-EXW01	
Sample Date		7/27/2010		7/29/2010		7/29/2010		7/29/2010		7/27/2010		7/23/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	0.51		1.9		0.99		7.0		1.3		0.93	
Total Organic Carbon	mg/L	0.52		0.97		1.1		4.8		0.63		0.62	
Methane	µg/L	3.0		0		0		260,000		5		0	
Ethene	µg/L	0		0		0		3.6		0		0	
Ethane	µg/L	0		0		0		0		0		0	
Carbon Dioxide	µg/L	42,100		39,100		39,800		1,190,000		25,300		35,300	
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	275		266		263		979		279		284	
Nitrate/Nitrite	mg/L	1.3		0.85		0.94		0.085	J	0.044	J	1.1	
Sulfate	mg/L	19.1		14.1		15.1		1.1		66.9		10.3	
Chloride	mg/L	12		9.4		11.1		13.2		16.9		11.6	
Ferrous Iron	mg/L	0		0		0		7.5		0.20	J	0	
Manganese	µg/L	0		0		0		198		0		0	
Hydrogen	nM	4.8		7.2		3.9		6.0		6.2		98	
Total Dissolved Solids	mg/L	339		311		330		633		398		341	
Benzene	µg/L	0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0	
Chloroform	µg/L	0.14	J	0.12	J	0		0		0		0.19	J
Dibromochloromethane	µg/L	0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	110		25		140		2.2		29		190	
Dichloroethene, trans-1,2-	µg/L	0.51	J	0.38	J	1.6		1.3		3.6		2.0	
Methylene chloride	µg/L	0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0	
Tetrachloroethene	µg/L	120		19		130		0		4.3		140	
Toluene	µg/L	0		0		0		0		0		0	
Trichloroethene	µg/L	130		34		160		0		35		170	
Vinyl chloride	µg/L	0		0		0		220		0		0	
Arsenic	µg/L	0		7.1		5.3		7.2		0		0	
Barium	µg/L	36.1		32.5		31.3		250		21.9		29.1	
Cadmium	µg/L	0		1.0	J	0.74	J	0		0		0	
Chromium	µg/L	0		1.8	J	0		1.7	J	0		0	
Copper	µg/L	52.4	B	0		0		0		18.8	B	6.2	
Lead	µg/L	4.4	J	0		0		5.8		0		2.1	J
Mercury	µg/L	0		0		0		0		0		0	
Nickel	µg/L	3.2	J	2.5	J	0		4.4	J	4.9	J	0.59	J
Zinc	µg/L	76.1		27.5	J	23.9	J	50.5		21.1	J	714	

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

Table 13.4.4

## SWMU B-3 Sump and Monitoring Well Microbial Data Quarter 13

Q13	Sample Location	B3 T1-2	B3 T6-1	CS-MW27-UGR
Analysis	Sample date:	7/20/2010	7/20/2010	5/192010
<b>Dechlorinating Bacteria</b>	units			
<i>Dehalococcoides spp (1)</i>	(cells/mL)	1.52E+03	3.52E+03	6.50E+00
<b>Functional Genes</b>	units			
TCE R-Dase (1)	(cells/mL)	5.66E+02	4.27E+02	<5.00E-01
BAV1 VC R-Dase (1)	(cells/mL)	2.00E-01J	1.49E+01	<5.00E-01
VC R-Dase	(cells/mL)	1.13E+03	2.14E+03	<5.00E-01

Table 13.5.2

B3 - UIC Analytical Results  
February - July 2010

	Sample ID			B3-UIC			B3-UIC			B3-UIC			B3-UIC			B3-UIC					
	Sample Date			02/23/10			03/23/10			04/20/10			05/19/10			06/22/10			07/20/10		
	Sample Type			N1			N1			N1			N1			N1			N1		
Sampling Method			Grab			Grab			Grab			Grab			Grab			Grab			
Lab ID			AY11832			AY13402			AY14479			AY15780			AY17148			AY18286			
	B-3 UIC			Results	Flags	Dilution	Results	Flags	Dilution	Results	Flags	Dilution	Results	Flags	Dilution	Results	Flags	Dilution			
	Lab	MDL	PQL																Criteria (RCRA Haz.)		
<b>SW8260B (µg/L)</b>																					
Cis-DCE	0.16	1.2	--	92		1	29		1	73		1	75		1	110		1			
Trans-DCE	0.19	0.6	--	2.2		1	4.0		1	2.3		1	4.6		1	5.0		1			
TCE	0.16	1.0	500.	100		1	32		1	89		1	86		1	110		1			
PCE	0.15	1.4	700.	68		1	2.9		1	50		1	57		1	79		1			
Toluene	0.17	1.1	--	0.17	U	1	0.17	U	1	0.17	U	1	0.17	U	1	0.17	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	0.23	U	1			
<b>EPA 160.1 (mg/L)</b>																					
TDS	4.4	10.	--	397		1	393		1	350		1	308		1	363		1			
<b>Field measured</b>																					
pH				7.06			7.40			7.30			7.22			7.21					

Tables present all laboratory results for analytes.  
Data packages for laboratory analysis 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 Qualifiers:**  
J- The analyte was positively identified, the quantitation is an estimation.  
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 13.5.3

SWMU B3-UIC Analytical Summary Table  
Quarter 12 - Quarter 13

Q13		B3-UIC											
Well ID		B3-UIC		B3-UIC		B3-UIC		B3-UIC		B3-UIC		B3-UIC	
Sample Date		2/23/2010		3/23/2010		4/20/2010		5/19/2010		6/22/2010		7/20/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Total Dissolved Solids	mg/L	397		393		350		308		363		364	
Benzene	µg/L	0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0	
Chloroform	µg/L	0.086	J	0		0		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	92		29		73		75		110		100	
Dichloroethene, trans-1,2-	µg/L	2.2		4.0		2.3		4.6		5.0		5.6	
Methylene chloride	µg/L	0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0	
Tetrachloroethene	µg/L	68		2.9		50		57		79		72	
Toluene	µg/L	0		0		0		0		0		0	
Trichloroethene	µg/L	100		32		89		86		110		100	
Vinyl chloride	µg/L	0		0		0		0		0		0	

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

Table 13.6.2

Extraction Well VOC summary  
Quarter 13

Q13 Well ID	Extraction Wells		
	16 LGR	16 CC	B3-EXW01
Date	7/27/10	7/27/10	7/20/10
PCE (µg/L)	120	4.3	140
TCE (µg/L)	130	35	170
cis-1,2-DCE (µg/L)	110	29	190
trans-1,2-DCE (µg/L)	0.51	3.6	2.0
Vinyl Chloride (µg/L)	0	0	0
Ethene (µg/L)	0	0	0

PCE (nM/L)	723.633	25.930	844.238
TCE (nM/L)	989.421	266.383	1293.858
cis-1,2-DCE (nM/L)	1134.605	299.123	1959.773
trans-1,2-DCE (nM/L)	5.260	37.133	20.629
Vinyl Chloride (nM/L)	0.000	0.000	0.000
Ethene (nM/L)	0.000	0.000	0.000
<b>Total Molar Conc. (nM/L)</b>	<b>2,852.919</b>	<b>628.568</b>	<b>4,118.498</b>

% moles PCE	25.365%	4.125%	20.499%
% moles TCE	34.681%	42.379%	31.416%
% moles cis-1,2-DCE	39.770%	47.588%	47.585%
% moles trans-1,2-DCE	0.184%	5.907%	0.501%
% moles Vinyl Chloride	0.000%	0.000%	0.000%
% moles Ethene	0.000%	0.000%	0.000%
<b>sum % moles</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Note: 0 sample indicates a non-detect analyte value





















Table 13.7.3

B-3 Bioreactor Shallow UGR Well Analytical Summary - Quarter 13

Q13		Shallow UGR Wells																	
Well ID		B3-MW26-UGR				B3-MW27-UGR				B3-MW29-UGR				B3-MW30-UGR					
Sample Date		6/23/2010		8/2/2010		5/19/2010		6/23/2010		8/2/2010		6/23/2010		8/2/2010		6/23/2010		8/2/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	1.9		2.4				2.8		2.4		2.7		3.5		1.6		2.5	
Total Organic Carbon	mg/L	2.2		2.3				4.6		2.4		2.2		2.0		1.9		3.2	
Methane	µg/L	1,930		2,900		1,090		3,440		496		1.2		0		0		0	
Ethene	µg/L	3.3		2.71		0		2.3	J	0.0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	97,000		143,000		60,900		172,000		221,000		27,500		55,000		26,600		63,000	
Alkalinity, Total (as CaCO3)	mg/L	415		418				455		429		284		347		391		3310	
Nitrate/Nitrite	mg/L	0		0				0		0		0.37		0		0.67		0.54	
Sulfate	mg/L	21.8		32.0				16		16		33.5		34		29		41	
Chloride	mg/L	19.4		19.0				16.7		18.0		18.6		20.4		11.8		13.3	
Ferrous Iron	mg/L	0.20	J	1.20		0		1.7		3.2		0.31	J	1.3		0.80	J		
Manganese	µg/L	159		432		23.2		69.2		37.5		61.4		151		57.6		249	
Hydrogen	nM																		
Total Dissolved Solids	mg/L	483		493				388		494		509		396		439		471	
Benzene	µg/L	0		0		0		0		0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0		0		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	46		36		2.9		9.7		12		0		0		0.64	J	1.4	
Dichloroethene, trans-1,2-	µg/L	3.1		2.6		0.37	J	2.2		1.1		0		0		0		0	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0		0		0		0	
Tetrachloroethene	µg/L	0.19	J	0.49	J	0.18	J	0		0		0.70	J	0.38	J	3.8		4.3	J
Toluene	µg/L	0		0.19	J	0.39	J	0		0.23	J	0		0.26	J	0		0.43	J
Trichloroethene	µg/L	8.4		2.6		0.42	J	0.61	J	0.49	J	0.49	J	0.56	J	0.38	J	0.63	J
Vinyl chloride	µg/L	35		13		3.4		15		4		0		0		0		0	
Arsenic	µg/L	0		5.6		0		0		6.5		0		8		0		5.7	
Barium	µg/L	82.9		93.9		78.9		153		103		100		199		138		189	
Cadmium	µg/L	0		0.77	J	0		0		0.84	J	1.2	J	0.52	J	0		0	
Chromium	µg/L	3.0	J	0		0		2.7	J	1.8	J	2.8	J	6.6		2.5	J	11.1	
Copper	µg/L	2.8	J	0		5.4		2.7	J	0.0		3.0	J	0		1.5	J	0	
Lead	µg/L	0		0		0		3.1	J	0.0		1.6	J	0		0		1.6	J
Mercury	µg/L	0.071	J	0.073	J	0		0.070	J	0.099	J	0.096	J	0.12	J	0.086	J	0	
Nickel	µg/L	2.7	J	2.6	J	0		2.4	J	2.1	J	2.3	J	3.7	J	1.9	J	6.8	
Zinc	µg/L	35.2	J	16.6	J	12.4	J	34.2	J	14.5	J	40.2	J	57.5	J	37.9	J	62.6	

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

Well ID		B3-MW31-UGR				B3-MW32-UGR				B3-MW33-UGR				B3-MW34-UGR			
Sample Date		6/23/2010		8/3/2010		6/23/2010		8/3/2010		6/23/2010		8/3/2010		6/23/2010		8/3/2010	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Dissolved Organic Carbon	mg/L	2.2		2.3		1.0		1.4		1.0		3.1		2.2		2.7	
Total Organic Carbon	mg/L	2.3		2.1		1.3		1.7		1.2		1.7		1.9		2.4	
Methane	µg/L	0		0		0		0		0		0		4,470		5680	
Ethene	µg/L	0		0		0		0		0		0		19.3		8.52	
Ethane	µg/L	0		0		0		0		0		0		0		0.858	J
Carbon Dioxide	µg/L	63,500		76,000		11,600		21,000		38,500		6,140		111,000		130,000	
Alkalinity, Total (as CaCO3)	mg/L	830		734		239		630		317		341		366		414	
Nitrate/Nitrite	mg/L	3.1		2.3		0.51		0.40		0.63		0.29		0		0	
Sulfate	mg/L	27.8		42.6		16.6		24.3		17.1		8.3		9.2		19	
Chloride	mg/L	9.6		9.9		10.1		10.6		11.4		16.0		17.6		15.1	
Ferrous Iron	mg/L	0		0.36	J	0		1.5		0		0.30	J	1.4		0.56	J
Manganese	µg/L	89.2		412		9.6		139		19.8		31.4		595		458	
Hydrogen	nM																
Hydrogen Sulfide																	
Total Dissolved Solids	mg/L	481		480		290		337		374		424		444		456	
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	
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	
Dichloroethene, cis-1,2-	µg/L	21		11		89		79		4.9		3.3		8.5		250	
Dichloroethene, trans-1,2-	µg/L	1.4		0.53	J	2.2		0.71		0		0		3.6		3.8	
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	23		11	J	67		29	J	26		13		1.5		0.58	J
Toluene	µg/L	0		0.70	J	0		0.94	J	0		0.58	J	0		0.81	J
Trichloroethene	µg/L	6.5		3.9		19		12		9.4		4.6		1.3		10	
Vinyl chloride	µg/L	0		0		0		0		0.34	J	0		47		43	
Arsenic	µg/L	0		7.8		0		4.0	J	0		3.7	J	4.4	J	4.6	J
Barium	µg/L	74.5		112		29.4		69.0		42.5		53.8		115		77.6	
Cadmium	µg/L	0		0		0		0		0		0.88	J	0		0.57	J
Chromium	µg/L	3.8	J	20.4		0		12.4		1.5	J	1.9	J	18.1		2.1	J
Copper	µg/L	4.7	J	0		1.9	J	0		0		0		10.9		0	
Lead	µg/L	0		0		0		0		0		0		6.2		0	
Mercury	µg/L	0.067	J	0.11	J	0.065	J	0.077	J	0		0.078	J	0.095	J	0.093	J
Nickel	µg/L	4.8	J	16.9	J	0		6.9		0.80	J	0		22.6		8.8	
Zinc	µg/L	23.7	J	42.0	J	10.4	J	59.2		16.4	J	26.0	J	64.1		42.3	J