

**CSSA B-3 BIOREACTOR OPERATIONS  
ANNUAL PERFORMANCE STATUS REPORT  
(QUARTER 53 – QUARTER 56, MAY 2020 – APRIL 2021)**

**AUGUST 25, 2021**

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This status report summarizes the operation of a bioreactor at Solid Waste Management Unit (SWMU) B-3 from May 2020 through April 2021, comprising the fourteenth year 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 April 2021 are attached for reference. Parsons personnel responsible for bioreactor operations during the reporting period include Ken Rice, Bradly Dietert, Samantha Elliott, Adrien Lindley, Richard Fincke, Fabian Bocanegra, and Scott Pearson.

***Executive Summary***

For the year (May 2020 through April 2021) a total of 27.40 inches of rain was recorded on site, 4.87 inches below the average. Injection of extracted groundwater continued through the year with few interruptions. Minor interruptions include system maintenance, reaching automatic cut-off levels in the wells and/or storage tank, and B-3 bioreactor system upgrade activities. During the reporting period, pumping at wells CS-MW16-LGR, B3-EXW01, B3-EXW02, and B3-EXW04 was suspended temporarily for well maintenance primarily related to the Winter Storm Uri freeze event in February 2021. Well maintenance included the replacement of damaged valves at CS-MW16-LGR, B3-EXW01, B3-EXW02, and B3-EXW04. Additionally, a damaged flowmeter at B3-EXW01 was also replaced and upgraded to an Endress Hauser® ProMag53 meter. In addition to wells being inoperative due to damaged components, wells CS-MW16-LGR, B3-EXW01, B3-EXW02, and B3-EXW03 remained offline for prolonged periods of time due to sustained drought conditions through much of the reporting period as wells reached the automatic cut-off levels. Currently, all wells are operational.

Through the reporting period, approximately 12,557,000 gallons of groundwater, extracted from wells CS-MW16-LGR, CS-MW16-CC, B3-EXW01, B3-EXW02, B3-EXW03, B3-EXW04, and B3-EXW05, were injected into bioreactor trenches 1, 2, and 6. Currently, only trenches 1, 2 and 6 are receiving extracted groundwater.

During the reporting period, most of the injected groundwater, ~3,576,300 gallons, was extracted from B3-EXW04, followed by ~3,100,000 gallons from CS-MW16-CC and ~2,571,600 from EXW05. Wells B3-EXW01, EXW02, EXW03 and CS-MW16-LGR were less productive with ~707,900 ~1,287,000, ~855,000 and ~419,000 gallons extracted, respectively. The total groundwater production for the year (12,557,000 gallons) is approximately 35% less than the previous year's total (19,557,000 gallons). Since the start of normal operations in 2007, approximately 260,000,000 gallons of extracted groundwater have been injected into the bioreactor.

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 from trench sumps samples provides evidence that biotic and abiotic dechlorination of tetrachloroethene (PCE) and trichloroethene (TCE) is occurring. The presence of ethene or vinyl chloride indicates that the biotic reductive dechlorination process is the major degradation pathway for CAHs within the trenches. The presence of ethene would indicate that complete reductive dechlorination is occurring. No ethene was detected in the trench sumps this reporting period, however, ethene has been detected in prior years.

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

Analytical results from biannual sampling at the bioreactor sumps indicate that SWMU B-3 trenches contain a range of *cis*-DCE levels (non-detect (ND) to 44 µg/L) as well as concentrations of other dechlorination products (e.g., VC). A summary of the analytical data collected for the reporting period (year 14) is included in Table 1. A summary of biannual 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 volatile organic carbon (VOC) analyses indicate that groundwater from the uppermost saturated zone (LGR-03B) of Westbay<sup>®</sup> wells CS-WB05, CS-WB06, CS-WB07, and CS-WB08 contain less than 100 micrograms per liter (µg/L) of PCE and TCE. Additionally, the LGR-03B zone of CS-WB05 and CS-WB08 were dry during one or more of the reporting periods. A summary of the VOC data collected for the reporting period is included in Table 56.2.2. Similar analysis of groundwater samples from the extraction well network (Table 56.6.2) indicate all seven extraction wells (CS-MW16-LGR, CS-MW16-CC, B3-EXW01, B3-EXW02, B3-EXW03, B3-EXW04, and B3-EXW05) contain less than 100 µg/L of PCE. Wells CS-MW16-LGR, CS-MW16-CC, B3-EXW01, B3-EXW02, B3-EXW03, and B3-EXW05 additionally contain less than 100 µg/L of TCE. The remaining well, B3-EXW04 contains greater than 100 µg/L of TCE. Wells B3-EXW-01 and B3-EXW-04 both contain greater than 100 µg/L *cis*-DCE.

VOC analytical results from operational bioreactor trench sumps samples indicate a decrease in contaminant mass (total molar concentration) in trenches 1 (T1-1, T1-2, and T1-3), 2 (T2-1 and T2-2), and 6 (T6-1 and T6-2) since the last reporting period in April 2020. Over the bioreactor operational period (14 years), contaminant mass appears stable or decreasing. Currently, extracted groundwater is being applied to bioreactor trenches 1, 2 and 6. Applications in trench 1 began in 2007 as the bioreactor became operable and has been ongoing for 14 years. Applications in trench 2 began in 2009 (twelve years of application), followed by applications in trench 6 in 2010 (eleven years), and injections in trenches 3, 4, and 5 began in 2016 and ceased in 2018 (two years of application) due to low water availability during drought conditions.

Water quality field measurements from bioreactor trench 1 sumps indicate average annual values for DO, pH, ORP, and specific conductivity were 0.54 mg/L, 6.43, -72.28 mV, and 1.006 mS/cm, respectively, and temperatures ranged from ~19 °C to ~29 °C.

Field measurements from trench 2 during the year include average DO, pH, ORP, and specific conductivity of 0.71 mg/L, 6.36, -77.31 mV, and 0.792 mS/cm respectively; and temperatures ranged between ~16 °C to ~26 °C.

Trench 6 water quality field measurements during the year include average DO, pH, ORP, and specific conductivity of 0.92 mg/L, 6.63, -46.68 mV, and 0.695 mS/cm respectively; and temperatures ranged between 21 °C to 24 °C.

While the annual average DO within trench 2 and 6 is above 0.50 mg/L, multiple quarterly measurements are recorded near or less than the desired 0.5 mg/L concentration.

The geochemical parameters measured within each of the active trenches indicate adequate conditions exist for reductive anaerobic bioremediation of CAHs in trenches 1, 2, and 6.

Ground water elevation data from the shallow UGR monitoring wells (B3-MW26-UGR – MW34) combined with similar data from the Westbay UGR zones (CS-WB06-UGR-01, CS-WB08-UGR-01) and the bioreactor sumps helped confirm the presence of a groundwater “mound” around the bioreactor trenches. Analyses of samples from these wells indicates the presence of vinyl chloride with concentrations ranging from ND to 14 ppb (WB08-UGR-01) with the highest levels typically found north and west of the bioreactor. B3-MW28-UGR, located southwest of the bioreactor, has been consistently dry and therefore is not sampled. Water quality parameters in UGR wells are collected every 9 months and were collected only one time in the reporting period. In general, DO values at UGR wells ranged from 0.17 to 3.48 mg/L, ORP values ranged from 190 to -191 eV, and pH ranged from 5.73 to 6.92.

During the reporting period, 27.40 inches of precipitation were measured on-post. Over the year, average water thicknesses within active trenches were 8.47, 7.55, and 8.24 feet in trenches 1, 2, and 6, respectively. Average water thickness greater than 1 foot indicate saturated conditions within the active bioreactor trenches are being maintained.

Attached are graphs including: trenches 1 and 6 average water thickness with rainfall data, VOC concentration summaries for extraction wells, storage tanks (UIC), trench 1 and 6 sumps, and in the defined uppermost saturated zones (zone LGR-03B) in the surrounding multi-port monitoring wells, cumulative precipitation, as well as water level elevations in the defined uppermost saturated zone (zone LGR-03B) of the B-3 multi-port monitoring wells with rainfall data.

### ***Quarter 56 - Analytical Data Observations***

1. Arsenic (As) was detected in concentrations exceeding the MCL (10 µg/L) in one Westbay well zone, CS-WB05-LGR-04B (16 µg/L), during the year. All other multi-port monitoring well (MPMW) zones reported Arsenic levels below the MCL. The elevated levels are likely due to changing pH conditions of the groundwater and the reduction of naturally occurring arsenic within the limestone media to a more soluble form.
2. DO and ORP values were favorable for the reduction of CAHs, and it is likely that geochemical conditions will remain favorable for continued enhanced anaerobic continue to improve as normal bioreactor operations continue.
3. The volatile organic compound summary for the trenches indicates an intermediate and end-product (DCE isomer and VC) dominated chemical composition in water. Total molar concentrations within trenches 1, 2 and 6 have fluctuated throughout the year and indicate a slight increase in total contaminant mass in trench 6, and slight decreases in trenches 1 and 2 since last year.

4. *Dehalococcoides* (DHC) bacteria have been identified within the trench sumps, indicating the reductive dechlorination of CAHs by microbial activity is occurring. Since the last reporting period, DHC cell counts have fluctuated in each of the active trenches and healthy populations continue to exist. Comparison of CAH mole fractions of extracted groundwater (prior to injection) and trench sump water (after injection) confirms reductive dechlorination of VOCs is occurring within the bioreactor, with VOC parents (PCE, TCE) representing a higher portion of the total molar concentration pre-injection, and daughter products (DCE, VC, and ethene) representing the higher portion of the total molar concentration post-injection.
5. Saturated conditions within the bioreactor were maintained through the year with thicknesses ranging from 4.20 feet in trench 2 to 8.09 feet in trench 1.

The reductive dechlorination end product VC is present in samples collected from shallow UGR zone wells around the periphery of SWMU B-3 indicating the lateral influence of the bioreactor in the shallow subsurface. VC is present in samples from shallow UGR wells MW26, MW31, MW33, and MW34, (2.0, 1.9, 1.2 and 2.4 µg/L, respectively), and in samples from the MPMW well UGR-01 zones in WB06 and WB08 (1.9 and 14 µg/L, respectively). Neither ethene nor ethane was detected in samples from shallow UGR wells during the reporting period.

In addition to reductive dechlorination end products within the UGR, these products are also observed at depth. VC is observed in the LGR-03B, 04A, 04B, and BS-01 zones within WB05 (19, 50, 33, and 4.8 µg/L, respectively); in the LGR-02 and 03B zones in WB06 (1.7 and 0.22 µg/L, respectively); in WB-07 LGR-01 and 03B zones (8.1, and 0.31 µg/L, respectively); and within WB08 in zones LGR-01 and 03B (0.49 and 0.63 µg/L). Neither ethene nor ethane was observed in samples from any of the WB LGR zones during the reporting period.

### ***Recommendations***

Recommendation for further remedial action include:

- Continue monitoring bioreactor and surrounding wells for UIC Permit and Performance parameters.

### ***Anticipated Schedule for Next Period (May 2021 – April 2022):***

- Lactate injections within trenches in conjunction with elevated water levels following significant precipitation to maintain appropriate geochemical conditions and promote reductive dechlorination within the upper levels of the Upper Glen Rose.
- Continue monitoring and maintenance activities for delivery of groundwater to the bioreactor trenches.
- Conduct semi-annual monitoring events for the bioreactor system.
- Continue UIC monitoring with annual reporting due July 2022.
- Continue SCADA control and automation integration.

## **Specific Data Observation Notes for Attachments**

- Table 56.1.1 presents field collected data from bioreactor trench sumps, and indicates saturated conditions were maintained during the year.
- Table 56.1.2 shows analytical results from semiannual sampling at sumps within active bioreactor trenches (Trenches 1, 2, and 6) and present data from the fourteenth year of bioreactor operations.

- Data in Table 56.1.2 indicate dechlorination products are being generated within the bioreactor. VC was present at variable concentrations in each of the active trench sumps, ranging from, 0.37 to 6.7 µg/L during the year.
- Table 56.1.3 indicates the presence of Fe(II) at concentrations consistent with alternative degradation pathways.
- Table 56.2.3a indicates VC concentrations of 50 µg/L in WB05-LGR04A and 33 µg/L in WB05-LGR04B, indicating reductive dechlorination is occurring at depth and suggest a connection between this zone and CS-B3-MW01.
- Table 56.4.4 indicates moderate populations of *Dehalococcoides* (DHC) bacteria exist in trenches 1, 2, and 6.
- Figure 56.1.2 presents the changes in molar fraction and total molar concentrations at sumps in trenches 1, 2, and 6 and indicate slight increases in contaminant mass at sumps T2-1 and T6-2 and decreases in contaminant mass in the remaining active trench sumps.
- Table 56.6.2 indicates contaminant mass, provided by seven extraction wells, is available for injection into the bioreactor. Parent products (PCE and TCE) make up the majority of the contaminant mass within LGR wells, though *cis*-DCE is also present. Within the CC extraction well, the DCE isomers provide nearly all available contaminant mass.
- Figure 56.2.5 shows that the water levels in Westbay wells are significantly influenced by drought conditions and 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 56.7.3 indicates the presence of VC in five of the shallow UGR wells with concentrations ranging from ND to 2.1 µg/L. Additionally, Table 56.7.3 provides evidence of the biotic anaerobic degradation pathway as indicated by elevated concentrations of Mn and CO<sub>2</sub>.

## Analytical Summary Data

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

Event	VOCs	TDS	TOC	MEE & CO <sub>2</sub>	SO <sub>3</sub> <sup>2-</sup>	Chloride, Sulfate	Fe <sup>2+</sup>	Mn	Metals*	H <sup>+</sup>	DHC
Semi-Annual Sampling <sup>a</sup> (Quarter 54)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Semi-Annual Sampling <sup>a</sup> (Quarter 56)	✓	✓	✓	✓				✓	✓		✓

<sup>a</sup> - Semi-annual sampling includes samples from B3-trench sumps, Monitoring Wells, Extraction Wells, and Multi-port (Westbay) wells.

\* - Metals analyses were reduced to include only arsenic results beginning with the Month 44 sampling event.

- Performance sampling analysis were reduced beginning with the Quarter 56 sampling event in accordance with 2020 LTMO schedule. Sulfide, Chloride/Sulfate, Ferrous Iron, and Dissolved Hydrogen were reduced to an as-needed basis.

## Figures

Figure 56.1.2 T1-1

**B-3 Bioreactor Trench 1 Sump 1 VOC Summary**  
**Mar 2020 - Mar 2021**

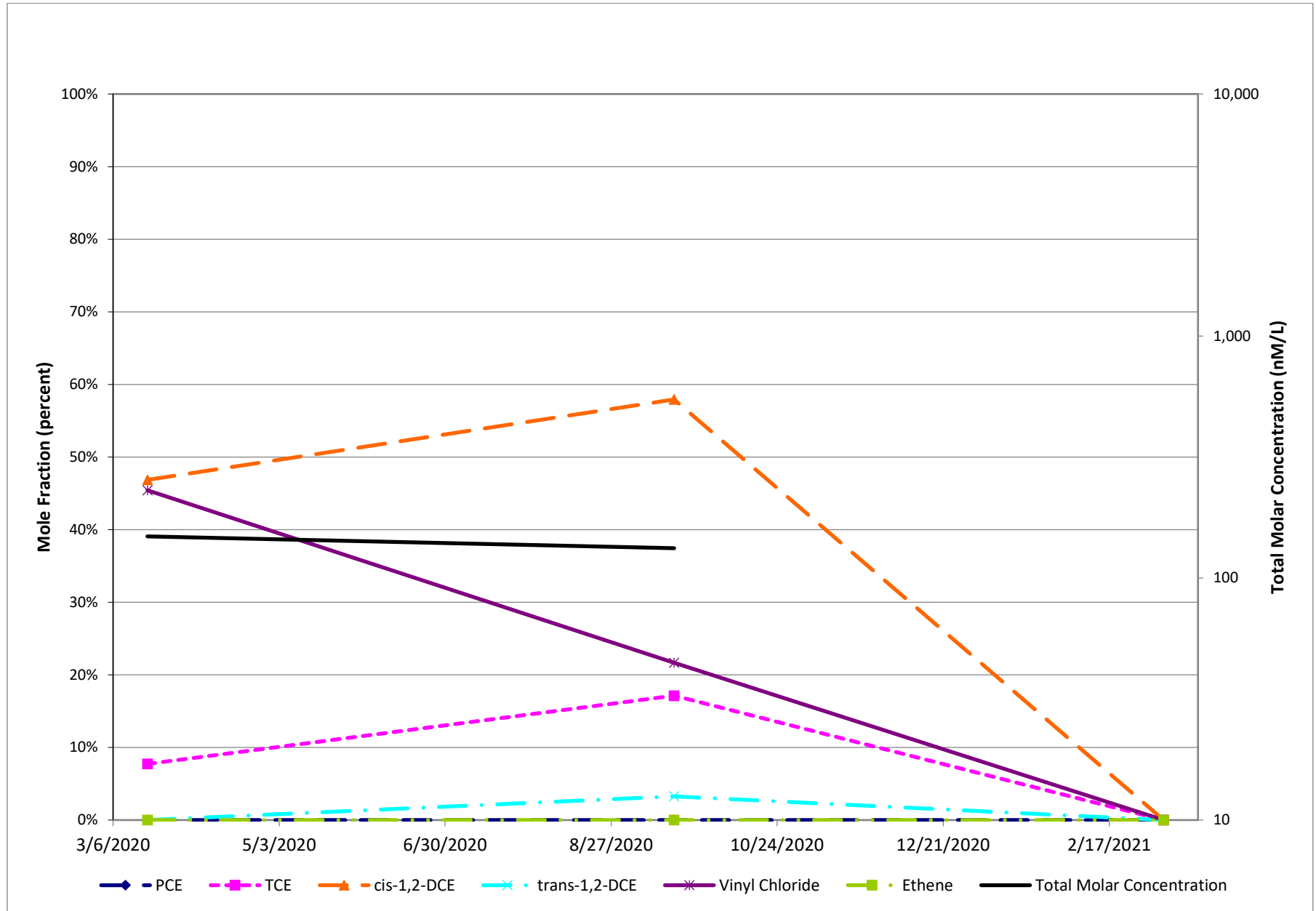




Figure 56.1.2 T1-2

**B-3 Bioreactor Trench 1 Sump 2 VOC Summary  
Mar 2020 - Mar 2021**

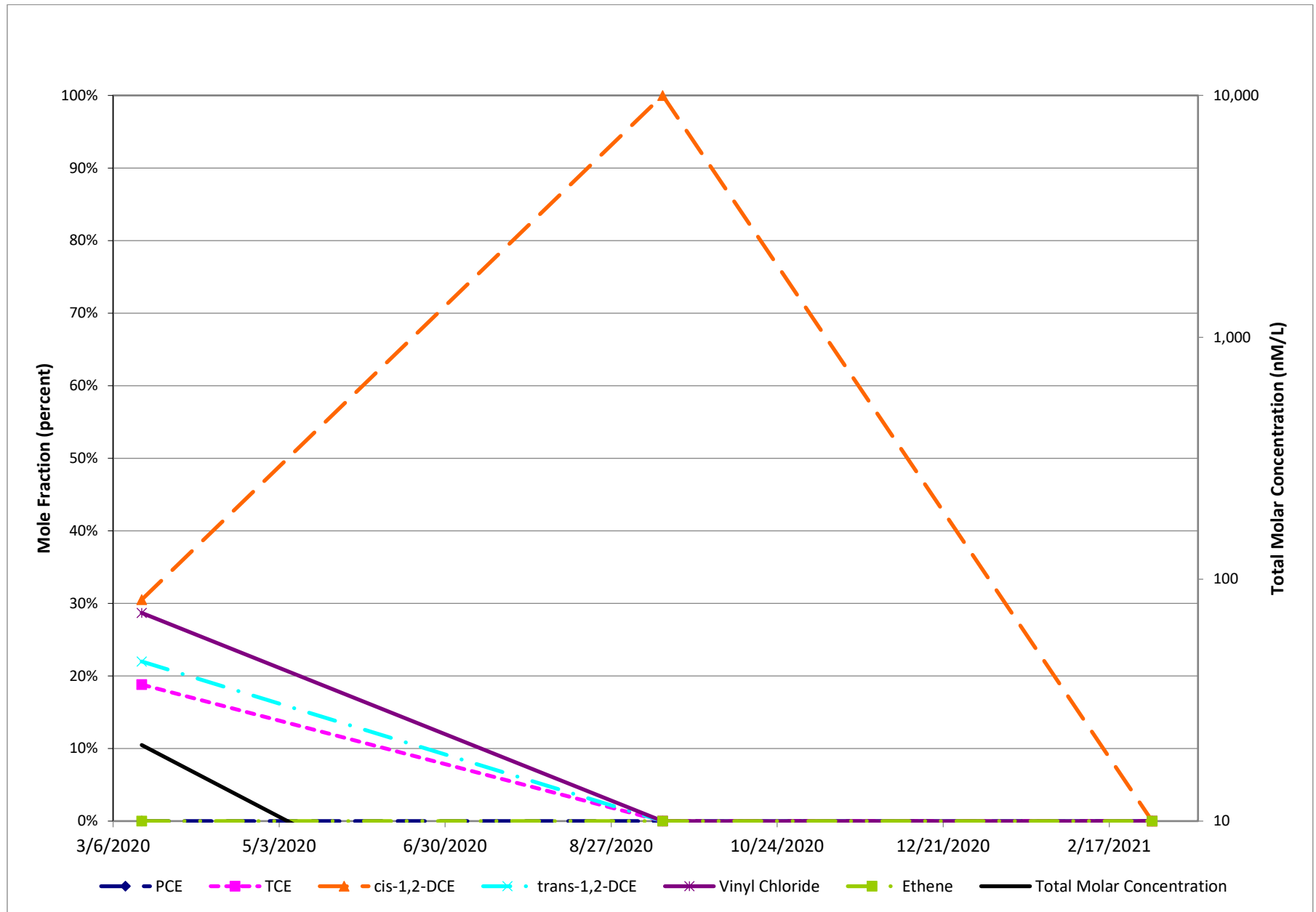


Figure 56.1.2 T1-3

**B-3 Bioreactor Trench 1 Sump 3 VOC Summary  
Mar 2020 - Mar 2021**

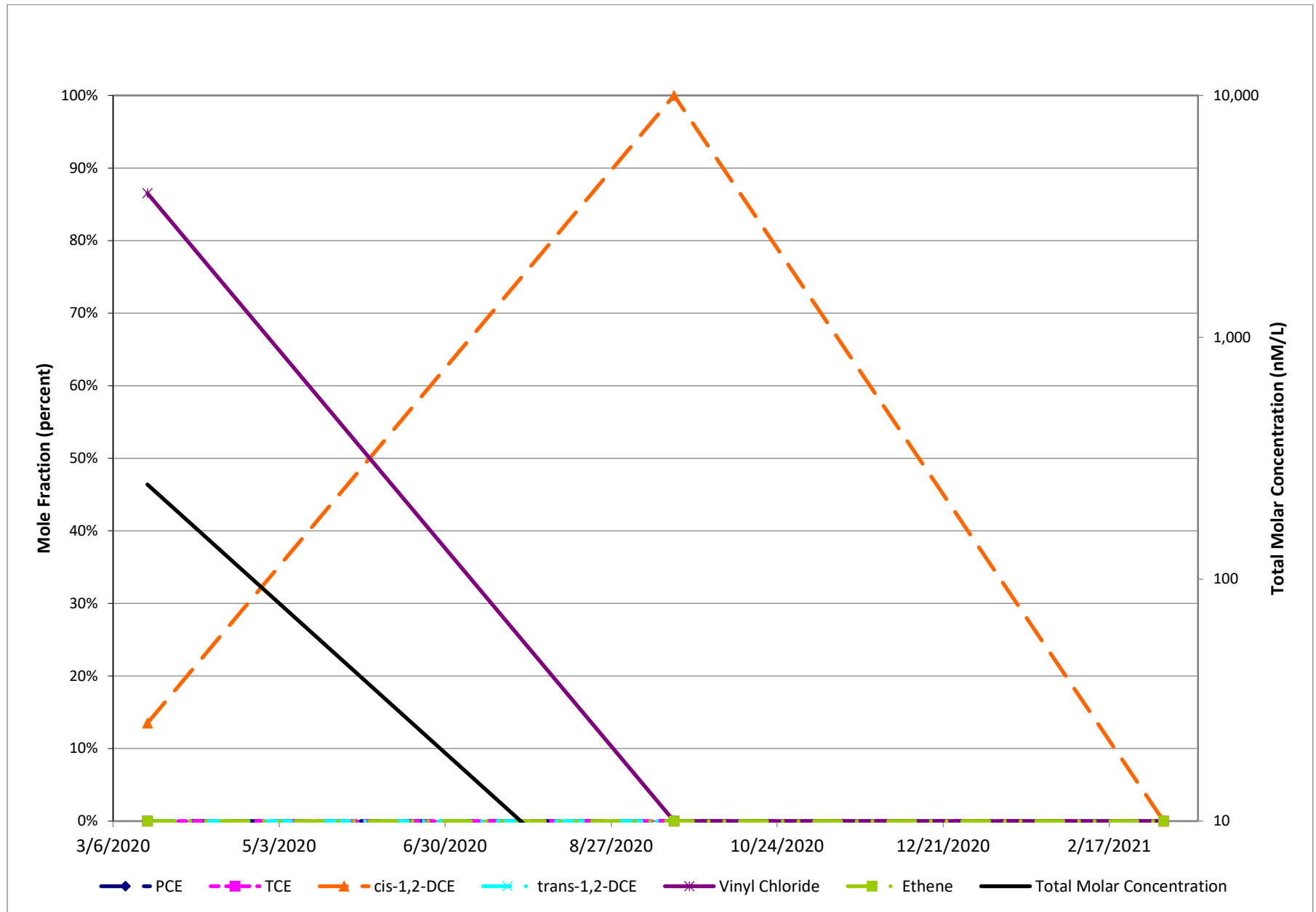


Figure 56.1.2 T2-1

**B-3 Bioreactor Trench 2 Sump 1 VOC Summary  
Mar 2020 - Mar 2021**

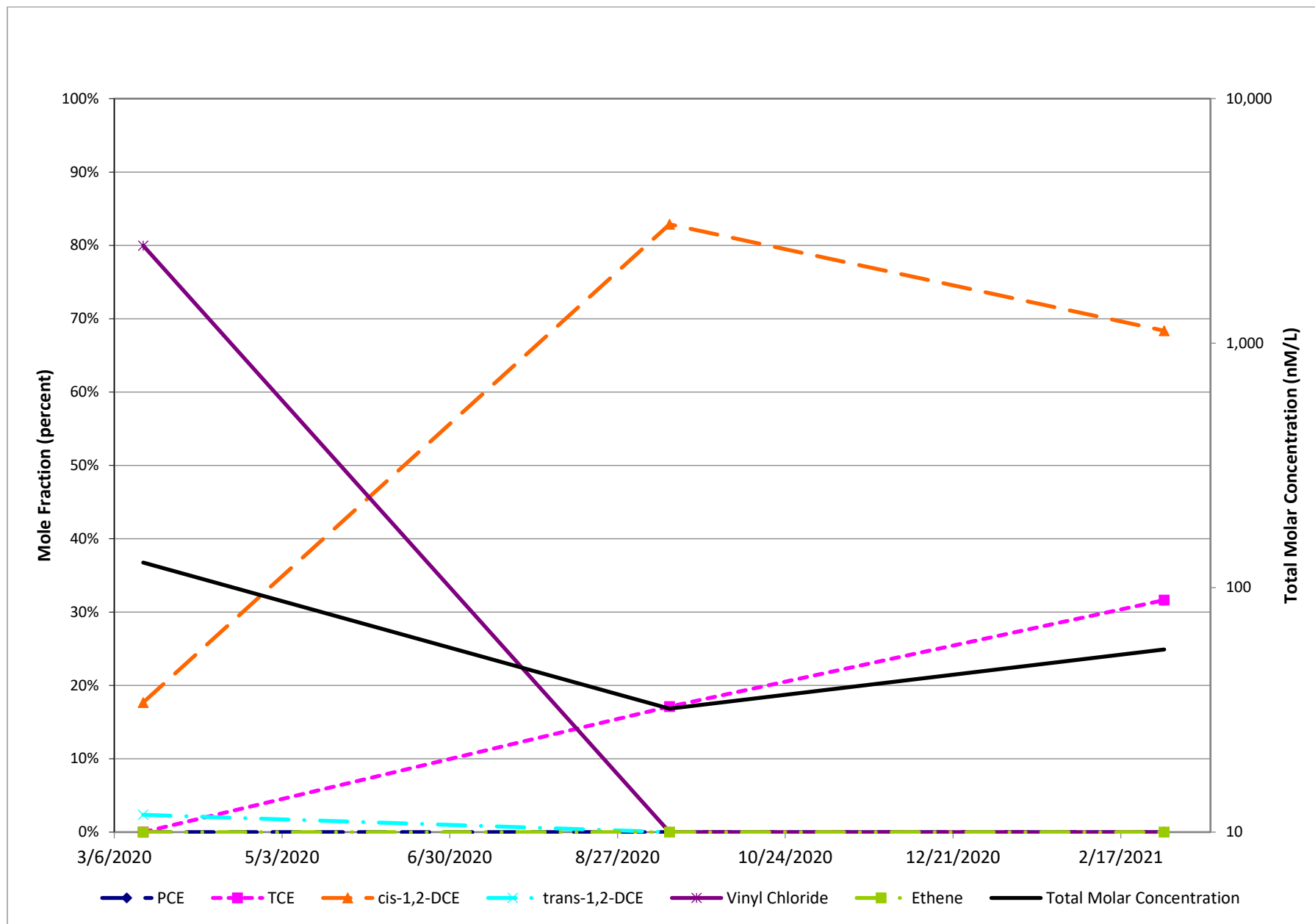


Figure 56.1.2 T2-2

**B-3 Bioreactor Trench 2 Sump 2 VOC Summary  
Mar 2020 - Mar 2021**

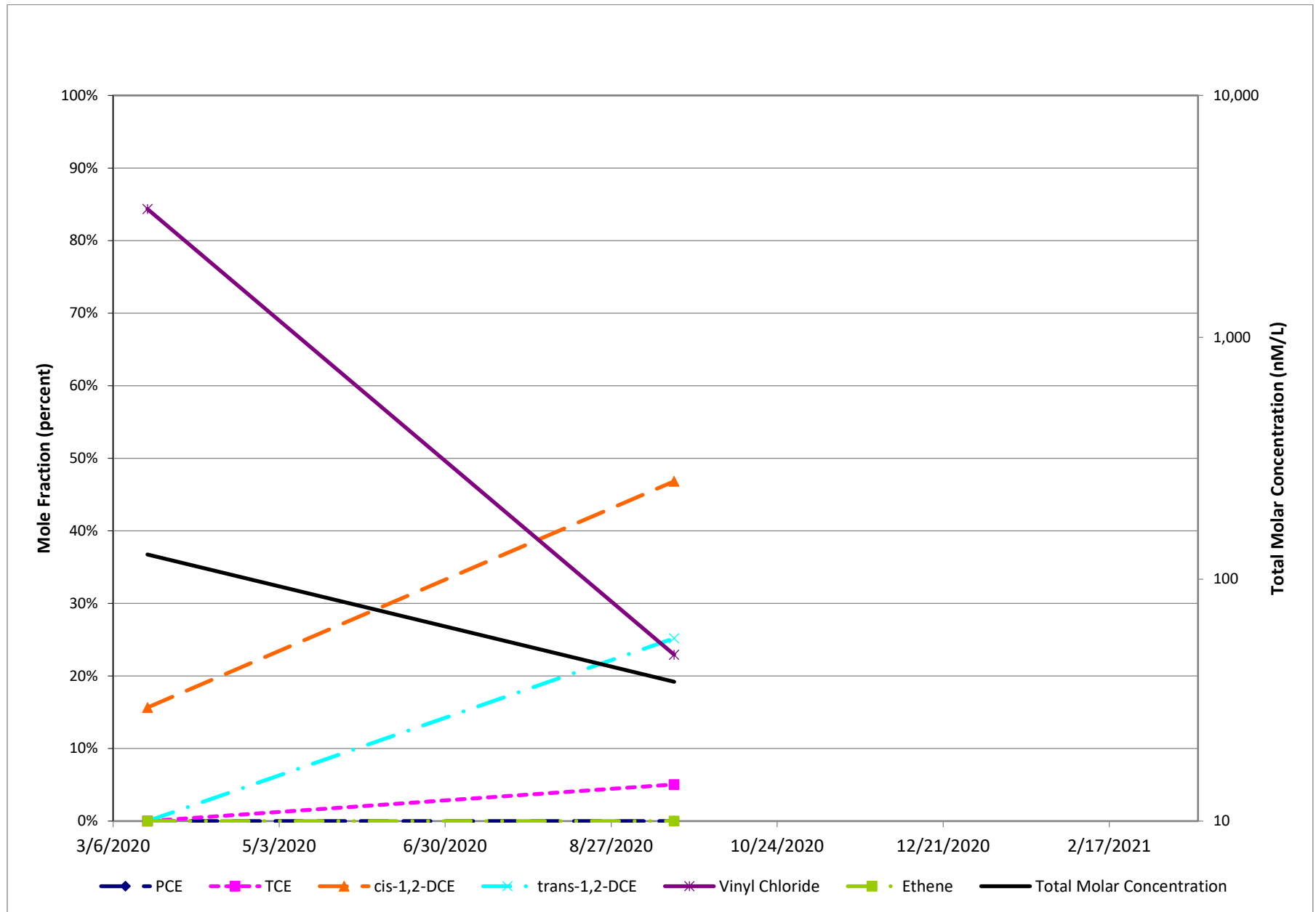


Figure 56.1.2 T6-1

**B-3 Bioreactor Trench 6 Sump 1 VOC Summary  
Mar 2020 - Mar 2021**

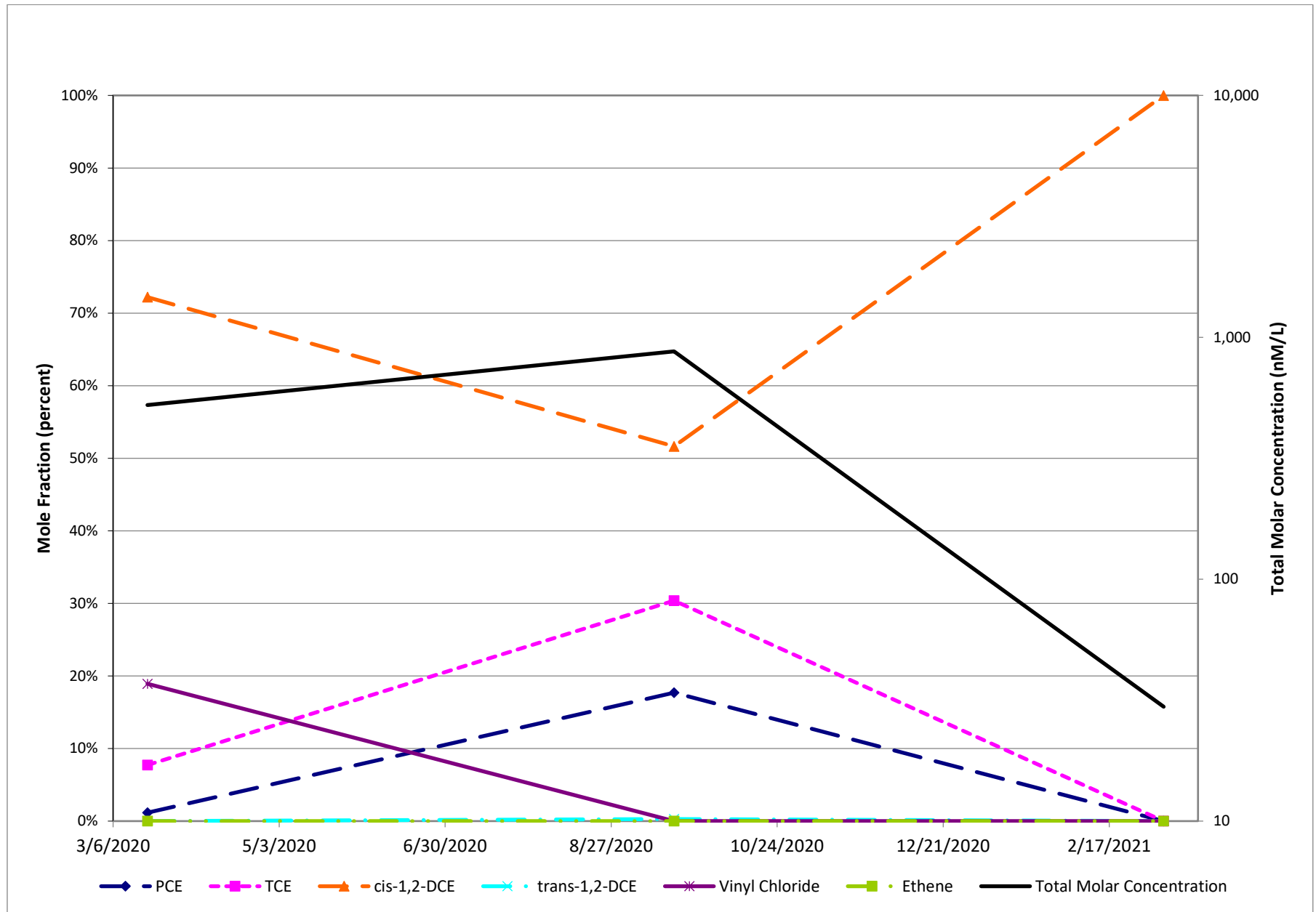


Figure 56.1.2 T6-2

### B-3 Bioreactor Trench 6 Sump 2 VOC Summary Mar 2020 - Mar 2021

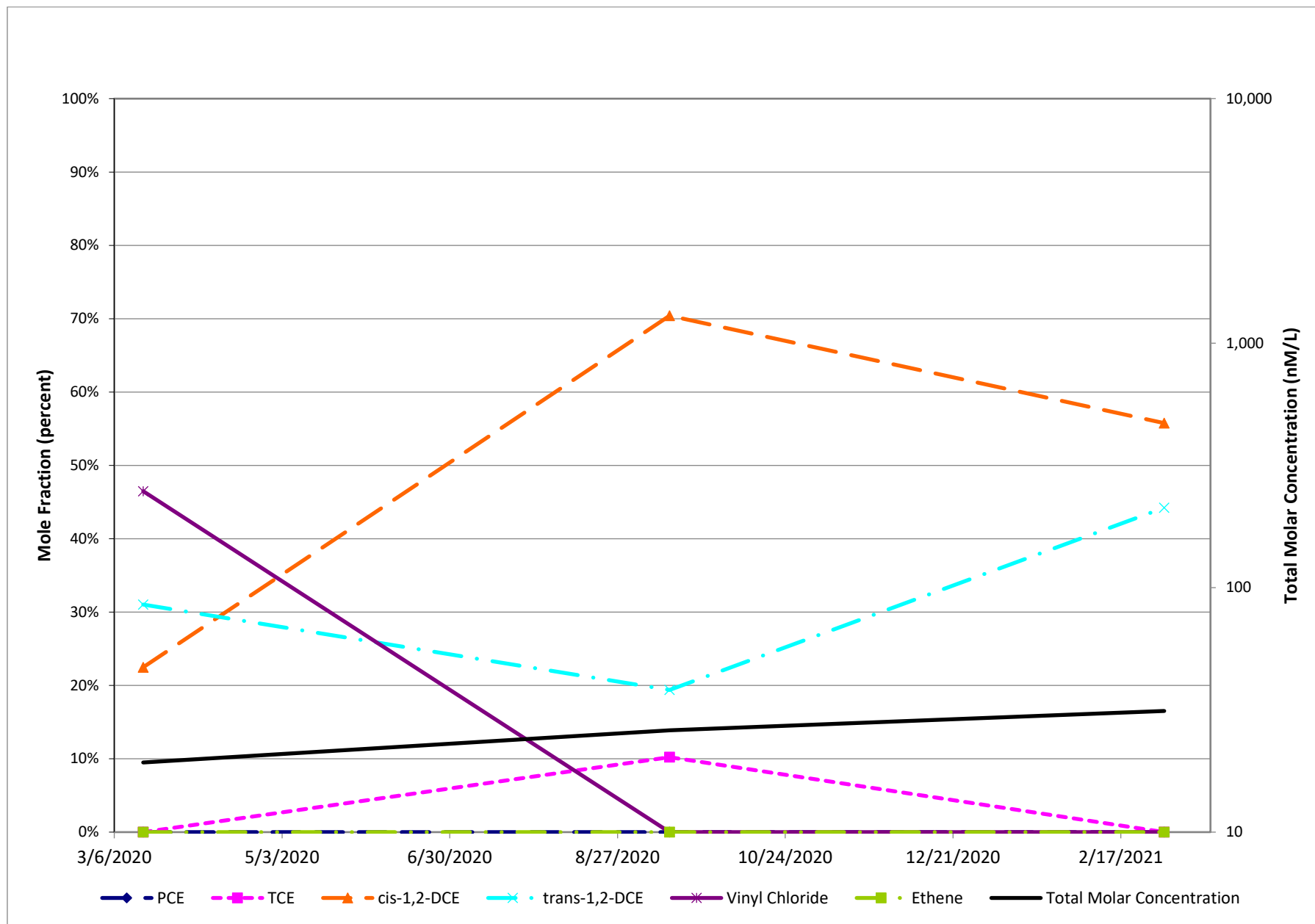


Figure 56.2.2a

CS-WB05-LGR03B VOC Summary  
Mar 2020 - Mar 2021

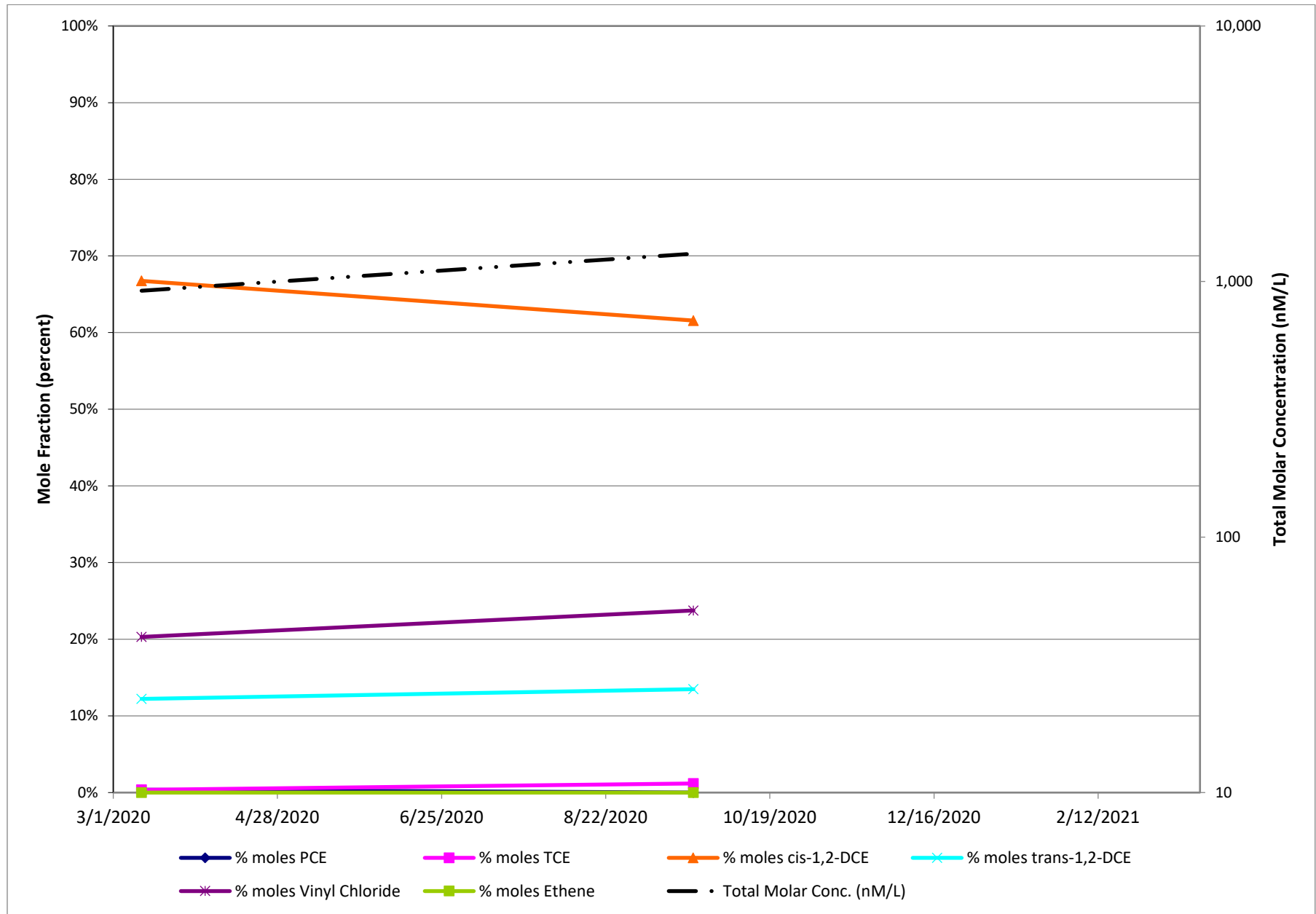


Figure 56.2.2c

CS-WB07-LGR03B VOC Summary  
Mar 2020 - Mar 2021

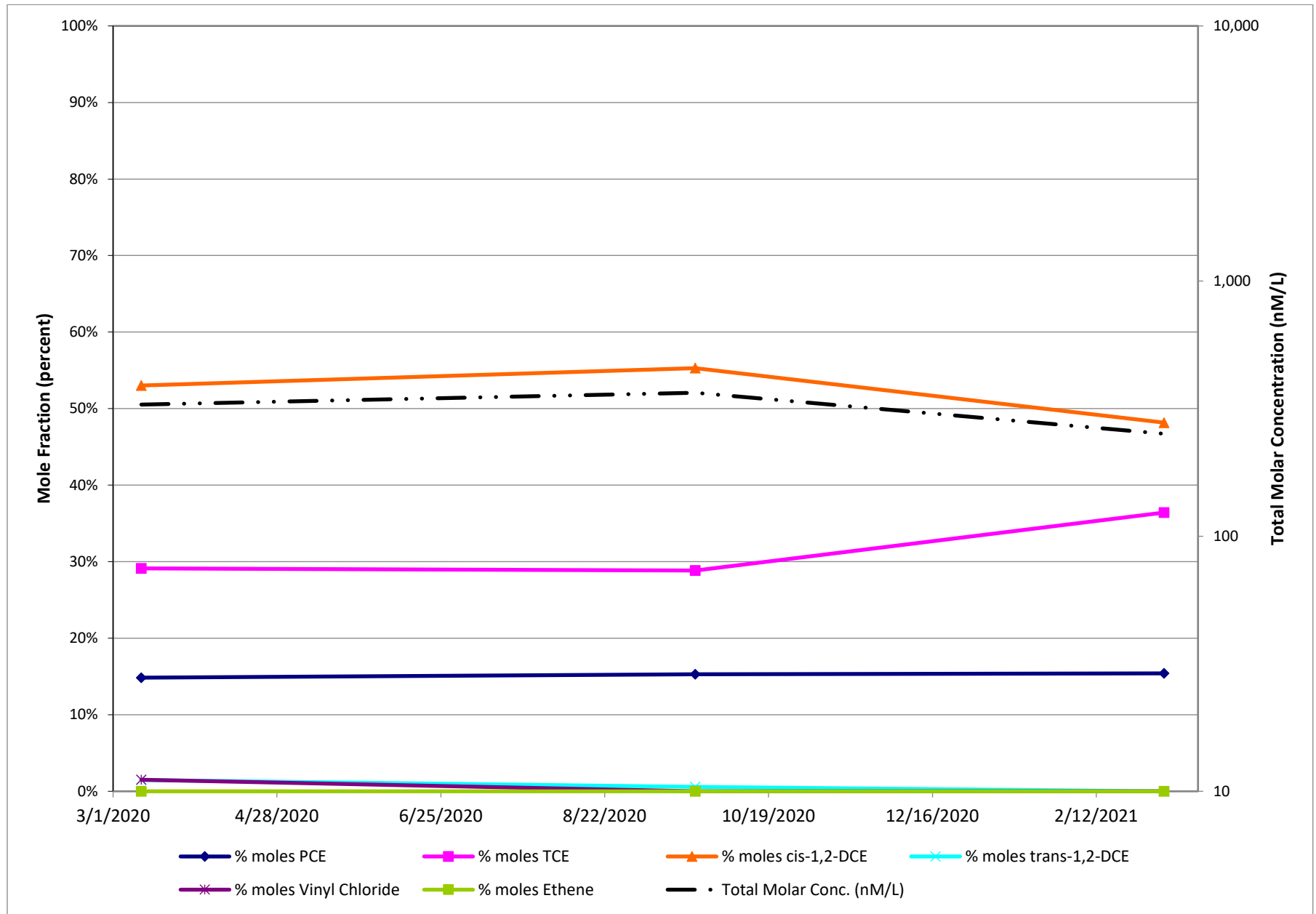




Figure 56.2.2b

CS-WB06-LGR03B VOC Summary  
Mar 2020 - Mar 2021

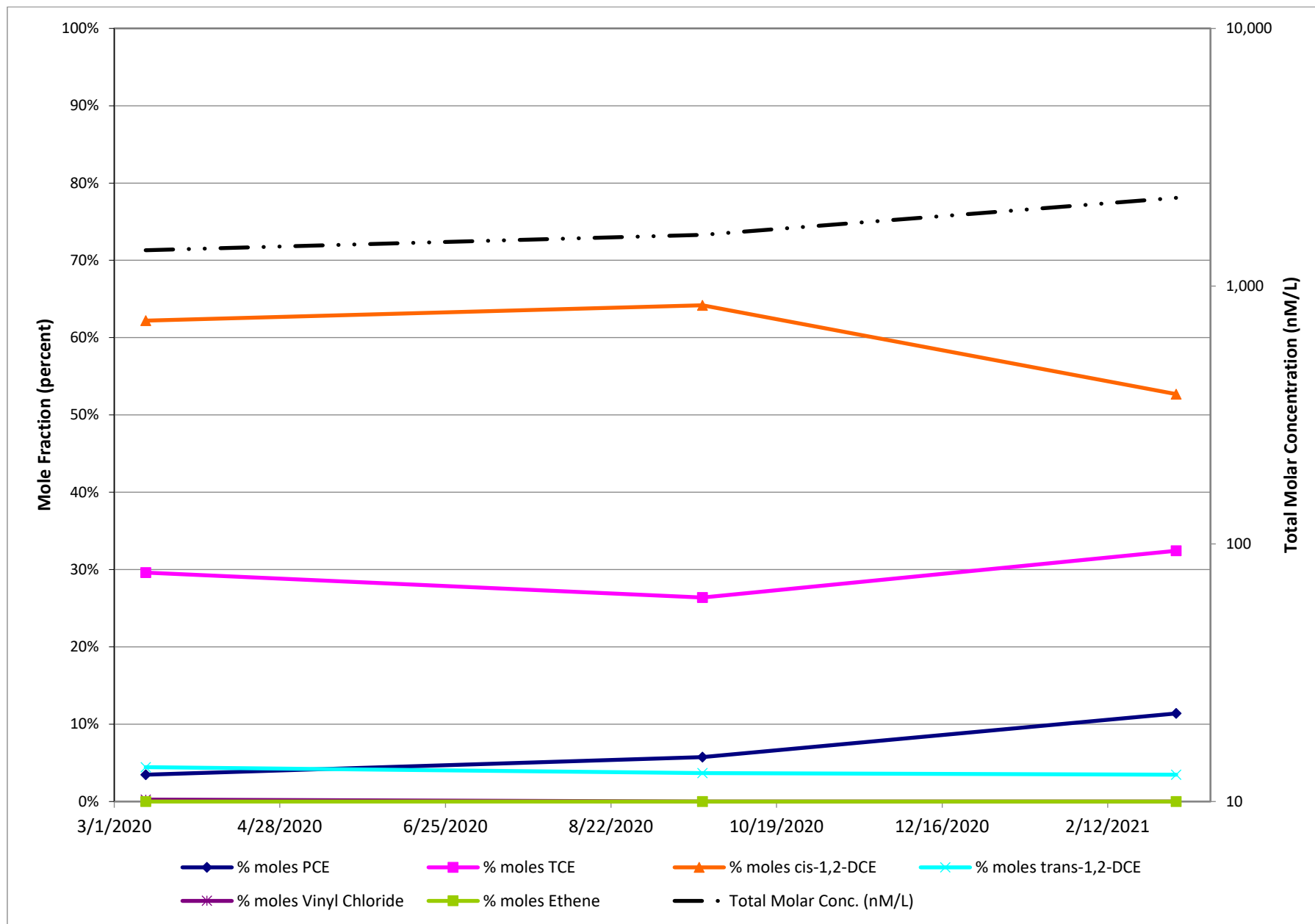


Figure 56.2.5

Lower Glen Rose Groundwater Elevations (feet above MSL) Measured in Westbay Multi-Port Wells  
May 2014 - Mar 2021

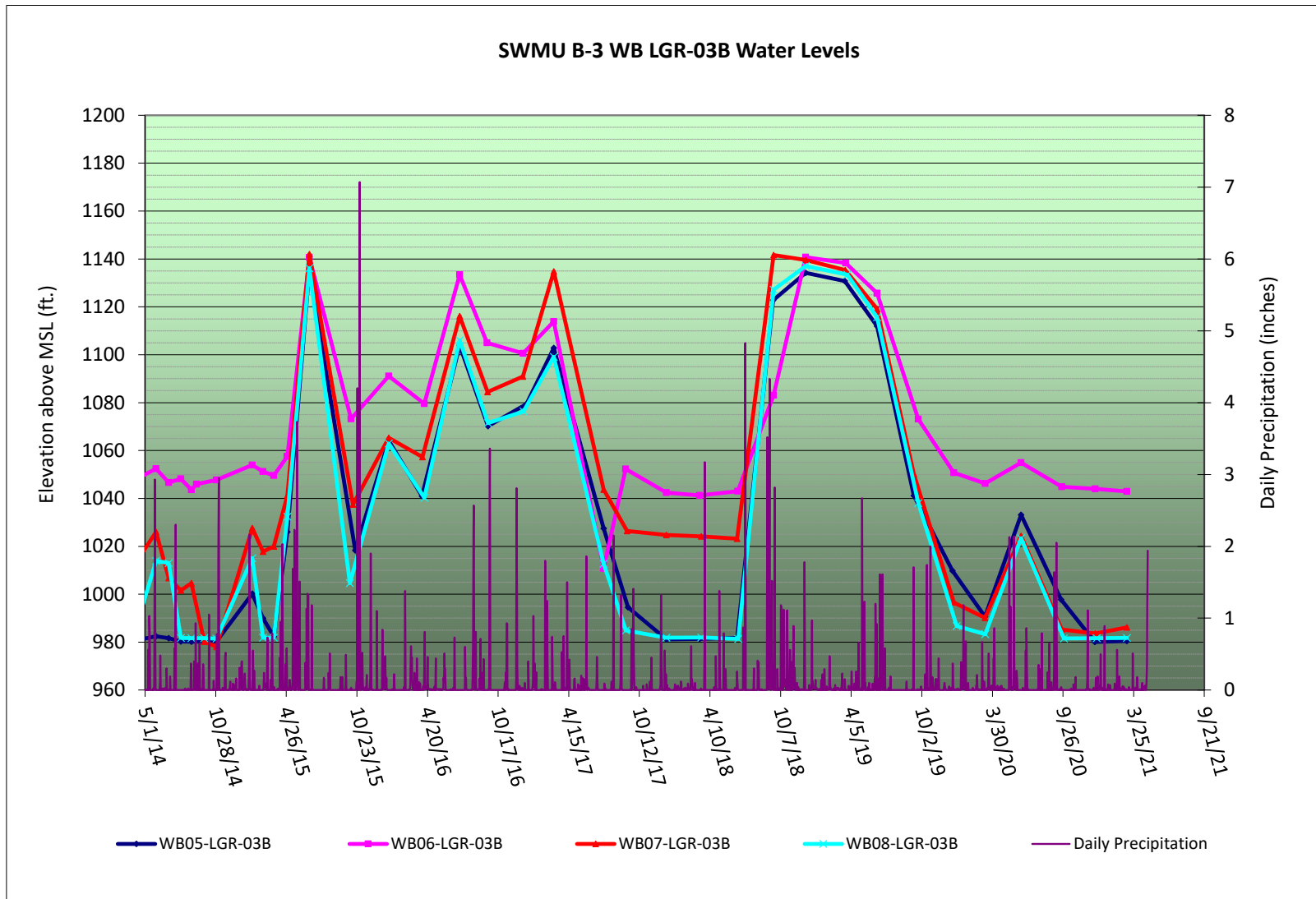


Figure 56.5.2

**Changes in Mole Fraction and Total Molar Concentration at Storage Tank (UIC)  
Mar 2020 - Mar 2021**

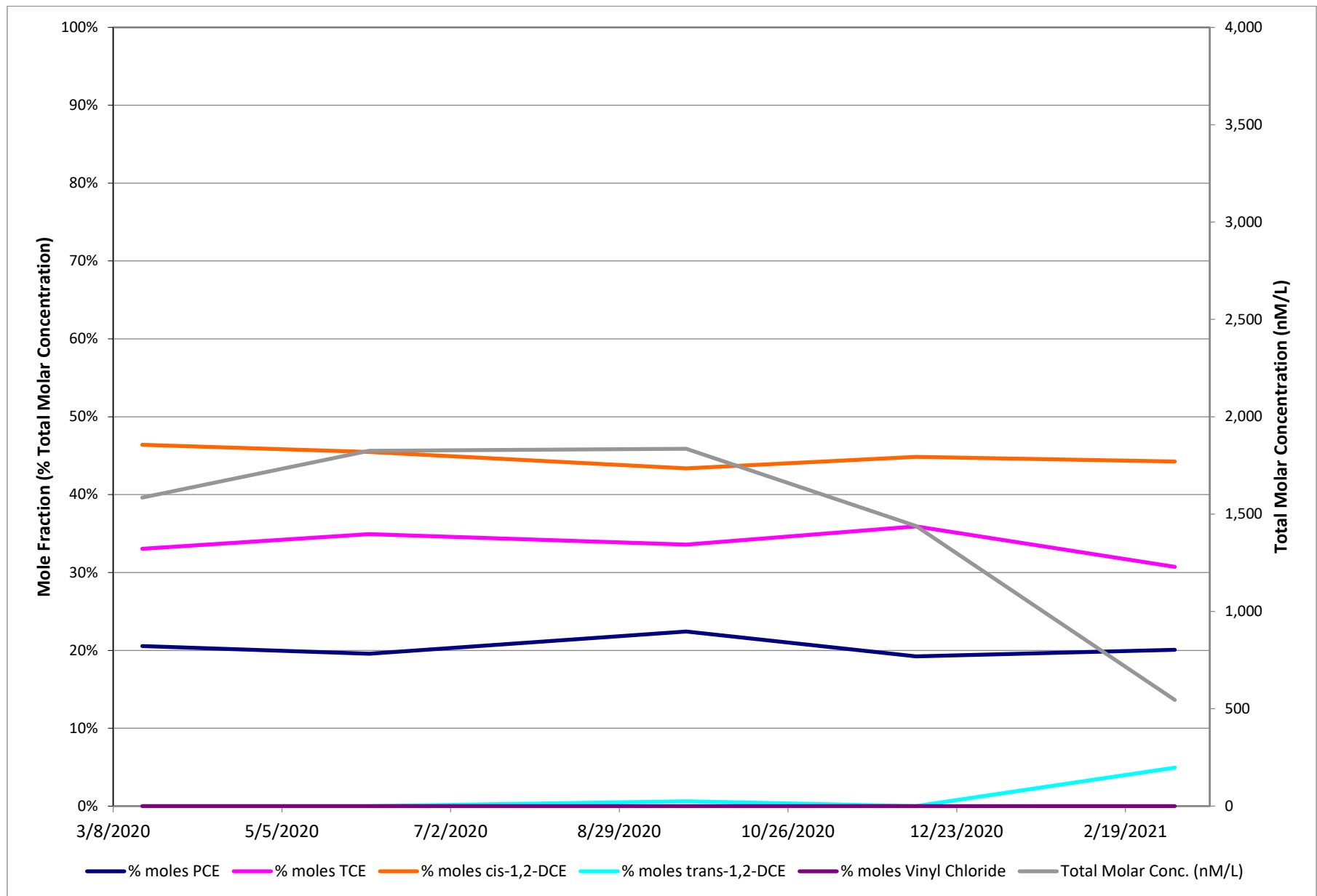


Figure 56.5.6

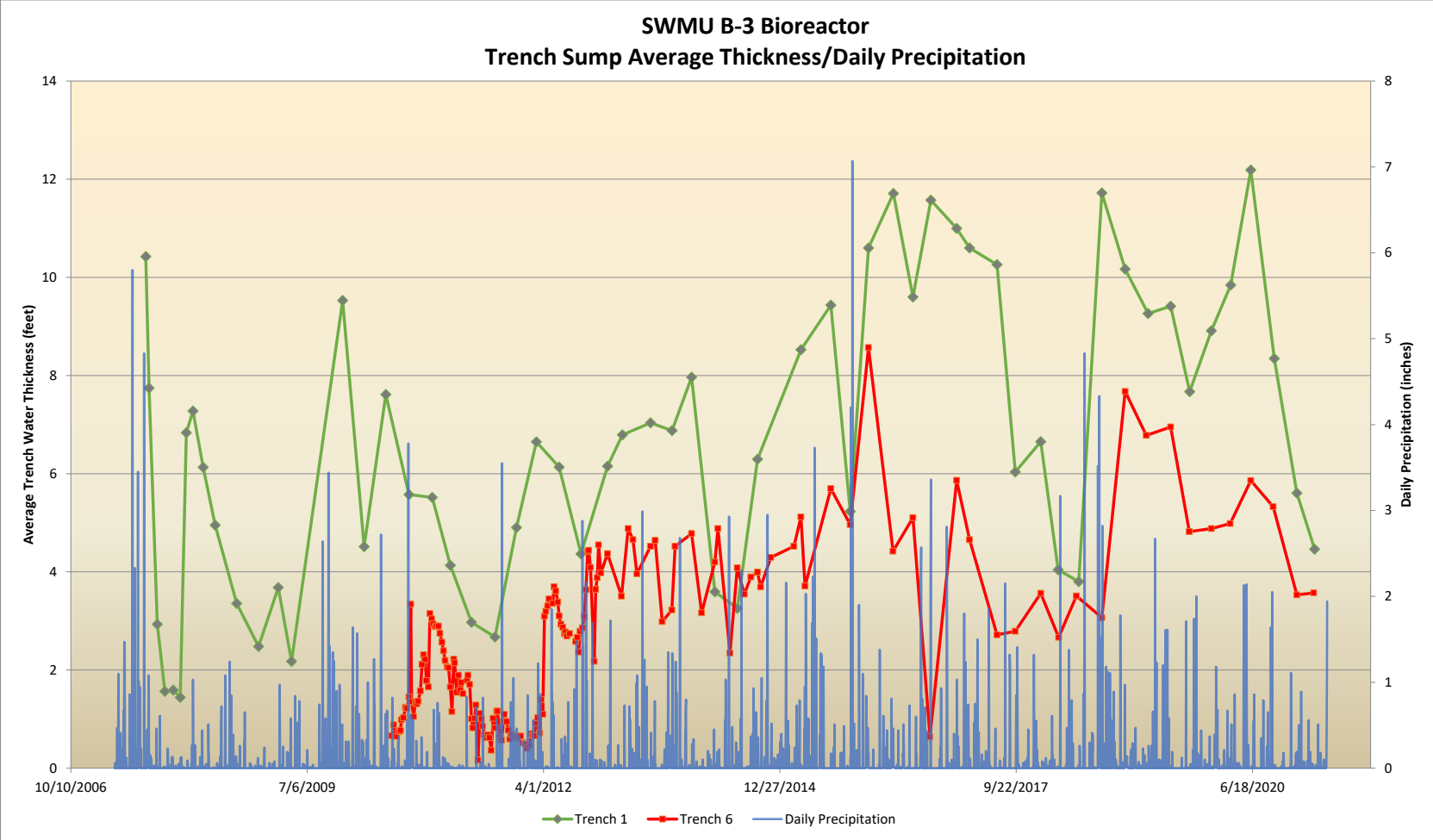


Figure 56.6.2 16-LGR

CS-MW16-LGR VOC Summary  
Mar 2020 - Mar 2021

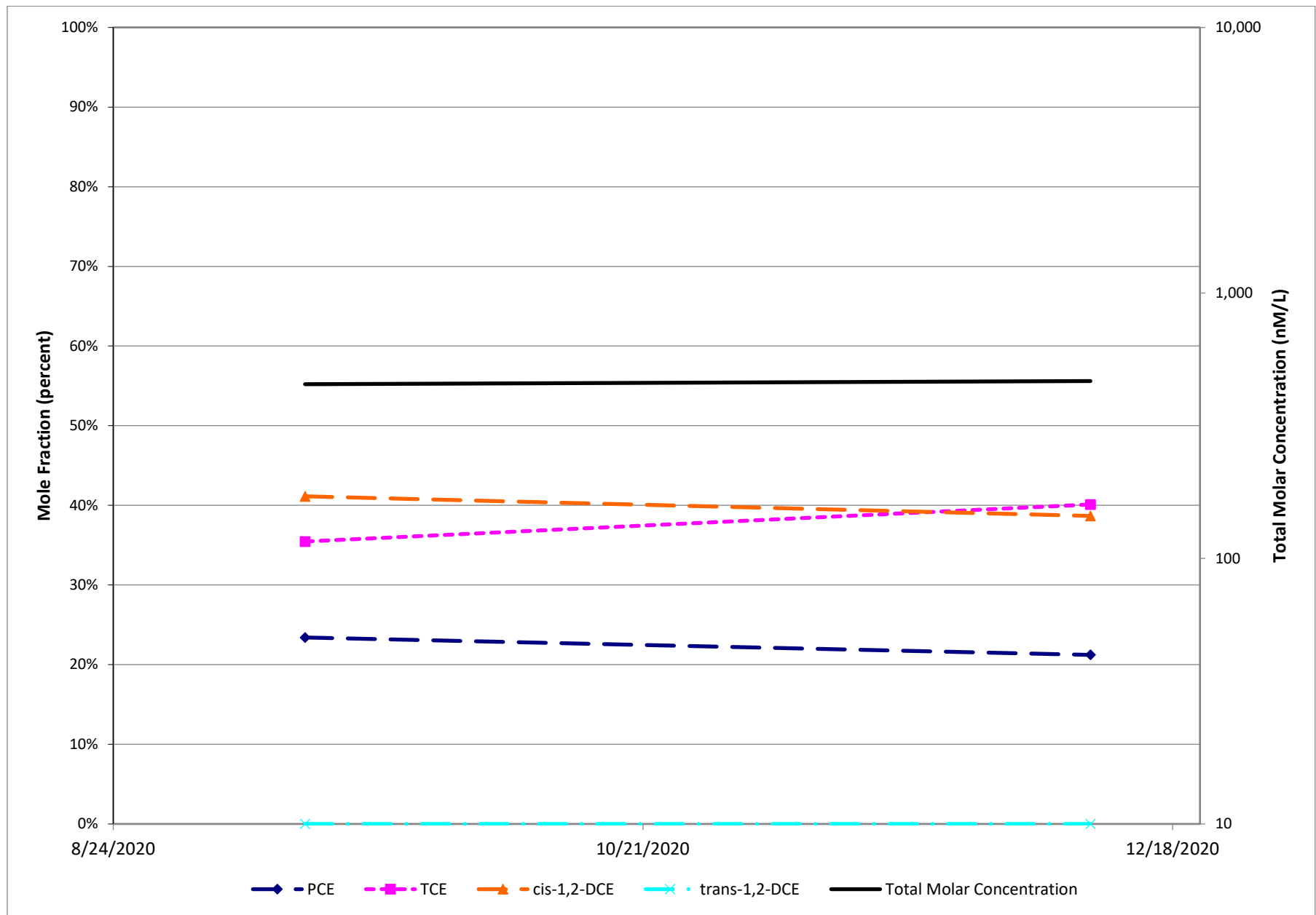


Figure 56.6.2 16-CC

CS-MW16-CC VOC Summary  
Mar 2020 - Mar 2021

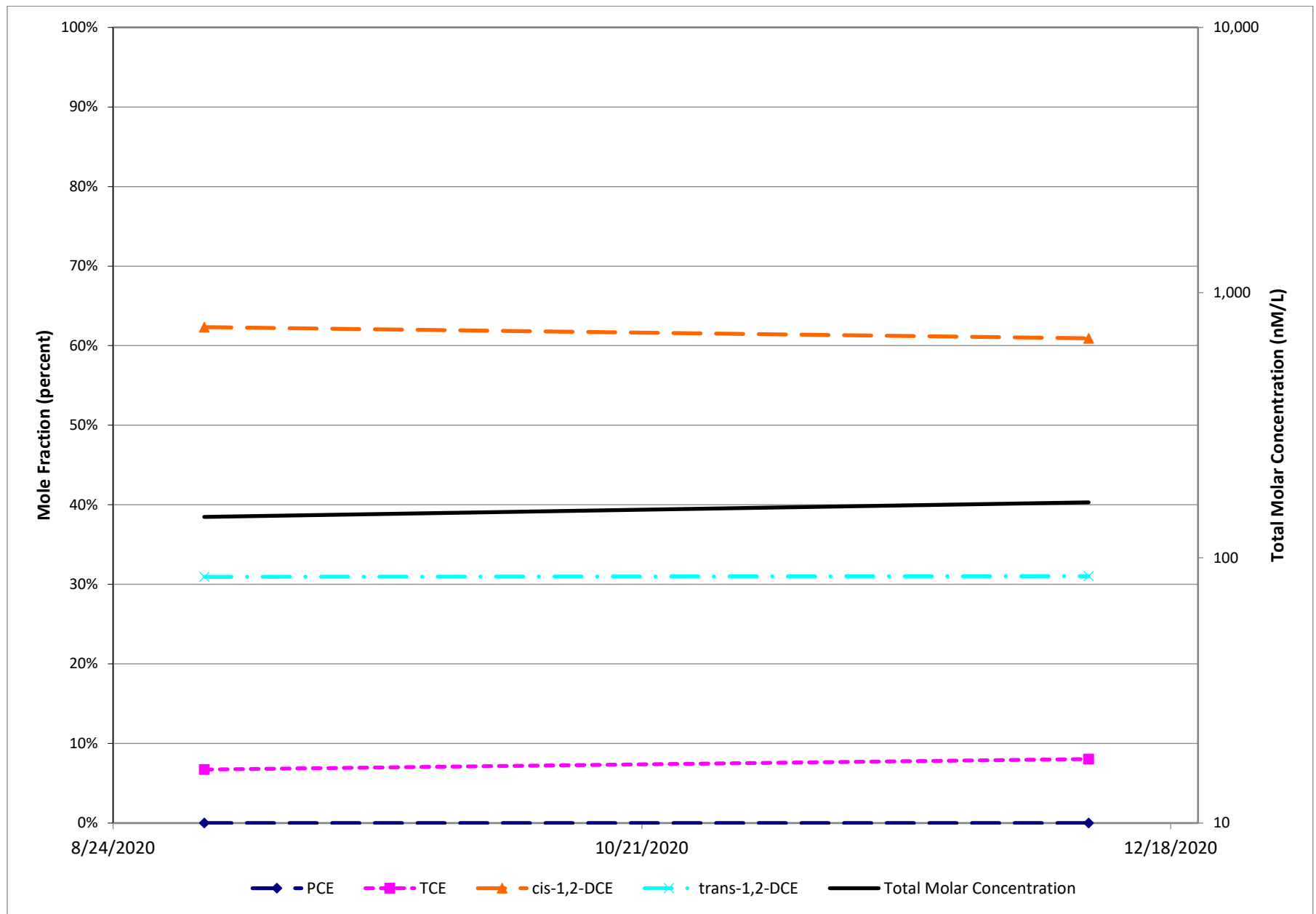


Figure 56.6.2 EXW01

**B3-EXW01 VOC Summary**  
**Mar 2020 - Mar 2021**

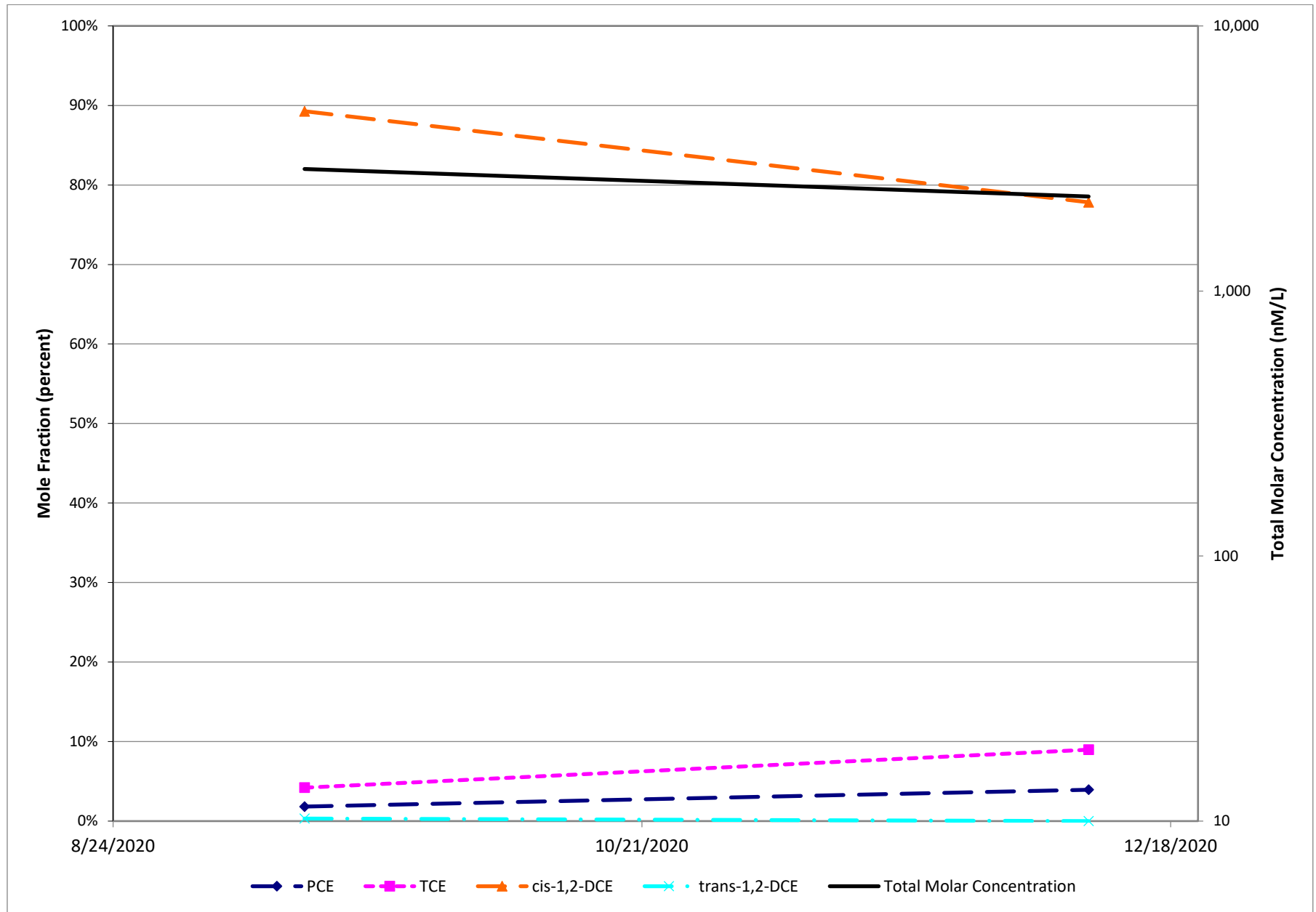


Figure 56.6.2 EXW02

**B3-EXW02 VOC Summary**  
**Mar 2020 - Mar 2021**

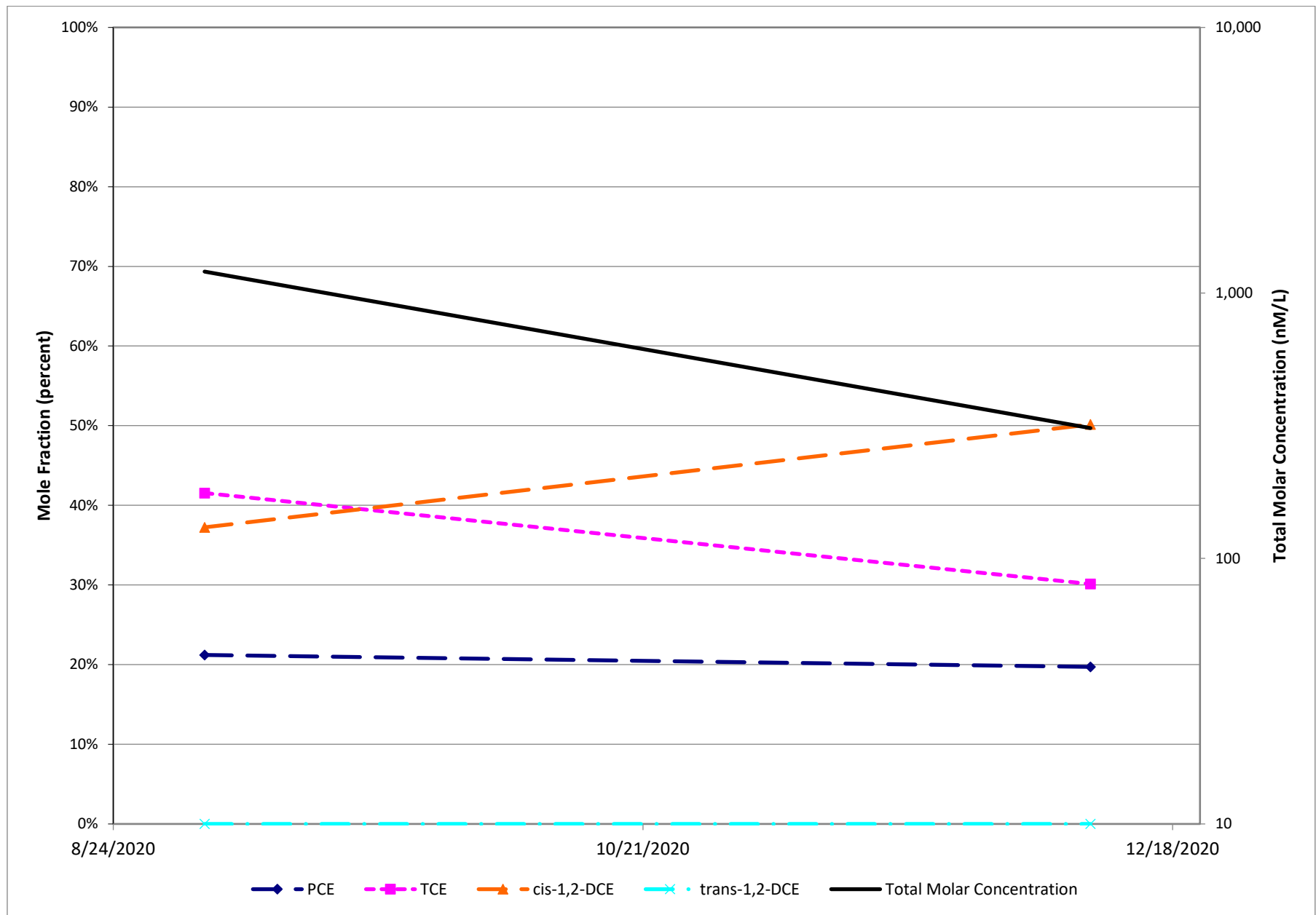




Figure 56.6.2 EXW03

**B3-EXW03 VOC Summary**  
**Mar 2020 - Mar 2021**

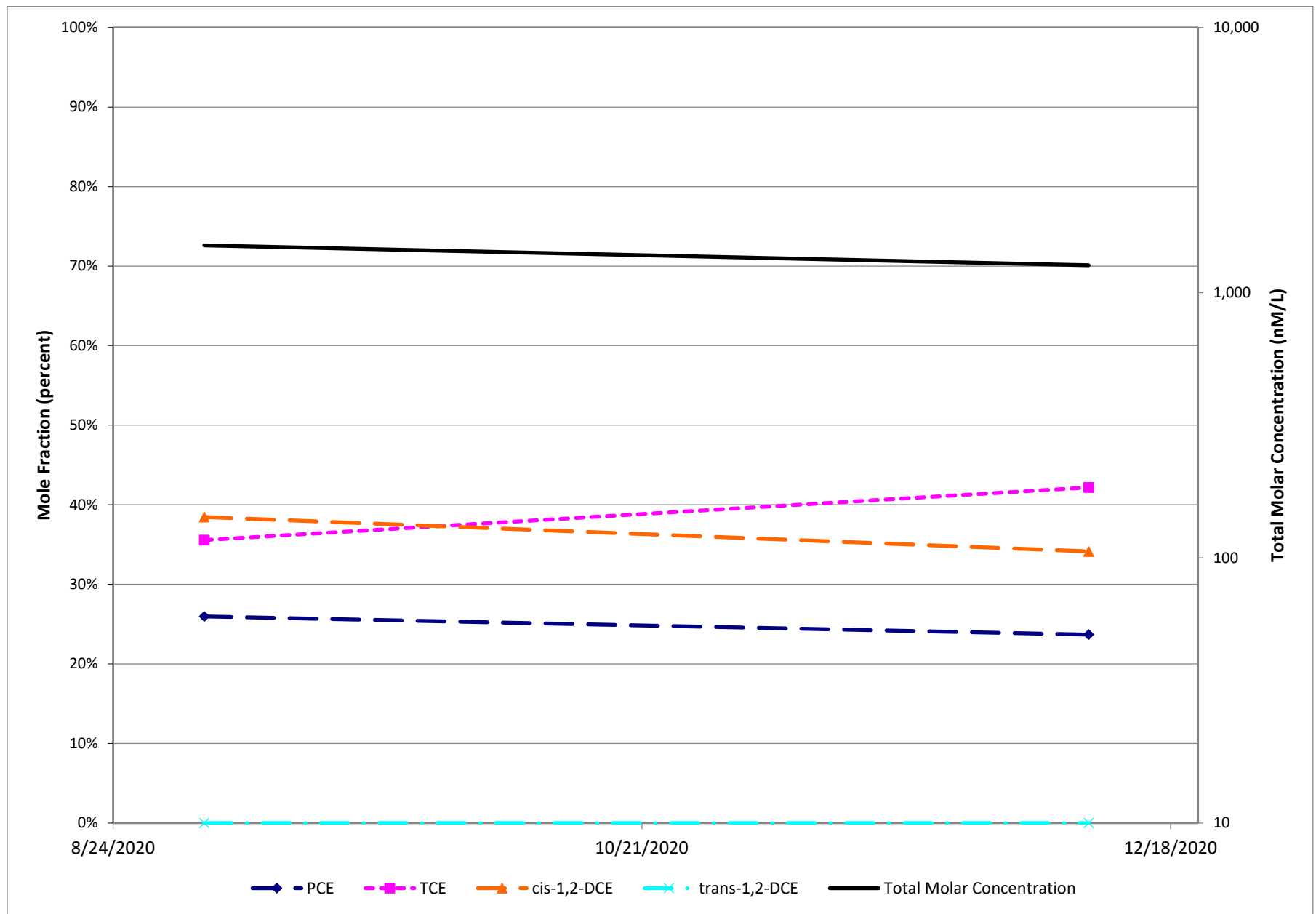


Figure 56.6.2 EXW04

**B3-EXW04 VOC Summary**  
**Mar 2020 - Mar 2021**

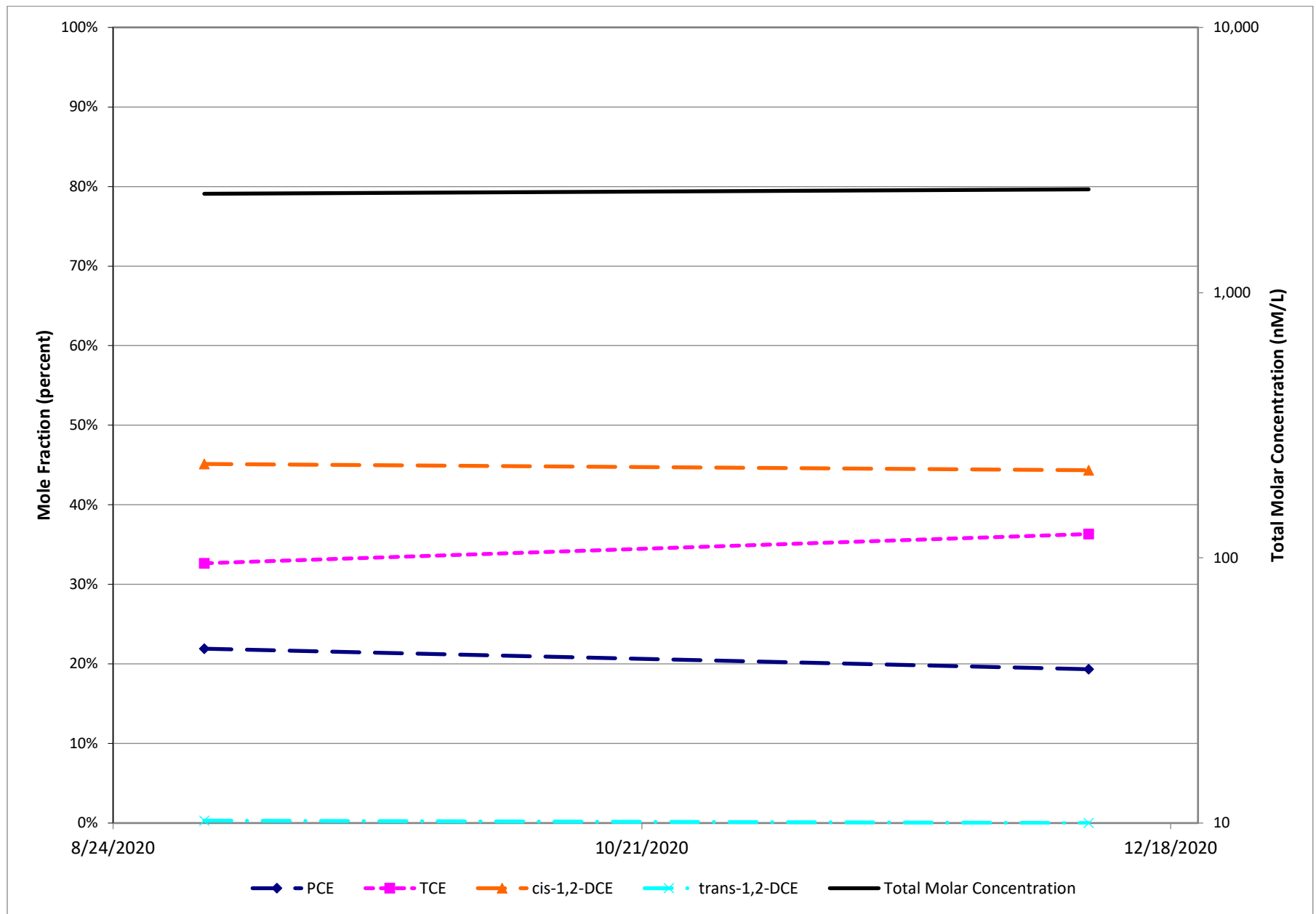
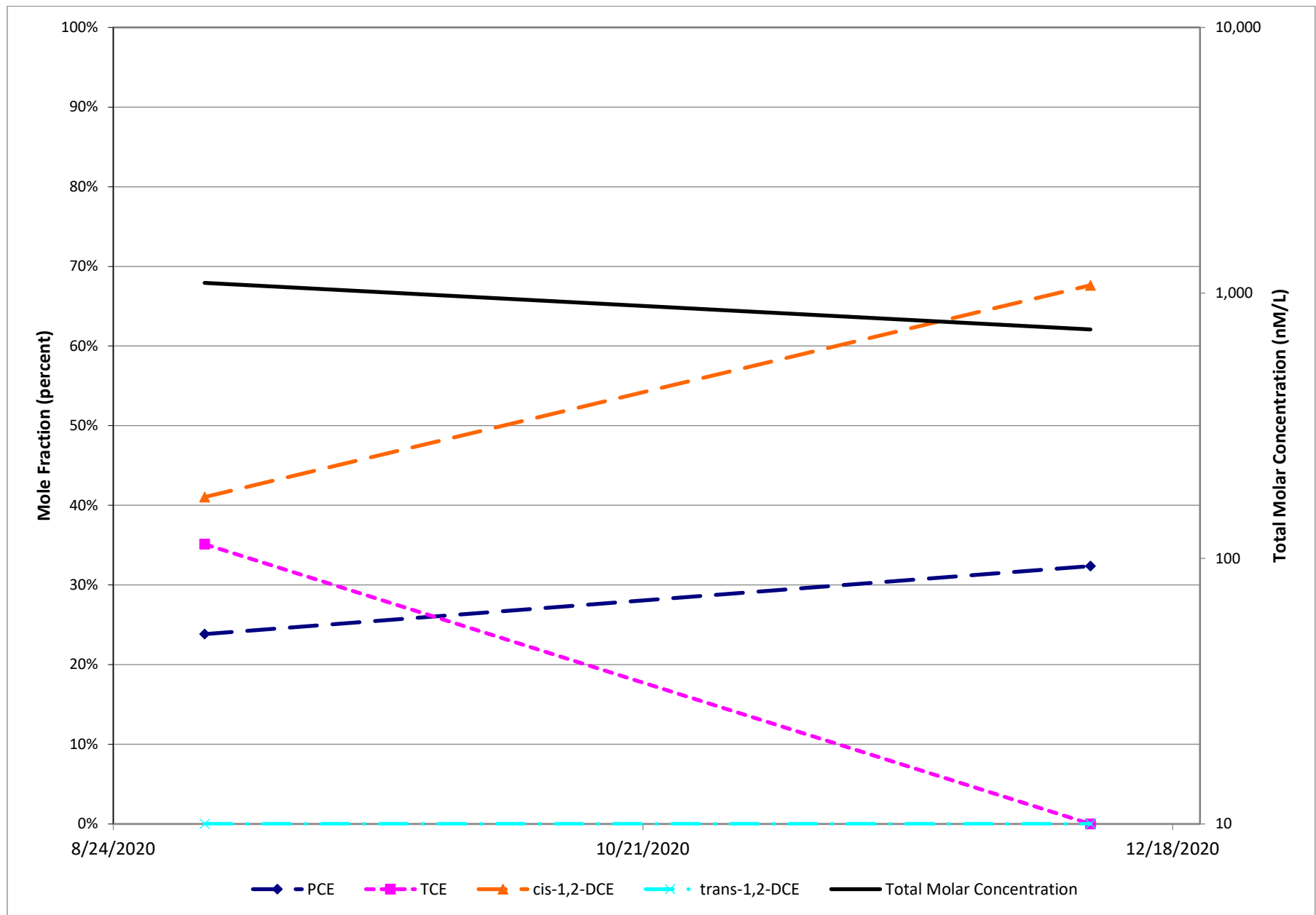


Figure 56.6.2 EXW05

**B3-EXW05 VOC Summary**  
**Mar 2020 - Mar 2021**



## Tables

Table 56.1.1

**SWMU B-3 Bioreactor Trenches - Field Measurement Data**  
**March 2020 - 2021**

TRENCH 1								
Sump 1-1								
Sump Depth: 15.56 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	930	6.31	6.34	22.12	0.954	0.21	-160.4	9.64
6/11/2020	900	3.38	6.73	24.73	0.643	0.12	112.6	12.57
9/18/2020	820	7.05	6.66	24.29	0.677	0.39	-118.9	8.9
12/23/2020	1004	10.55	6.25	19.07	0.645	0.36	-135.6	5.4
3/8/2021	830	10.10	7.10	20.51	1.018	0.58	-193.0	5.85

TRENCH 1								
Sump 1-2								
Sump Depth: 15.52 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/16/2020	830	5.80	6.84	22.17	0.801	0.52	-134.2	9.72
6/11/2020	900	3.32	6.49	24.46	0.784	0.1	-26.8	12.2
9/14/2020	1140	8.45	6.19	28.72	1.123	0.21	-200.7	7.07
12/23/2020	958	10.28	6.22	21.40	1.008	1.22	-76.4	5.24
3/4/2021	930	12.01	6.30	20.50	1.052	1.13	26.2	3.51

TRENCH 1								
Sump 1-3								
Sump Depth: 14.97 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	815	4.8	6.24	24.24	1.509	0.76	-86.1	10.17
6/11/2020	900	3.18	6.38	26.38	1.104	0.15	51.6	11.79
9/18/2020	900	5.9	6.3	29.46	1.191	0.33	-41.6	9.07
12/23/2020	952	8.8	6.18	21.86	1.150	0.96	-64	6.17
3/8/2021	815	10.95	6.18	20.49	1.435	1.13	-36.9	4.02

Table 56.1.1

**SWMU B-3 Bioreactor Trenches - Field Measurement Data**  
**March 2020 - 2021**

TRENCH 2								
Sump 2-1								
Sump Depth: 11.78 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/16/2020	1015	6.47	7.04	20.51	0.708	1.11	-175.5	5.31
6/11/2020	900	3.72	6.77	22.81	0.648	0.48	132.2	8.06
9/14/2020	1345	8.78	6.37	25.82	0.593	0.11	-213.7	3.00
12/23/2020	948	10.5	5.52	15.64	0.586	1.27	59.1	1.28
3/4/2021	1015	10.85	6.71	16.74	0.870	0.73	-189.7	0.93

TRENCH 2								
Sump 2-2								
Sump Depth: 11.12 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	845	5.77	6.09	22.99	0.913	0.29	-102.6	5.35
6/11/2020	900	2.91	6.50	24.93	0.754	0.24	-36.6	8.21
9/18/2020	845	6.5	6.17	24.12	1.033	0.7	-70.3	4.62
12/23/2020	944	10.1	6.11	20.67	1.021	1.5	-98.7	1.02
3/8/2021	Dry							

Table 56.1.1

**SWMU B-3 Bioreactor Trenches - Field Measurement Data**  
**March 2020 - 2021**

TRENCH 3								
Sump 3-1								
Sump Depth: 11.05 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020		8.19	6.10	19.10	1.147	1.09	46.60	2.86
6/11/2020	900	6.30	6.49	24.12	1.045	0.14	166.5	4.75
9/14/2020	900	9.82	6.34	27.79	1.676	0.32	-174.9	1.23
12/23/2020	Dry							
3/8/2021	Dry							

TRENCH 3								
Sump 3-2								
Sump Depth: 6.7 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	Dry							
6/11/2020	900	4.58	6.84	26.26	0.633	0.29	45.1	2.82
9/14/2020	Dry							
12/23/2020	Dry							
3/8/2021	Dry							

Table 56.1.1

SWMU B-3 Bioreactor Trenches - Field Measurement Data  
 March 2020 - 2021

TRENCH 4								
Sump 4-1								
Sump Depth: 8.42 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		<i>(feet BTOC)</i>		<i>(°C)</i>	<i>(m-mho/cm)</i>	<i>(mg/L)</i>	<i>(eV)</i>	<i>(feet)</i>
3/18/2020	Dry							
6/11/2020	900	7.10	6.94	25.43	0.842	1.45	239.2	1.32
9/14/2020	Dry							
12/23/2020	Dry							
3/8/2021	Dry							



Table 56.1.1

**SWMU B-3 Bioreactor Trenches - Field Measurement Data**  
**March 2020 - 2021**

TRENCH 5								
Sump 5-1								
Sump Depth: 11.55 feet BTOC								
Sample Date	Sample Time	Sump H2O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H2O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	1005	9.74	6.34	22.08	0.837	0.49	-70.8	1.81
6/11/2020	900	9.00	6.79	23.07	0.633	1.10	198	2.55
9/14/2020	900	10.22	6.44	25.03	0.788	0.28	-164.9	1.33
12/23/2020	925	11.31	6.44	23.85	0.538	3.81	-7	0.24
3/8/2021	Dry							

TRENCH 5								
Sump 5-2								
Sump Depth: 11.04 feet BTOC								
Sample Date	Sample Time	Sump H2O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H2O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	Dry							
6/11/2020	900	9.30	6.54	29.30	1.172	0.42	157.1	1.74
9/14/2020	900	10.03	6.56	22.44	1.232	0.53	-161.8	1.01
12/23/2020	Dry							
3/8/2021	Dry							

Table 56.1.1

**SWMU B-3 Bioreactor Trenches - Field Measurement Data**  
**March 2020 - 2021**

<b>TRENCH 6</b>								
<b>Sump 6-1</b>								
Sump Depth: 14.5 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/18/2020	1030	10.42	6.58	22.23	0.629	0.25	-163.50	4.17
6/11/2020	900	9.41	6.83	23.50	0.741	0.29	243.90	5.18
9/18/2020	800	9.41	6.72	23.09	0.593	1.36	54.80	5.18
12/23/2020	909	11.75	6.25	21.05	0.551	1.68	-25.40	2.84
3/8/2021	900	11.78	7.56	21.01	0.787	6.57	45.40	2.81

<b>TRENCH 6</b>								
<b>Sump 6-2</b>								
Sump Depth: 15.56 feet BTOC								
Sample Date	Sample Time	Sump H <sub>2</sub> O Level	pH	Temperature	Specific Conductivity	Dissolved Oxygen	ORP	Sump H <sub>2</sub> O Thickness
		(feet BTOC)		(°C)	(m-mho/cm)	(mg/L)	(eV)	(feet)
3/16/2020	1110	9.7	6.95	22.26	0.614	0.51	-208.7	5.80
6/11/2020	900	8.96	6.72	23.21	0.651	0.70	90.1	6.54
9/14/2020	940	10.03	6.22	23.95	0.692	0.41	-260.3	5.47
12/23/2020	915	11.28	5.93	21.32	0.767	2.00	-113.1	4.22
3/4/2021	1115	11.17	6.52	20.64	0.920	1.05	-130.0	4.33

Table S6.1.2

B-3 Bioreactor Trench VOC Summary  
March 2020 - March 2021

Q56 Date	T1-1			T1-2			T1-3		
	3/18/2020	9/18/2020	3/8/2021	3/16/2020	9/14/2020	3/4/2021	3/18/2020	9/18/2020	3/8/2021
PCE (µg/L)	0	0	0	0	0	0	0	0	0
TCE (µg/L)	1.5	3.0	0	0.51	0	0	0	0	0
cis-1,2-DCE (µg/L)	6.8	7.5	0	0.61	0.15	0	3.2	0.26	0
trans-1,2-DCE (µg/L)	0	0.42	0	0.44	0	0	0	0	0
Vinyl chloride (µg/L)	4.2	1.8	0	0.37	0	0	13	0	0
Ethene (µg/L)	0	0	0	0	0	0	0	0	0
PCE (nM/L)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TCE (nM/L)	11.493	22.757	0.000	3.882	0.000	0.000	0.000	0.000	0.000
cis-1,2-DCE (nM/L)	69.624	76.947	0.000	6.292	1.547	0.000	33.213	2.682	0.000
trans-1,2-DCE (nM/L)	0.000	4.332	0.000	4.538	0.000	0.000	0.000	0.000	0.000
Vinyl chloride (nM/L)	67.509	28.795	0.000	5.919	0.000	0.000	213.086	0.000	0.000
Ethene (nM/L)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Molar Conc. (nM/L)	148.63	132.83	0.00	20.63	1.55	0.00	246.30	2.68	0.00
% moles PCE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% moles TCE	7.7%	17.1%	0.0%	18.8%	0.0%	0.0%	0.0%	0.0%	0.0%
% moles cis-1,2-DCE	46.8%	57.9%	0.0%	30.5%	100.0%	0.0%	13.5%	100.0%	0.0%
% moles trans-1,2-DCE	0.0%	3.3%	0.0%	22.0%	0.0%	0.0%	0.0%	0.0%	0.0%
% moles Vinyl Chloride	45.4%	21.7%	0.0%	28.7%	0.0%	0.0%	86.5%	0.0%	0.0%
% moles Ethene	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
sum % moles	100.0%	100.0%	0.0%	100.0%	100.0%	0.0%	100.0%	100.0%	0.0%

Q56 Date	T2-1			T2-2	
	3/16/2020	9/14/2020	3/4/2021	3/18/2020	9/18/2020
PCE (µg/L)	0	0	0	0	0
TCE (µg/L)	0	0.72	2.3	0	0.25
cis-1,2-DCE (µg/L)	2.2	2.6	3.7	1.9	1.7
trans-1,2-DCE (µg/L)	0.29	0	0	0	0.92
Vinyl chloride (µg/L)	6.3	0	0	6.7	0.54
Ethene (µg/L)	0	0	0	0	0
PCE (nM/L)	0.000	0.000	0.000	0.000	0.000
TCE (nM/L)	0.000	5.480	17.657	0.000	1.903
cis-1,2-DCE (nM/L)	22.383	26.509	38.164	19.804	17.638
trans-1,2-DCE (nM/L)	2.991	0.000	0.000	0.000	9.489
Vinyl chloride (nM/L)	101.264	0.000	0.000	106.703	8.639
Ethene (nM/L)	0.000	0.000	0.000	0.000	0.000
Total Molar Conc. (nM/L)	126.64	31.99	55.82	126.51	37.67
% moles PCE	0.0%	0.0%	0.0%	0.0%	0.0%
% moles TCE	0.0%	17.1%	31.6%	0.0%	5.1%
% moles cis-1,2-DCE	17.7%	82.9%	68.4%	15.7%	46.8%
% moles trans-1,2-DCE	2.4%	0.0%	0.0%	0.0%	25.2%
% moles Vinyl Chloride	80.0%	0.0%	0.0%	84.3%	22.9%
% moles Ethene	0.0%	0.0%	0.0%	0.0%	0.0%
sum % moles	100.0%	100.0%	100.0%	100.0%	100.0%

Q56 Date	T6-1			T6-2		
	3/18/2020	9/18/2020	3/8/2021	3/16/2020	9/14/2020	3/4/2021
PCE (µg/L)	1.0	26	0	0	0	0
TCE (µg/L)	5.3	35	0	0	0.35	0
cis-1,2-DCE (µg/L)	37	44	2.9	0.42	1.8	1.7
trans-1,2-DCE (µg/L)	0	0.24	0	0.58	0.49	1.3
Vinyl chloride (µg/L)	6.2	0	0	0.56	0	0
Ethene (µg/L)	0	0	0	0	0	0
PCE (nM/L)	6.030	154.797	0.000	0.000	0.000	0.000
TCE (nM/L)	40.642	265.698	0.000	0.000	2.664	0.000
cis-1,2-DCE (nM/L)	378.958	451.676	29.706	4.332	18.360	17.432
trans-1,2-DCE (nM/L)	0.000	2.476	0.000	5.982	5.054	13.822
Vinyl chloride (nM/L)	99.344	0.000	0.000	8.959	0.000	0.000
Ethene (nM/L)	0.000	0.000	0.000	0.000	0.000	0.000
Total Molar Conc. (nM/L)	524.97	874.65	29.71	19.27	26.08	31.3
% moles PCE	1.1%	17.7%	0.0%	0.0%	0.0%	0.0%
% moles TCE	7.7%	30.4%	0.0%	0.0%	10.2%	0.0%
% moles cis-1,2-DCE	72.2%	51.6%	100.0%	22.5%	70.4%	55.8%
% moles trans-1,2-DCE	0.0%	0.3%	0.0%	31.0%	19.4%	44.2%
% moles Vinyl Chloride	18.9%	0.0%	0.0%	46.5%	0.0%	0.0%
% moles Ethene	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%

Note: 0 sample indicates a non-detect analyte value

Table 56.1.3

B-3 Bioreactor Analytical Summary  
March 2020 - March 2021

Q56 Bioreactor Active Trench Sumps																			
Well ID	T1-1						T1-2						T1-3						
	3/18/2020		9/18/2020		3/8/2021		3/16/2020		9/14/2020		3/4/2021		3/18/2020		9/18/2020		3/8/2021		
Sample Date	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	
Compound	Units																		
Total Organic Carbon	mg/L	24		17		19	F	25		24		7.1		56		28		14	F
Methane	µg/L	2,160		3,760		1,380		6,060		4,200		1,700		7,140		3,550		2,030	
Ethene	µg/L	0		0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		1.5	F	0		0		0		0		0	
Carbon Dioxide	µg/L	57,500		79,500		83,000		134,000		295,000		212,000		409,000		306,000		268,000	
Sulfate	mg/L	8.0		8.2	F			0						3.1		19		F	
Chloride	mg/L	17		19	F			16		22				25		17		F	
Ferrous Iron	mg/L	5.4		2.7				9.7		9.9				15	J	30		J	
Manganese	µg/L	323		227		226		470		517		567		1,000		1,040		1,040	
Hydrogen	nM							5.1		5.5									
Sulfide	mg/L	0		0				0		0				0		0			
Total Dissolved Solids	mg/L	502		593		534		531		880		599		954		969		739	
Benzene	µg/L	0		0		0		0		0		0		0		0.11		F	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	6.8		7.5		0		0.61	F	0.15	F			3.2		0.26		F	0
Dichloroethene, trans-1,2-	µg/L	0		0.42	F	0		0.44	F	0		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		0.79		0	
Tetrachloroethene	µg/L	0		0		0		0		0		0		0		0		0	
Toluene	µg/L	1.3		0.18	F	0		0		0.12	F	0		22		0.36		F	0
Trichloroethene	µg/L	1.5		3.0		0		0.51	F	0		0		0		0		0	
Vinyl chloride	µg/L	4.2		1.8		0		0.37	F	0		0		13		0		0	
Arsenic	µg/L	3.3	F	1.1	F	7.6	F	0.50	F	1.6	F	16	F	4.9	F	0		11	F
		Month 155		Month 161		Month 167		Month 155		Month 161		Month 167		Month 155		Month 161		Month 167	

Q56 Bioreactor Active Trench Sumps											
Well ID	T2-1						T2-2				
	3/16/2020		9/14/2020		3/4/2021		3/18/2020		9/18/2020		
Sample Date	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	
Compound	Units										
Total Organic Carbon	mg/L	21		15		0		11		7.7	
Methane	µg/L	1,360		2,090		184		5,220		3,310	
Ethene	µg/L	0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0	
Carbon Dioxide	µg/L	61,000		48,000		72,200		386,000		273,000	
Sulfate	mg/L	2.7		35				5.3		55	
Chloride	mg/L	16		30				14		16	
Ferrous Iron	mg/L	4.8		3.0				10	J	6.8	
Manganese	µg/L	340		222		31		503		237	
Hydrogen	nM	6.4									
Sulfide	mg/L	0		0				0		0	
Total Dissolved Solids	mg/L	487		499		516		513		831	
Benzene	µg/L	0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	2.2		2.6		3.7		1.9		1.7	
Dichloroethene, trans-1,2-	µg/L	0.29	F	0		0		0		0.92	
Methylene chloride	µg/L	0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0	
Tetrachloroethene	µg/L	0		0		0		0		0	
Toluene	µg/L	0		0		0		15		0.17	
Trichloroethene	µg/L	0		0.72	F	2.3		0		0.25	
Vinyl chloride	µg/L	6.3		0		0		6.7		0.54	
Arsenic	µg/L	0.80	F	2.1	F	4.3	F	3.7	F	0	
		Month 155		Month 161		Month 167		Month 155		Month 161	

Q56 Bioreactor Active Trench Sumps													
Well ID	T6-1						T6-2						
	3/18/2020		9/18/2020		3/8/2021		3/16/2020		9/14/2020		3/4/2021		
Sample Date	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	
Compound	Units												
Total Organic Carbon	mg/L	2.8		1.8		1.6		5.2		6.4		3.6	F
Methane	µg/L	65		0		4.9		1,570		4,050		192	
Ethene	µg/L	0		0		0		0		0		0	
Ethane	µg/L	0		0		0		3.2		0		0	
Carbon Dioxide	µg/L	12,700		11,000		8,620		69,800		114,000		150,000	
Sulfate	mg/L	21		21				13		11		F	
Chloride	mg/L	14		15	F			15		21			
Ferrous Iron	mg/L	3.0		0.27	F			0.99	F	3.4			
Manganese	µg/L	82		16		88		86		164		143	
Hydrogen	nM							8.1		6.6			
Sulfide	mg/L	0		0				0		0			
Total Dissolved Solids	mg/L	326		522		422		349		572		513	
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		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	37		44		2.9		0.42	F	1.8		1.7	
Dichloroethene, trans-1,2-	µg/L	0		0.24	F	0		0.58	F	0.49	F	1.3	
Methylene chloride	µg/L	0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0		0		0		0	
Tetrachloroethene	µg/L	1.0	F	26		0		0		0		0	
Toluene	µg/L	0.19	F	0		0		1.1	F	0.15	F	0	
Trichloroethene	µg/L	5.3		35		0		0		0.35	F	0	
Vinyl chloride	µg/L	6.2		0		0		0.56	F	0		0	
Arsenic	µg/L	0		0		4.9	F	0.80	F	1.4	F	3.8	F
		Month 155		Month 161		Month 167		Month 155		Month 161		Month 167	

Note: 0 sample indicates a non-detect analyte value

Table 56.2.2

**Upper Saturated Zone (Zone 03B) VOC Summary**  
**Mar 2020 - Mar 2021**

Q56	CS-WB05-LGR03B		CS-WB06-LGR03B			CS-WB07-LGR03B			CS-WB08-LGR03B
Date	3/11/2020	9/22/2020	3/12/2020	9/23/2020	3/8/2021	3/11/2020	9/23/2020	3/8/2021	3/12/2020
PCE (µg/L)	0.57	0	7.9	15	42	8.1	9.3	6.4	32
TCE (µg/L)	0.43	2.0	54	55	94	13	14	12	62
cis-1,2-DCE (µg/L)	60	77	83	98	112	17	20	12	93
trans-1,2-DCE (µg/L)	11	17	5.9	5.6	7.4	0.47	0.20	0	1.5
Vinyl chloride (µg/L)	12	19	0.22	0	0	0.31	0	0	0.63
Ethene (µg/L)	0	0	0	0	0	0	0	0	0
PCE (nM/L)	3.437	0.000	47.820	90.816	250.739	48.725	55.840	38.835	194.356
TCE (nM/L)	3.273	15.222	408.022	416.851	713.829	95.593	105.259	91.788	468.681
cis-1,2-DCE (nM/L)	614.234	791.129	857.246	1014.028	1159.773	174.007	201.753	121.403	958.123
trans-1,2-DCE (nM/L)	112.429	173.285	61.269	58.071	76.431	4.848	2.063	0.000	15.059
Vinyl chloride (nM/L)	186.850	305.231	3.519	0.000	0.000	4.959	0.000	0.000	10.078
Ethene (nM/L)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Molar Conc. (nM/L)	920.22	1284.87	1377.88	1579.77	2200.77	328.13	364.92	252.03	1646.3
% moles PCE	0.4%	0.0%	3.5%	5.7%	11.4%	14.8%	15.3%	15.4%	11.8%
% moles TCE	0.4%	1.2%	29.6%	26.4%	32.4%	29.1%	28.8%	36.4%	28.5%
% moles cis-1,2-DCE	66.7%	61.6%	62.2%	64.2%	52.7%	53.0%	55.3%	48.2%	58.2%
% moles trans-1,2-DCE	12.2%	13.5%	4.4%	3.7%	3.5%	1.5%	0.6%	0.0%	0.9%
% moles Vinyl Chloride	20.3%	23.8%	0.3%	0.0%	0.0%	1.5%	0.0%	0.0%	0.6%
% moles Ethene	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%

Note: 0 sample indicates a non-detect analyte value

Table 56.2.3a

B-3 Bioreactor Multi-Port Well CS-WB05 Analytical Summary  
Mar 2020 - Dec 2020

Q56		CS-WB05																											
Well ID		CS-WB05-LGR-01				CS-WB05-LGR03B				CS-WB05-LGR-04A				CS-WB05-LGR-04B				CS-WB05-BS-01				CS-WB05-CC-01				CS-WB05-CC-02			
Sample Date		9/28/2020		12/16/2020		3/11/2020		9/22/2020		9/22/2020		12/16/2020		9/28/2020		12/16/2020		9/21/2020		12/16/2020		9/21/2020		12/16/2020		9/21/2020		12/16/2020	
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
Total Organic Carbon	mg/L	0.62	F	0.46	F	1.4	F	0.71	F	0.89	F	0.52	F	0.90	F	0.53	F	0.56	F	0.36	F	0.58	F	0.36	F	0.82	F	0.70	F
Methane	µg/L	0.40		3.0		21		16		126		1,730		91		52		6.1		5.0		0		0.70	F	0.40	F	0.90	F
Ethene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	6,830		5,200		8,830		4,040		3,640		4,040		6,120		4,750		3,720		3,030		3,940		3,580		2,630		3,830	
Sulfate	mg/L	95				39		39		29				11	F			29				82				99			
Chloride	mg/L	18	F			11		14	F	13	F			17	F			15	F			21				23			
Ferrous Iron	mg/L	0				0.20	F	0.19	F	0.25	F			0.73	F			0		0.22	F				0.23	F			
Manganese	µg/L	3.0	F	2.0	F	0		14.2		28.4		6.0		34		32		0		0		0		0		0		2.0	F
Sulfide	mg/L	0				0		0		0		0		0		0		0		0		0		0		0		0	
Total Dissolved Solids	mg/L	698		577		449		509		503		398		395		352		511		387		585		453		605		480	
Benzene	µg/L	0		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		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	6.6		6.8		60		77		166	J	169	J	390		372	J	19		17		0.46	F	0		7.3		6.3	
Dichloroethene, trans-1,2-	µg/L	1.3		2.0		11		17		14		19		19		17		0		0		0.59	F	0		4.8		4.2	
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	0.67	F	0		0.57	F	0		0		0		75		132	J	0		0		0		0		0		0	
Toluene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	1.3		0.67	F	0.43	F	2.0		0		0.94	F	193		317	J	0		0		0.11	F	0		0.13	F	0	
Vinyl chloride	µg/L	0		0		12		19		22		50		0		33		4.2		4.8		0		0		0		0	
Arsenic	µg/L	2.2	F	0		0		0		1.8		0.30	F	14	F	16	F	0		0		0		0		0.70	F	0	
		Q54-Month 161		Q55-Month 164		Q52-Month 155		Q54-Month 161		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164	

Note: 0 sample indicates a non-detect analyte value

Table 56.2.3b

B-3 Bioreactor Multi-Port Well CS-WB06 Analytical Summary  
Mar 2020 - Mar 2021

Q56		CS-WB06																										
Well ID		CS-WB06-UGR-01				CS-WB06-LGR-01				CS-WB06-LGR-02				CS-WB06-LGR03A				CS-WB06-LGR03B				CS-WB06-LGR-04						
Sample Date		9/24/2020		12/21/2020		9/24/2020		12/17/2020		9/24/2020		12/17/2020		9/24/2020		12/17/2020		3/12/2020		9/23/2020		3/8/2021		9/23/2020		12/17/2020		
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	
Total Organic Carbon	mg/L	2.8		6.0		3.9		4.2		0.92	F	0.57	F	0.80	F	0.46	F	1.2	F	0.79	F	0.59	F	0.95	F	0.52	F	
Methane	µg/L	0		174		0		5.5		11		41		3.7		0.80	F	25		3.2		1.9		105		2.2		
Ethene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0
Ethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0
Carbon Dioxide	µg/L	12,200		33,300		27,500		9,800		4,280		5,260		4,400		3,990		7,130		4,200		7,290		9,410		7,100		
Sulfate	mg/L	10	F			9.7	F			25				21				22		22				13	F			
Chloride	mg/L	16	F			17	F			11	F			13	F			12		17	F			16	F			
Ferrous Iron	mg/L	3.5				0				0				0				0		0				0				
Manganese	µg/L	1,230		1,340		488		702		5.7		0		3.0	F	0		0		5.9		2.0	F	1.8	F	2.0	F	
Sulfide	mg/L	0				0				0				0				0		0				0				
Total Dissolved Solids	mg/L	503		478		516		527		456		402		455		378		413		449		360		425		414		
Benzene	µg/L	0		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		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	16		8.6		11		13		19		17		95		91		83		98		112		105	J	170	J	
Dichloroethene, trans-1,2-	µg/L	0		0		0.13	F	0.55	F	0.50	F	0.50	F	5.1		4.1		5.9		5.6		7.4		0.86		1.0		
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	0		0.48	F	1.2	F	0.42	F	0.13	F	0		16		22		7.9		15		42		49		92		
Toluene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0
Trichloroethene	µg/L	0.83	F	0		1.4		1.4		0.46	F	0.42	F	53		59		54		55		94		53		119	J	
Vinyl chloride	µg/L	1.9		0		0		0		0		1.7		0		0		0.22	F	0		0		0		0		
Arsenic	µg/L	5.6	F	0		0		0		0		0		2.0	F	0		0		1.6	F	0		0		0		
		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q52-Month 155		Q54-Month 161		Q56-Month 167		Q54-Month 161		Q55-Month 164		

Note: 0 sample indicates a non-detect analyte value

Table 56.2.3c

B-3 Bioreactor Multi-Port Well CS-WB07 Analytical Summary  
Mar 2020 - Mar 2021

Q56		CS-WB07																	
Well ID		CS-WB07-LGR-01				CS-WB07-LGR-02				CS-WB07-LGR03B						CS-WB07-LGR-04			
Sample Date		9/23/2020		12/17/2020		9/23/2020		12/17/2020		3/11/2020		9/23/2020		3/8/2021		9/23/2020		12/17/2020	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Total Organic Carbon	mg/L	8.3		4.2		1.3		0.78	F	1.0	F	0.70	F	0.59	F	0.74	F	0.39	F
Methane	µg/L	669		948		52		50		217		78		62		83		4.1	
Ethene	µg/L	0		0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	85,700		72,100		7,410		5,480		6,350		4,420		7,330		5,580		5,220	
Sulfate	mg/L	16	F			34				22		23				15	F		
Chloride	mg/L	18	F			16	F			9.6		13	F			14	F		
Ferrous Iron	mg/L	8.9				0.59	F			0		0				0			
Manganese	µg/L	1,320		1,110		21		16		2.0	F	2.7	F	2.0	F	5.3		2.0	F
Sulfide	mg/L	0				0				0		0				0			
Total Dissolved Solids	mg/L	661		582		596		476		389		472		345		502		398	
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		0.15	F	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		0.14	F	0	
Dichloroethene, cis-1,2-	µg/L	35		57		1.5		0		17		20		12		219	J	268	J
Dichloroethene, trans-1,2-	µg/L	1.1		0		0.24	F	0		0.47	F	0.20	F	0		0.53	F	1.2	
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	0.37	F	0		0.17	F	1.7		8.1		9.3		6.4		144	J	164	J
Toluene	µg/L	0		0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	0.35	F	0.87	F	0.13	F	1.7		13		14		12		174	J	263	J
Vinyl chloride	µg/L	0		8.1		0		0		0.31	F	0		0		0		0	
Arsenic	µg/L	3.2	F	0		0		2.9	F	3.9	F	0.84	F	1.6	F	0		0	
		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q52-Month 155		Q54-Month 161		Q56-Month 167		Q54-Month 161		Q55-Month 164	

Note: 0 sample indicates a non-detect analyte value



Table 56.2.3d

B-3 Bioreactor Multi-Port Well CS-WB08 Analytical Summary  
Mar 2020 - Dec 2020

Q56		CS-WB08																	
Well ID		CS-WB08-UGR-01				CS-WB08-LGR-01				CS-WB08-LGR-02				CS-WB08-LGR03B		CS-WB08-LGR-04			
Sample Date		9/28/2020		12/21/2020		9/28/2020		12/21/2020		9/28/2020		12/21/2020		3/12/2020		9/28/2020		12/21/2020	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Total Organic Carbon	mg/L	2.2		1.6		0.81	F	0.51	F	0.96	F	0.63	F	1.1	F	2.8		1.6	
Methane	µg/L	156		542		0		164		18		15		215		0		0	
Ethene	µg/L	0		0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	9,580		33,900		4,180		7,460		4,150		8,500		12,400		37,500		39,100	
Sulfate	mg/L	0				101				100				18		11	F		
Chloride	mg/L	18	F			15	F			15	F			11		19	F		
Ferrous Iron	mg/L	3.2				0				0.16	F			3.2		0			
Manganese	µg/L	578		635		2.0	F	0		2.0	F	0		26		190		5.0	
Sulfide	mg/L	0				0				0				0		0			
Total Dissolved Solids	mg/L	479		462		531		720		537		570		402		497		481	
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		1.6		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	17		31		10		8.3		19		21		93		15		22	
Dichloroethene, trans-1,2-	µg/L	1.1		0		0.33	F	0		0.91		1.2		1.5		0.12	F	0	
Methylene chloride	µg/L	0		0		0		0		0		0		0		0		0	
Naphthalene	µg/L	0		0		0.12	F	0		0		0		0		0		0	
Tetrachloroethene	µg/L	0		0		0		0		0.56	F	0		32		2.2		2.6	
Toluene	µg/L	0		0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	0.89	F	0.47	F	0		0		0.76	F	0		62		3.6		4.8	
Vinyl chloride	µg/L	0		14		0.49	F	0		0		0		0.63	F	0		0	
Arsenic	µg/L	3.2	F	2.7	F	0		0		1.4	F	0		0		0		0	
		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q54-Month 161		Q55-Month 164		Q52-Month 155		Q54-Month 161		Q55-Month 164	

Note: 0 sample indicates a non-detect analyte value

Table 56.3.3

**B-3 Bioreactor Monitoring Well Analytical Summary**  
Mar 2020 - Mar 2021

Q56		Monitoring Wells															
Well ID		CS-3		CS-MW1-LGR				CS-D				CS-MW5-LGR					
Sample Date		3/3/2021		3/2/2020		8/31/2020		3/4/2021		3/2/2020		3/2/2020		9/3/2020		3/3/2021	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Total Organic Carbon	mg/L	0.51	F	1.1		0.77	F	0.49	F	0.90	F	0.97	F	0.59	F	0.49	F
Methane	µg/L	0		0.63	F	0		0		0		0		0		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	27,300		9,020		6,550		24,100		6,110		6,800		8,720		21,000	
Sulfate	mg/L			15		37				20		15		18	F		
Chloride	mg/L			9.3		18	F			10		8.8		10	F		
Ferrous Iron	mg/L			0		0				0		0		0			
Manganese	µg/L	0		0		50		3.0	F	0		0		3.0	F	0	
Hydrogen	nM			1.9		3.6											
Sulfide	mg/L			0		0				0		0		0			
Total Dissolved Solids	mg/L	308		320		438		320		337		336		330		303	
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	0		14		5.7		19		3.1		7.1		7.3		1.8	
Dichloroethene, trans-1,2-	µg/L	0		0		0		0		0		1.4		1.4		0.67	
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	1.2	F	11		5.2		15		4.1		1.8		1.6		0.41	F
Toluene	µg/L	0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	0		22		6.6		17		4.7		5.3		5.5		0.32	F
Vinyl chloride	µg/L	0		0		0		0		0		0		0		0	
Arsenic	µg/L	1.4	F	0.80	F	0		2.3	F	2.0	F	0		0.40	F	1.9	F

Note: 0 sample indicates a non-detect analyte value

Table 56.4.4

**SWMU B-3 Microbial Data Summary**  
**Mar 2020 - Mar 2021**

<b>Trench Sump</b>				
<b>B3-T1-2</b>	<b>Sample Date:</b>	<b>3/16/2020</b>	<b>9/14/2020</b>	<b>3/4/2021</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>			
Dehalococcoides spp (1)	cells/mL	2.38E+03	1.01E+03	4.15E+02
<b>Functional Genes</b>	<b>Units</b>			
TCE R-Dase (1)	cells/mL	1.32E+02	1.46E+02	1.46E+01
BAV1 VC R-Dase (1)	cells/mL	3.40E+00	3.20E+00	1.40E+01
VC R-Dase	cells/mL	5.36E+02	3.09E+02	4.24E+01
<b>B3-T2-1</b>	<b>Sample Date:</b>	<b>3/16/2020</b>	<b>9/14/2020</b>	<b>3/4/2021</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>			
Dehalococcoides spp (1)	cells/mL	1.97E+03	3.69E+01	2.41E+01
<b>Functional Genes</b>	<b>Units</b>			
TCE R-Dase (1)	cells/mL	2.54E+02	5.70E+00	1.10E+00
BAV1 VC R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01	< 5.00E-01
VC R-Dase	cells/mL	4.99E+02	8.80E+00	2.90E+00
<b>B3-T6-2</b>	<b>Sample Date:</b>	<b>3/16/2020</b>	<b>9/14/2020</b>	<b>3/4/2021</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>			
Dehalococcoides spp (1)	cells/mL	2.08E+03	2.98E+02	1.04E+03
<b>Functional Genes</b>	<b>Units</b>			
TCE R-Dase (1)	cells/mL	8.51E+01	3.85E+01	4.63E+01
BAV1 VC R-Dase (1)	cells/mL	2.63E+01	1.36E+01	1.55E+01
VC R-Dase	cells/mL	3.21E+02	7.25E+01	1.08E+02

<b>Monitoring Wells</b>				
<b>CS-MW1-LGR</b>	<b>Sample Date:</b>	<b>3/2/2020</b>	<b>8/31/2020</b>	<b>3/4/2021</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>			
Dehalococcoides spp (1)	cells/mL	3.00E-01 F	1.50E+00	1.20E+00
<b>Functional Genes</b>	<b>Units</b>			
TCE R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01	< 5.00E-01
BAV1 VC R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01	< 5.00E-01
VC R-Dase	cells/mL	< 5.00E-01	< 5.00E-01	< 5.00E-01

<b>Extraction Wells</b>			
<b>B3-EXW01</b>	<b>Sample Date:</b>	<b>9/14/2020</b>	<b>12/9/2020</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>		
Dehalococcoides spp (1)	cells/mL	1.06E+03	1.36E+04
<b>Functional Genes</b>	<b>Units</b>		
TCE R-Dase (1)	cells/mL	6.15E+01	4.62E+02
BAV1 VC R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01
VC R-Dase	cells/mL	3.86E+02	1.15E+03
<b>CS-MW16-LGR</b>	<b>Sample Date:</b>	<b>9/14/2020</b>	<b>12/9/2020</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>		
Dehalococcoides spp (1)	cells/mL	2.00E+00	< 5.00E-01
<b>Functional Genes</b>	<b>Units</b>		
TCE R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01
BAV1 VC R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01
VC R-Dase	cells/mL	5.00E-01 F	< 5.00E-01

<b>Westbay Wells</b>			
<b>CS-WB05-LGR-04B</b>	<b>Sample Date:</b>	<b>9/28/2020</b>	<b>12/16/2020</b>
<b>Dechlorinating Bacteria</b>	<b>Units</b>		
Dehalococcoides spp (1)	cells/mL	1.19E+01	6.70E+00
<b>Functional Genes</b>	<b>Units</b>		
TCE R-Dase (1)	cells/mL	2.00E-01 F	< 5.00E-01
BAV1 VC R-Dase (1)	cells/mL	< 5.00E-01	< 5.00E-01
VC R-Dase	cells/mL	2.00E-01 F	< 5.00E-01

Table 56.5.1

B3-UIC Analytical Results  
March 2020 - March 2021

	Sample ID			B3-UIC			B3-UIC			B3-UIC			B3-UIC			B3-UIC		
	Sample Date			03/18/20			06/04/20			09/21/20			12/09/20			03/08/21		
	Sample Type			N1			N1			N1			N1			N1		
Sampling Method			Grab			Grab			Grab			Grab			Grab			
Lab ID			BA08976			BA12400			BA18795			BA22870			BA28550			
	Lab MDL	Lab PQL	B3-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	0.07	1.2	--	71		1	80		1	77		1	63		1	23		1
trans-DCE	0.08	0.6	--	0.08	U	1	0.08	U	1	1.1		1	0.08	U	1	2.6		1
TCE	0.05	1.0	500	69		1	84		1	81		1	68		1	22		1
PCE	0.06	1.4	700	54		1	59		1	68		1	46		1	18		1
Toluene	0.06	1.1	--	0.06	U	1	0.06	U	1	0.06	U	1	0.06	U	1	0.06	U	1
Vinyl chloride	0.08	1.1	200	0.08	U	1	0.08	U	1	0.08	U	1	0.08	U	1	0.08	U	1
<b>EPA 160.1 (mg/L)</b>																		
TDS	4.4	10	--	302		1	318		1	466		1	384		1	382		1

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 Qualifiers:**

U - The analyte was analyzed for, but not detected. The associated numeric

**Abbreviations:**

- MDL Method Detection Limit
- PQL Practical Quantitation Limit
- N1 Environmental Sample
- UIC Underground Injection Control

Table 56.5.2

**Storage Tank (UIC) VOC Summary**  
**Mar 2020 - Mar 2021**

Q56	B3-UIC				
Date	3/18/2020	6/4/2020	9/21/2020	12/9/2020	3/8/2021
PCE (µg/L)	54	59	68	46	18
TCE (µg/L)	69	84	81	68	22
cis-1,2-DCE (µg/L)	71	80	77	63	23
trans-1,2-DCE (µg/L)	0	0	1.1	0	2.6
Vinyl chloride (µg/L)	0	0	0	0	0
Ethene (µg/L)	0	0	0	0	0
PCE (nM/L)	325.635	357.052	411.566	276.669	109.570
TCE (nM/L)	524.165	637.491	616.561	516.782	167.593
cis-1,2-DCE (nM/L)	735.637	830.015	796.080	645.178	241.362
trans-1,2-DCE (nM/L)	0.000	0.000	11.346	0.000	26.921
Vinyl chloride (nM/L)	0.000	0.000	0.000	0.000	0.000
Ethene (nM/L)	0.000	0.000	0.000	0.000	0.000
Total Molar Conc. (nM/L)	1585.4	1824.6	1835.6	1438.6	545.4
% moles PCE	20.5%	19.6%	22.4%	19.2%	20.1%
% moles TCE	33.1%	34.9%	33.6%	35.9%	30.7%
% moles cis-1,2-DCE	46.4%	45.5%	43.4%	44.8%	44.3%
% moles trans-1,2-DCE	0.0%	0.0%	0.6%	0.0%	4.9%
% moles Vinyl Chloride	0.0%	0.0%	0.0%	0.0%	0.0%
% moles Ethene	0.0%	0.0%	0.0%	0.0%	0.0%
sum % moles	100.0%	100.0%	100.0%	100.0%	100.0%

Note: 0 sample indicates a non-detect analyte value

Table 56.5.3

**SWMU B3-UIC Analytical Summary Table**  
Mar 2020 - Mar 2021

Q56		B3-UIC									
Well ID											
Sample Date		3/18/2020		6/4/2020		9/21/2020		12/9/2020		3/8/2021	
Compound	Units	Value	Flag	Value	Flag	Value	Flag	Value	Flag	Value	Flag
Total Dissolved Solids	mg/L	302		318		466		384		382	
Benzene	µg/L	0		0		0		0		0	
Bromodichloromethane	µg/L	0		0		0		0		0	
Bromoform	µg/L	0		0		0		0		0	
Chloroform	µg/L	0		0		0		0		0	
Dibromochloromethane	µg/L	0		0		0		0		0	
Dichlorodifluoromethane	µg/L	0		0		0		0		0	
Dichloroethene, 1,1-	µg/L	0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	71		80		77		63		23	
Dichloroethene, trans-1,2-	µg/L	0		0		1.1		0		2.6	
Methylene chloride	µg/L	0		0		0		0		0	
Naphthalene	µg/L	0		3.1		0		0		0	
Tetrachloroethene	µg/L	54		59		68		46		18	
Toluene	µg/L	0		0		0		0		0	
Trichloroethene	µg/L	69		84		81		68		22	
Vinyl chloride	µg/L	0		0		0		0		0	

Table 56.6.2

**B-3 Bioreactor Extraction Well VOC Summary**  
**Mar 2020 - Mar 2021**

Q56 Date	16-CC		EXW01		EXW02		EXW03		EXW04		EXW05		16-LGR	
	9/3/2020	12/9/2020	9/14/2020	12/9/2020	9/3/2020	12/9/2020	9/3/2020	12/9/2020	9/3/2020	12/9/2020	9/3/2020	12/9/2020	9/14/2020	12/9/2020
PCE (µg/L)	0	0	8.8	15	42	10	65	50	86	79	43	39	18	16
TCE (µg/L)	1.3	1.7	16	27	66	12	70	70	101	117	50	0	21	25
cis-1,2-DCE (µg/L)	8.6	9.6	250	171	43	15	56	42	103	105	43	48	18	17
trans-1,2-DCE (µg/L)	4.3	4.9	0.89	0	0	0	0	0	0.70	0	0	0	0	0
Vinyl chloride (µg/L)	0	0	7.9	13	0	0	0	0	0	0	0	0	0	0
Ethene (µg/L)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PCE (nM/L)	0.000	0.000	52.765	89.550	255.261	61.087	391.184	300.187	516.794	473.919	260.025	235.844	106.072	98.836
TCE (nM/L)	9.590	13.015	121.242	204.049	499.886	93.310	535.733	534.516	769.998	890.327	383.210	0.000	160.667	186.772
cis-1,2-DCE (nM/L)	88.912	98.608	2575.761	1768.540	448.066	155.338	579.371	432.697	1064.363	1086.952	447.757	492.728	186.385	180.093
trans-1,2-DCE (nM/L)	44.146	50.232	9.180	0.000	0.000	0.000	0.000	0.000	7.220	0.000	0.000	0.000	0.000	0.000
Vinyl chloride (nM/L)	0.000	0.000	126.380	210.366	0.000	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total Molar Conc. (nM/L)	142.65	161.85	2885.33	2272.51	1203.21	309.73	1506.29	1267.40	2358.38	2451.20	1090.99	728.57	453.12	465.7
% moles PCE	0.0%	0.0%	1.8%	3.9%	21.2%	19.7%	26.0%	23.7%	21.9%	19.3%	23.8%	32.4%	23.4%	21.2%
% moles TCE	6.7%	8.0%	4.2%	9.0%	41.5%	30.1%	35.6%	42.2%	32.6%	36.3%	35.1%	0.0%	35.5%	40.1%
% moles cis-1,2-DCE	62.3%	60.9%	89.3%	77.8%	37.2%	50.2%	38.5%	34.1%	45.1%	44.3%	41.0%	67.6%	41.1%	38.7%
% moles trans-1,2-DCE	30.9%	31.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
% moles Vinyl Chloride	0.0%	0.0%	4.4%	9.3%	0.0%	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%	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%	100.0%	100.0%

Note: 0 sample indicates a non-detect analyte value

Table 56.6.3

B-3 Bioreactor Extraction Well Analytical Summary  
Mar 2020 - Mar 2021

Q56		Extraction Wells																											
Well ID		CS-MW16-CC				B3-EXW01				B3-EXW02				B3-EXW03				B3-EXW04				B3-EXW05				CS-MW16-LGR			
Sample Date	Units	9/3/2020		12/9/2020		9/14/2020		12/9/2020		9/3/2020		12/9/2020		9/3/2020		12/9/2020		9/3/2020		12/9/2020		9/3/2020		12/9/2020		9/14/2020		12/9/2020	
Compound		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
Total Organic Carbon	mg/L	0.47	F	0.43	F	1.8		1.0		0.67	F	0.79	F	2.0		1.5		0		0.51	F	0.47	F	0.41	F	0.60	F	0.33	F
Methane	µg/L	2.0		1.8		162		139		0		72		0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Ethane	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Carbon Dioxide	µg/L	6,180		6,760		40,600		21,800		9,710		12,200		65,000		38,500		36,300		24,300		8,330		8,310		7,030		5,940	
Sulfate	mg/L	78				18	F			16	F			12	F			13	F			16	F			29			
Chloride	mg/L	23				21				16	F			16	F			17	F			14	F			18	F		
Ferrous Iron	mg/L	0.40	F			4.6				0				0				0				0				0			
Manganese	µg/L	0		2.0	F	12		28		0		13		32		194		0		0		26		2.0	F	0		25	
Hydrogen	nM					1.6	F																			3.5			
Sulfide	mg/L	0				0				0				0				0				0				0			
Total Dissolved Solids	mg/L	432		422		476		383		393		430		399		343		345		379		347		341		449		325	
Benzene	µg/L	0		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		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		0.12	F	0		0		0		0.11	F	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		0.20	F	0		0		0		0		0		0		0		0		0		0		0	
Dichloroethene, cis-1,2-	µg/L	8.6		9.6		250		171	J	43		15		56		42		103		105		43		48		18		17	
Dichloroethene, trans-1,2-	µg/L	4.3		4.9		0.89		0		0		0		0		0		0.70		0		0		0		0		0	
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	0		0		8.8		15		42		10		65		50		86		79		43		39		18		16	
Toluene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0		0	
Trichloroethene	µg/L	1.3		1.7		16		27		66		12		70		70		101		117		50		0		21		25	
Vinyl chloride	µg/L	0		0		7.9		13		0		0		0		0		0		0		0		0		0		0	
Arsenic	µg/L	0.90	F	13	F	20	F	22	F	1.9	F	5.0	F	0		11	F	0.90	F	8.1	F	2.2	F	12	F	0		3.9	F

Note: 0 sample indicates a non-detect analyte value



Table 56.7.1

SWMU B3 Shallow UGR Wells - Field Measurement Data  
Jan 2020 - Nov 2020

B3-MW-26								
Elev (ft. MSL)	1238.49		Total Depth: 20.32 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	805	13.07	6.71	21.64	0.674	1.23	190.00	1225.42
9/18/2020	1000	13.05	5.73	21.95	0.876	0.68	28.60	1225.44
11/30/2020	815	13.90	6.70	21.78	0.896	0.27	-81.00	1224.59

B3-MW-28								
Elev (ft. MSL)	1226.67		Total Depth: 18.33 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	Not enough water for field readings							
9/18/2020	Not enough water for field readings							
11/30/2020	Not enough water for field readings							

B3-MW-30								
Elev (ft. MSL)	1246.01		Total Depth: 23.90 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	1020	22.02	6.77	21.79	0.734	2.72	111.2	1223.99
9/18/2020	1250	23.06	5.83	21.63	0.737	3.48	42.3	1222.95
11/30/2020	No enough water for field readings							

B3-MW-32								
Elev (ft. MSL)	1266.98		Total Depth: 58.45 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	915	52.15	6.80	20.80	0.602	3.03	50.7	1214.83
9/18/2020	1130	39.44	6.62	21.24	0.62	0.18	-4.30	1227.54
11/30/2020	925	55.07	6.92	20.58	0.683	2.15	-46.7	1211.91

B3-MW-34								
Elev (ft. MSL)	1244.51		Total Depth: 25.40 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	840	18.23	6.72	22.29	0.754	1.24	-76.6	1226.28
9/18/2020	1050	18.05	5.78	22.16	0.973	0.24	9.9	1226.46
11/30/2020	840	19.13	6.66	22.10	0.975	0.44	-114.2	1225.38

B3-MW-27								
Elev (ft. MSL)	1233.42		Total Depth: 17.00 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	820	9.67	6.82	22.15	0.730	0.87	-191.2	1223.75
9/18/2020	1030	9.12	6.27	22.83	0.929	0.46	-16.2	1224.30
11/30/2020	1020	9.72	6.57	22.24	1.111	0.56	-72.1	1223.70

B3-MW-29								
Elev (ft. MSL)	1233.25		Total Depth: 19.30 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	Not enough water for field readings							
9/18/2020	Not enough water for field readings							
11/30/2020	Not enough water for field readings							

B3-MW-31								
Elev (ft. MSL)	1257.20		Total Depth: 39.06 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	1000	35.18	6.69	21.08	0.729	0.97	3.6	1222.02
9/18/2020	1315	33.52	5.73	21.48	0.707	0.75	23.6	1223.68
11/30/2020	945	35.04	6.86	20.93	0.760	0.17	-143.8	1222.16

B3-MW-33								
Elev (ft. MSL)	1249.55		Total Depth: 29.55 feet BTOC					
Sample Date	Sample Time	Depth to H <sub>2</sub> O (ft. BTOC)	pH	Temperature (°C)	Specific Conductivity (m-mho/cm)	Dissolved Oxygen (mg/L)	ORP (eV)	H <sub>2</sub> O Elevation (feet)
1/2/2020	900	23.05	6.77	21.39	0.741	0.49	-78.9	1226.50
9/18/2020	1110	22.16	6.23	21.40	0.699	0.35	-20.2	1227.39
11/30/2020	900	24.08	6.92	21.20	0.746	0.18	-111.1	1225.47

Table 56.7.3

B-3 Bioreactor UGR Well Analytical Summary  
Mar 2020 - Mar 2021

Q56		Shallow UGR Wells																										
Well ID	Sample Date	B3-MW26-UGR				B3-MW27-UGR				B3-MW30-UGR		B3-MW31-UGR				B3-MW32-UGR				B3-MW33-UGR				B3-MW34-UGR				
		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	
	Units																											
	Total Organic Carbon	mg/L	3.6		2.8		4.8		8.6	F	2.9	F	2.0		0		1.6		0.98	F	2.0		3.4	F	14		11	
	Methane	µg/L	4,460		1,600		1,590		356		0		6.0		3.0		0.80	F	0		58		682		3,710		4,780	
	Ethene	µg/L	0		0		0		0		0		0		0		0		0		0		0		0		0	
	Ethane	µg/L	0		8.9		0		0		0		0		0		0		0		0		0		0		0	
	Carbon Dioxide	µg/L	210,000		79,700		185,000		116,000		78,500		84,900		52,300		57,600		34,600		66,500		44,200		184,000		202,000	
	Sulfate	mg/L	0				0		61		31		14	F			13	F			0							
	Chloride	mg/L	21				19	F			16	F	17	F			14	F			16	F			21			
	Ferrous Iron	mg/L	1.8				3.3						2.1								4.8				34	J		
	Manganese	µg/L	2,210		1,700		889		804		101		188		124		165		117		1,970		1,240		1,660		893	
	Sulfide	mg/L	0				0		0		0		0		0		0		0		0		0		0		0	
	Total Dissolved Solids	mg/L	730		458		717		667		645		598		453		541		415		539		482		680		588	
	Benzene	µg/L	0		0.30	F	0		0		0		0		0		0		0		0		0		0.20	F	0.19	F
	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		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	1.0	F	1.9		0		0		5.8		5.0		9.4		5.0		7.8		6.1		0.40	F	1.2			
	Dichloroethene, trans-1,2-	µg/L	0.47	F	0.57	F	0.18	F	0		0		0.52	F	0.54	F	0		0.49	F	0.42	F	0.50	F	0.55	F		
	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	0		0		0		0		0		0		0.57	F	1.9		0		0		0		0		0	
	Toluene	µg/L	0		0		0		0		0.10	F	0		0		0		0		0		0		0		0	
	Trichloroethene	µg/L	0		0		0		0		0.17	F	0.27	F	0.29	F	0.62	F	1.2		1.2		0.63	F	0		0	
	Vinyl chloride	µg/L	0.15	F	2.0		0		0		0		0.66	F	1.9		0.29	F	0		0.91	F	1.2		0		2.1	
	Arsenic	µg/L	8.8	F	8.5	F	7.6	F	56		0		0		9.2	F	0		2.2	F	0		9.9	F	7.9	F	12	F

Note: 0 sample indicates a non-detect analyte value