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August 26, 2014 Reference No. 017390

Mr. Glenn May, CPG
NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
270 Michigan Avenue
Buffalo, NY 14203-2999

Dear Mr. May:

Re: GM Powertrain Group – Tonawanda, New York
Endoline Area Evaluation of Enhanced Attenuation

On behalf of General Motors, LLC (GM), Conestoga-Rovers & Associates, Inc. (CRA) has completed and Enhanced Natural Attenuation program to address the Endoline Area chlorinated solvent plume at the GM Tonawanda Engine Plant.

The attached report presents the results of the monitoring program, an evaluation of the effectiveness of the remedy, and recommendations for further action. Please contact Jim Hartnett at 315-463-2391 (GM) or Katherine Galanti at 716-856-2142 (CRA) if you should have any questions or comments.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Christine Barton
for

Katherine B. Galanti
Project Manager

KBG/dl/009

Encl.
cc: M. Antonetti, J. Hartnett (GM)

Evaluation of Enhanced Attenuation for the Endoline Area Chlorinated Solvent Plume

General Motors, LLC
Tonawanda Engine Plant
Tonawanda, New York

Prepared for:
General Motors, LLC

Prepared by:
Conestoga-Rovers & Associates

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Section 1.0 Introduction

On behalf of General Motors, LLC (GM), Conestoga-Rovers & Associates, Inc. (CRA) has completed a 2-year Enhanced Attenuation (EA) program to address the Endoline Area chlorinated solvent plume at the GM Tonawanda Engine Plant located in Tonawanda, New York (Site). New York State Department of Environmental Conservation (NYSDEC) Spill Number 9875474 has been assigned to this Site.

1.1 Background

CRA conducted investigation activities to delineate the chlorinated solvent plume and performed a remedial technology evaluation to identify feasible remedial options for the Endoline Area. CRA submitted the "Report of Findings for the Supplemental Phase I and Phase II of the Endoline Area Chlorinated Solvent Subsurface Investigation" to the NYSDEC on July 1, 2008. Based on the results of the investigation and remedial technology evaluation, monitored natural attenuation (MNA) was the recommended remedial alternative. The NYSDEC approved the report and agreed with the selection of MNA as the remedial alternative for the Site in a letter dated July 9, 2008.

CRA submitted a Sampling and Analysis Plan (SAP) for the MNA program to the NYSDEC on August 19, 2008. The SAP was approved by the NYSDEC in a letter dated October 8, 2008.

Groundwater monitoring was completed between October 2008 and April 2010. An evaluation of the effectiveness of the MNA remedy was prepared and submitted to the NYSDEC in October 2010. The evaluation recommended the implementation of an In Situ Enhanced Biodegradation (ISEB) program consisting of the application of a carbon source and an additional 2 years of monitoring followed by an evaluation.

A work plan for implementation of the ISEB program was submitted to the NYSDEC in February 2011. The NYSDEC approved the work plan in a letter dated March 14, 2011. Baseline sampling was completed in April 2011, and the injection program was completed in September 2011. Monitoring events were completed at 90 and 180 days post injection with the 180-day event being the first semi-annual event. The four semiannual events were completed in March 2012, September 2012, March 2013, and September 2013.

In addition to the post-injection monitoring, samples were also collected annually to monitor the concentrations of residual petroleum compounds in monitoring wells MW-2, MW-3, MW-4, and MW-5.

1.2 Enhanced Biodegradation Injections

In situ treatment was performed at the Endoline Plume Area using 20 injection wells, installed in a grid pattern with an approximate spacing of 15 feet on center, between September 15 and September 27, 2011. The injection grid covered a 4,800-square foot area around monitoring wells MW-2, MW-11, and MW-12 (Figure 1).

A 10-percent EOS™ solution, a blend of emulsified soy-lactate containing nitrogen and phosphorus nutrients, was applied at each injection well. The targeted injection amount was 495 gallons per well; however, amounts varied at each injection location. The actual injection volumes are shown in the table below:

Injection Well	*Volume of EOS™ Applied (gallons)*
IP-1	121.2
IP-2	488
IP-3	13
IP-4	81.3
IP-5	2
IP-6	458.8
IP-7	1.3
IP-8	1
IP-9	810
IP-10	10.8
IP-11	183.5
IP-12	975
IP-13	6
IP-14	633
IP-15	1
IP-16	10.7
IP-17	932.5
IP-18	744
IP-A	39
IP-B	451.5

Section 2.0 Groundwater Sampling Program

The groundwater sampling program was designed to monitor the enhanced attenuation of the chlorinated solvent contamination, monitor migration of the chlorinated solvent plume, and to evaluate current conditions related to petroleum impacts at the former underground storage tank area adjacent to the area of chlorinated solvent impacts.

Groundwater monitoring wells MW-2, MW-11, and MW-12 located within the chlorinated solvent plume, were sampled to monitor the progress of attenuation. In addition, samples were collected from injection points IP-2, IP-10, and IP-13 beginning with the 180-day monitoring event to monitor the migration of the organic substrate out of the injection well area and confirm that enhanced biodegradation is occurring in the injection well area. Monitoring wells MW-1, MW-9, MW-101, MW-102, and MW-103 were sampled to monitor plume migration, while groundwater monitoring wells MW-2, MW-3, MW-4, and MW-5 were sampled to monitor residual petroleum impacts adjacent in the area of chlorinated solvent impacts. Groundwater monitoring well locations are shown on Figure 1. The attenuation and plume migration sampling was conducted semi-annually, while sampling to evaluate the petroleum impacts was conducted annually.

The groundwater samples collected from MW-2, MW-11, MW-12, IP-2, IP-10, and IP-13 were analyzed for Target Compound List (TCL), volatile organic compounds (VOCs), and the following parameters:

1. Total organic carbon (TOC)
2. Total iron
3. Dissolved iron (field filtered)
4. Total manganese
5. Dissolved manganese (field filtered)
6. Sulfate
7. Sulfide
8. Nitrate
9. Nitrite
10. Total nitrogen (as ammonia)
11. Orthophosphate phosphorus
12. Total heterotrophic microbial count
13. Total 1,1,1-TCA-specific microbial count
14. Chemical oxygen demand (COD)
15. Biological oxygen demand (BOD)
16. Alkalinity
17. Methane
18. Ethane

Analytical results for the sampling conducted between 2011 and 2013 are presented on Table 1.

The groundwater samples collected from perimeter monitoring wells MW-1, MW-9, MW-101, MW-102, and MW-103 were analyzed for TCL VOCs to monitor plume migration. The analytical results for the plume migration monitoring conducted between 2011 and 2013 are presented on Table 2.

The samples collected from monitoring wells MW-2, MW-3, MW-4, and MW-5 were analyzed for NYSDEC Spill Technology and Remediation Series (STARS) Memo #1 list of petroleum-related VOC compounds (STARS VOCs). The analytical results for the sampling related to the petroleum impacts are presented on Table 3.

The data were validated by CRA. Application of quality assurance criteria was consistent with "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," United States Environmental Protection Agency (USEPA) 540/R-99-008, October 1999, and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review," USEPA 540/R-94-013, February 1994. The data were found to exhibit acceptable levels of accuracy and precision with the qualifiers noted on the tables.

Section 3.0 Monitoring Results

3.1 Chlorinated Volatile Organic Compounds

At monitoring well MW-2, an increase in chlorinated VOC (CVOC) concentrations was observed between the baseline and 90-day monitoring events. The concentration of 1,1,1-TCA doubled, from 12,000 micrograms per liter (µg/L) to 24,000 µg/L. Concentrations of 1,1,1-TCA breakdown products 1,1-DCA, 1,1-dichloroethene (1,1-DCE), and chloroethane (CA) also increased. 1,1-DCA increased from 4,700 µg/L to 23,000 µg/L, 1,1-DCE increased from 140 µg/L to 1,100 µg/L, and CA increased from 740 µg/L to 3,700 µg/L. These data suggest that biodegradation was occurring in this area and that the soy-lactate increased the rate of microbial activity and also had solubilized absorbed CVOCs from soil into groundwater. Therefore, the doubling of the 1,1,1-TCA concentration was likely attributable to CVOC desorption from soil. The increases observed in the concentrations of 1,1-DCA and CA suggested that the 1,1,1-TCA was being degraded by reductive dechlorination.

At the 180-day monitoring event, the 1,1,1-TCA concentration had decreased to 7,500 µg/L, which was below the 90-day level and was also 38 percent lower than the concentration measured during the baseline monitoring event. This decrease confirms that biodegradation of 1,1,1-TCA was stimulated by the soy-lactate injection. The concentration of 1,1-DCA remained similar to its level at the 90-day monitoring event; however, the concentration of 1,1-DCE decreased to close to its baseline level. The CA concentration increased slightly between the 90- and 180-day monitoring events. These data showed that degradation products were still being produced, but since their concentrations had not increased significantly, they were also being degraded.

At the 1-year monitoring event (September 2012), the CA concentration had increased from 740 µg/L at the baseline monitoring event to 42,000 µg/L. This large increase indicated that 1,1,1-TCA and 1,1-DCA were being converted to CA. 1,1,1-TCA and 1,1-DCA were not detected at this sampling event above a detection limit of 1,300 µg/L, showing that a reduction of at least 82 percent for 1,1,1-TCA and 95 percent for 1,1-DCA had occurred since the 180-day monitoring event.

At the 18-month monitoring event (March 2013), the CA concentration had dropped to 13,000 µg/L, indicating that conversion of CA to ethane was occurring. The concentration of 1,1,1-TCA had been reduced to 170 µg/L, which was a 98.6-percent reduction from the baseline concentration. The concentration of 1,1-DCA was 3,600 µg/L, which was below its baseline level and significantly lower than the concentrations observed during the 90- and 180-day monitoring events.

At the 2-year monitoring event (September 2013), 1,1,1-TCA was not detected (a 98-percent reduction); 1,1-DCA had been reduced to 1,500 µg/L, which was a 68-percent reduction over the baseline value and a 94-percent reduction over the concentrations observed during the 90- and 180-day monitoring events. CA had been reduced to 10,000 µg/L, showing that it was being converted to ethane. These data are shown in Table 1 and graphically on Figures 2 through 5.

At well MW-11, the concentrations of the CVOCs remained unchanged between the baseline and 90-day monitoring events. A small decrease in 1,1,1-TCA was observed at the 180-day monitoring event; however, this concentration had returned to the baseline level at subsequent monitoring events. Therefore, it appears that the decrease observed after 180 days was a random fluctuation. No differences in the concentrations of 1,1-DCA or CA were observed. Therefore, it does not appear that the soy-lactate treatment reached this well. These data are shown in Table 1 and graphically on Figures 6 through 9.

No CVOCs were detected at well MW-12 at the baseline monitoring event except for a low concentration of 1,1-DCA (68 µg/L). This concentration remained relatively unchanged throughout the monitoring period. No other CVOCs were detected at this well. Therefore, no effects of the soy-lactate injection were observed at this well. These data are shown in Table 1 and graphically on Figures 10 through 13.

At the 180-day, 18-month, and 2-year monitoring events, injection wells IP-2, IP-10, and IP-13 were sampled. No previous data was available for these wells. Injection well IP-2 did not have detectable concentrations of 1,1,1-TCA; however, 1,1-DCA was present at 4.5 µg/L and increased to 210 µg/L by the 18-month monitoring event but was reduced to 1.8 µg/L by the 2-year monitoring event. A small increase in CA was observed at the 18-month monitoring

event, which was reduced by the 2-year monitoring event. These data suggest that biodegradation of 1,1,1-TCA did take place in this area.

Injection well IP-10 did not contain 1,1,1-TCA but contained 1,1-DCA at 290 µg/L at the 180-day monitoring event. This concentration did not change significantly at the 18-month monitoring event but had increased to 1,600 µg/L by the 2-year monitoring event. Concentrations of 1,1-DCE also increased at this well. The CA concentration at this well was high, indicating that 1,1-DCA was being biodegraded to CA. CA increased from 4,500 µg/L to 5,300 µg/L between the 180-day and 18-month events, but decreased to 3,600 µg/L by the 2-year event, indicating that biodegradation of CA to ethane was occurring at this well.

Very low concentrations of CVOCs were present at injection well IP-13 during the 180-day monitoring event. These concentrations remained low throughout the monitoring period.

Figure 14 depicts the total CVOC concentration contours.

3.2 Dissolved Gases

The dissolved gases monitored in the groundwater included ethane, which is the final product of the anaerobic biodegradation of 1,1,1-TCA, and methane, which is produced under strictly anaerobic conditions. Methane is an indicator that highly anaerobic conditions have been established. Ethane was detected at monitoring wells MW-2 and MW-11 both before and after the soy-lactate injection, indicating that complete biodegradation of 1,1,1-TCA was occurring at these wells. The methane concentration at well MW-2 remained high throughout the monitoring period. Ethane increased significantly at the 1-year monitoring event, and a high concentration of CA was also observed. The ethane concentration remained high at well MW-2 for the rest of the monitoring period. These data show that biodegradation of CA to ethane increased as the CA concentration increased and remained high when CA stopped increasing causing the CA concentration at well MW-2 to decrease.

Small increases in the methane concentration were observed at wells MW-11 and MW-12 at the 90-day monitoring event, however, decreases in methane concentration were observed at these wells during the 180-day monitoring event. Methane concentrations fluctuated at these wells during the monitoring period.

At well MW-11, the ethane concentration remained low but detectable throughout the study, indicating that biodegradation continued at a low level at this location, which supports the observation from the CVOC data that the soy-lactate injections had a minimal effect at this well. Ethane was not observed at well MW-12 due to the very low concentrations of CVOCs in the area of this well.

The methane concentration at injection well IP-2 was high (7,600 µg/L) at the 180-day monitoring event, indicating that anaerobic conditions had been created in this area by the soy-lactate injection. The methane concentration dropped at the 18-month monitoring event but had increased to high levels again by the 2-year monitoring event. Ethane was not detected at this well at the 180-day event but was detected at the 18-month and 2-year events, indicating that biodegradation had been stimulated in this area.

In injection well IP-10, methane concentrations were high at the 180-day and 18-month monitoring events, but had decreased by the 2-year monitoring event, suggesting that the soy-lactate had become depleted in this area by this time. Ethene was observed throughout the monitoring period, indicating that complete biodegradation of CVOCs was occurring in this area.

At injection well IP-13, the methane concentration increased significantly between the 180-day and 18-month monitoring events, but then decreased by the 2-year event, suggesting that the injected soy-lactate had become depleted in this area. Ethene was observed at low levels throughout the monitoring period, reflecting the low concentrations of CVOCs in this area.

3.3 General Chemistry

General chemistry parameters measured included alkalinity, ammonia-nitrogen, nitrate and nitrite-nitrogen, orthophosphate-phosphorus, biochemical oxygen demand (BOC), chemical oxygen demand (COD), total organic carbon (TOC), sulfate, sulfide, pH, microbial counts, Dehalococcoides, and Dehalobacter. Alkalinity did not change during the monitoring period in any of the monitoring or injection wells. Nitrate and nitrite were not detected above their detection limits in any of the wells either before or after soy-lactate treatment except at well MW-12, where 0.15 milligrams per liter (mg/L) nitrate was detected during the 18-month monitoring event.

At well MW-2, ammonia-nitrogen remained at between 2.9 and 4.2 mg/L throughout the monitoring period. These levels were sufficient to sustain microbial activity. Orthophosphate-phosphorus remained present at low concentrations throughout the monitoring period. These low concentrations may have limited microbial activity. Since ammonia and phosphate were injected with the soy-lactate solution, an increase in microbial activity had been expected. BOD, COD, and TOC all showed modest increases between the baseline and 90-day monitoring events. Their concentrations remained constant to the 1-year monitoring event, but decreased by the 18-month and 2-year monitoring events, indicating that the soy-lactate may have become depleted by this time. The TOC peaked at the 1-year monitoring event at 78 mg/L at well MW-2; this concentration was low compared to the amount of organic carbon that was injected. The TOC concentration after a soy-lactate

injection should have been greater than 500 mg/L. These data may indicate that only a small amount of the injected material reached well MW-2. The sulfate concentration at well MW-2 was low initially (6 mg/L), and decreased further to 1 mg/L and to 0.4 mg/L, while sulfide increased slightly. Sulfate is reduced to sulfide under anaerobic conditions; therefore, the sulfate/sulfide data suggested that anaerobic conditions had been established at this well. The sulfate concentrations had returned to close to pre-treatment levels by the 2-year sampling event, which again suggested that the soy-lactate had become depleted in the area. Microbial counts remained similar between the baseline and 90-day injection events; however, by the 180-day monitoring event, the number of total anaerobic bacteria had increased, which supported the conclusion that anaerobic conditions suitable for reductive dechlorination were established at this well. Microbial counts remained high for the rest of the monitoring period. Dehalococcoides bacteria were present at this well at the baseline, 90-day, 180-day, and 2-year sampling events. Dehalobacter bacteria were absent at the baseline event, but present at the 90-day, 180-day, and 2-year sampling events, indicating that the population of this bacteria increased after the soy-lactate injection.

At well MW-11, ammonia-nitrogen was not detected above its detection limit either before or after the injection event, and orthophosphate remained very low both before and after the injection. These data suggested that the injected nutrients did not reach this area. BOD, COD, and TOC concentrations remained unchanged throughout the monitoring period again suggesting that the injected organic substrate did not reach this well. The sulfate concentration at well MW-11 was much higher than that at well MW-2 at the baseline injection event and remained high throughout the monitoring period. Sulfide was not detected either before or after the soy-lactate injections. Total aerobic and anaerobic heterotrophic microbial counts and anaerobic 1,1,1-TCA specific microbial counts did not increase after the soy-lactate injections, which supported the conclusion that the injected organic substrate did not reach this well. Dehalococcoides bacteria were not detected at this well during the baseline, 90-day, and 180-day sampling events; however, Dehalobacter were present at all three sampling events. Both Dehalococcoides and Dehalobacter were both present at the 2-year sampling event.

The data from well MW-12 were similar to those from well MW-11. Ammonia-nitrogen and orthophosphate phosphorus were not detected either before or after the injection event. These data suggested that the injected nutrients did not reach this well. BOD, COD, and TOC concentrations remained unchanged throughout the monitoring period, suggesting that the injected organic substrate did not reach this well. Sulfate concentrations were also similar at each monitoring event, and sulfide was not detected; therefore, it does not appear that sulfate reduction was stimulated by the injection at this well. Total aerobic and anaerobic heterotrophic microbial counts and anaerobic 1,1,1-TCA specific microbial counts decreased after the soy-lactate injection, which did not change the conclusion that the injected organic substrate did not reach this well. Dehalococcoides bacteria were not detected in this well at

either the baseline, 90-day, or 180-day sampling events; however, Dehalobacter were present at all three sampling events. Both Dehalococcoides and Dehalobacter were present at the 2-year sampling event.

At the 180-day monitoring event, high BOD, COD, and TOC concentrations were observed at the injection wells. The highest concentrations were present at well IP-2 where BOD was 480 mg/L, COD was 950 mg/L, and TOC was 260 mg/L. These data showed that a portion of the injected soy-lactate remained in the area of the injection wells. Microbial counts at the injection wells were high, and Dehalococcoides and Dehalobacter were present at all three wells. By the 18-month and 2-year monitoring events, BOD, COD, and TOC concentrations had fallen at all three injection wells, indicating that the injected material had migrated out of the areas of the injection wells and/or been consumed. These data indicated that biodegradation was occurring in the areas of the injection wells.

3.4 Field Parameters

Field parameters including pH, oxidation-reduction potential (ORP), and dissolved oxygen (DO) were monitored. At well MW-2, the pH fluctuated but remained close to neutral throughout the monitoring period showing that the soy-lactate injection did not cause a drop in pH. The ORP at well MW-2 was highly negative prior to the soy-lactate injection at -250 millivolts (mV). At the 90-day monitoring event, the ORP was -209 mV. This ORP is in the optimum range for reductive dechlorination. By the 180-day monitoring event, the ORP had increased to -119 mV. At the 1-year, 18-month, and 2-year monitoring events, the ORP remained between -148 mV and -166 mV, showing that the ORP had remained in the range at which reductive dechlorination can occur. The DO at well MW-2 was low, suggesting the presence of anaerobic conditions. The DO increased during the monitoring period but was below 1 mg/L at the final (2-year) monitoring event.

At well MW-11, the pH deceased from 6.9 to 6.1 between the baseline and 90-day monitoring events but then increased to above baseline levels by the 18-month monitoring event. The ORP fluctuated at this location being generally positive during the March monitoring events and negative during the September monitoring events. This pattern suggested that ORP in the area was affected by changes in the water level resulting from infiltration of precipitation. The DO appeared to fluctuate with the ORP. These data suggested that these parameters were not affected by the soy-lactate injection.

At well MW-12, the pH fluctuated during the monitoring period. It stayed close to neutral during the 2012 monitoring events; however, during the March 2013 (18-month) event, it increased to pH 7.5 and then fell to pH 5.5 at the September 2013 (2-year) event. As observed at well MW-11, the ORP fluctuation was likely linked to changes in water level caused by

infiltration of precipitation. The DO also fluctuated, but a seasonal pattern was not observed. These data suggested that anaerobic conditions were not established at this well.

At the injection wells, DO concentrations of less than 1 mg/L and ORP values of between -130 and -255 mV were measured, indicating that highly reducing conditions were present at the injection wells throughout the study. No drop in pH was observed at any of the injection wells except for a pH of 5.3 standard units, which was measured for injection well IP-13 during the 2-year monitoring event. This low pH did not appear to be linked to the soy-lactate injection since it occurred 2 years after the soy-lactate was injected into this well.

3.5 Petroleum Impacts

The samples collected annually in October at MW-2, MW-3, MW-4, and MW-5 were analyzed for STARS VOCs. The analytical results for the sampling related to the petroleum impacts are presented on Table 3. The data show that, with the exception of a slight increase in the concentration of methyl tert butyl ether (MTBE) at MW-3, the concentrations of the residual petroleum compounds remain stagnant.

Section 4.0 Conclusions and Recommendations

4.1 Conclusions

4.1.1 Enhanced Attenuation

The following conclusions can be drawn regarding the Enhanced Attenuation program:

- Strongly reducing conditions were present in the area of well MW-2 both before and after the soy-lactate injections. Groundwater in the areas of wells MW-11 and MW-12 did not exhibit the same level of reducing conditions.
- At monitoring well MW-2, 1,1,1-TCA was degraded to non-detect levels, and a significant decrease in the levels of 1,1-DCA was observed. A temporary increase in CA was observed; however, much of this CA was degraded to ethane during the monitoring period. These data suggested that biodegradation was stimulated in the area of well MW-2.
- Organic carbon and nutrient data suggest sufficient substrate reached well MW-2 to stimulate biodegradation, but that additional organic substrate is needed to stimulate biodegradation in the areas of MW-11 and MW-12.
- Highly reducing conditions were present in the areas of the injection wells, which would support enhanced biodegradation of 1,1,1-TCA.

The results of the injection program showed that treatment with soy-lactate and nutrients was very effective in areas where the injected material made contact with CVOCs in groundwater. At well MW-2, sufficient substrate was present to ensure that treatment of the CVOCs was very effective. Data from the injection wells support this conclusion and also confirm that enhanced biodegradation was occurring in areas where the organic substrate was present.

4.1.2 Plume Migration

A review of the data from the perimeter wells shows that there are no exceedances of any TCL VOC parameters and based on these results, the plume does not appear to be migrating.

4.1.3 Petroleum Impacts

A review of data obtained from MW-2 through MW-5 show that there has been no significant change in concentrations of benzene and MTBE over the monitoring period. Benzene and MTBE are still present at MW-3 and MTBE is still present at MW-4 at concentrations exceeding groundwater standards.

4.2 Recommendations

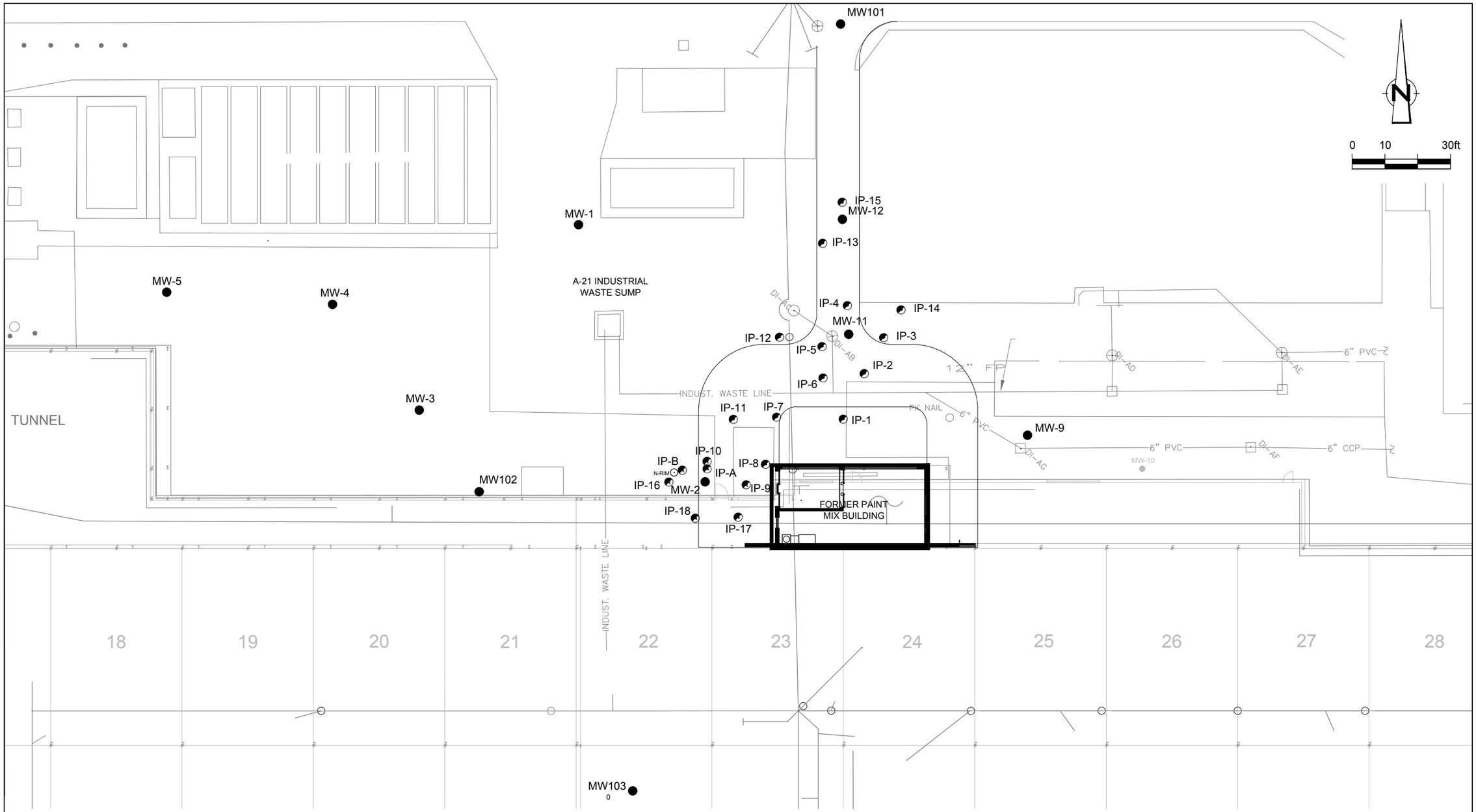
The clay matrix at the Site is tight, and groundwater flow is slow. All three monitoring wells were located in the area where the injections were performed and were located close to the injection wells. MW-11 was located within 10 feet of the nearest injection well, and wells MW-2 and MW-12 were located within approximately 5 feet of the nearest injection well. A second round of injection using direct push technology (i.e. Geoprobe™) is recommended to allow targeted injections in the areas of around MW-11 and MW-12 as well as additional injections near MW-2. Using the direct push method will allow flexibility to inject the substrate at varying depths including at the fill clay interface. It is anticipated that injections would be done at up to 10 locations to be determined in the field based on conditions at the time.

Similar to the first injection event, the injection should be followed by a groundwater monitoring program. The groundwater monitoring parameters are presented on Table 4 and the proposed monitoring schedule is provided on Table 5.

The proposed groundwater monitoring program does not include monitoring for the STARS parameters at wells MW-2 through MW-5, as data from these wells have shown no change from the October 2009 event through the September 2013 event. The concentrations of benzene and MTBE remain stagnant, and the chemistry is not migrating. It is recommended that the monitoring requirement for the petroleum portion of Spill No. 9875474 be eliminated.

It is also recommended that the perimeter well monitoring be reduced to annually, as this data has been consistent throughout the program as well. Additionally, monitoring for the natural attenuation parameters should also be reduced to annually beginning at the one-year, post-injection mark.

Figures



LEGEND

MW-1 ● MONITORING WELL LOCATION

IP-11 ◐ INJECTION WELL LOCATION

EXTENT OF GROUNDWATER CONTAMINATION

figure 1

WELL LOCATIONS
ENHANCED ATTENUATION AT THE ENDOLINE AREA CHLORINATED SOLVENT PLUME
GENERAL MOTORS COMPANY TONAWANDA ENGINE PLANT
Tonawanda, New York

17390-00(006)GN-BU001 AUG 14/2014

Figure 2. Concentration Versus Time Plot for Well MW-2

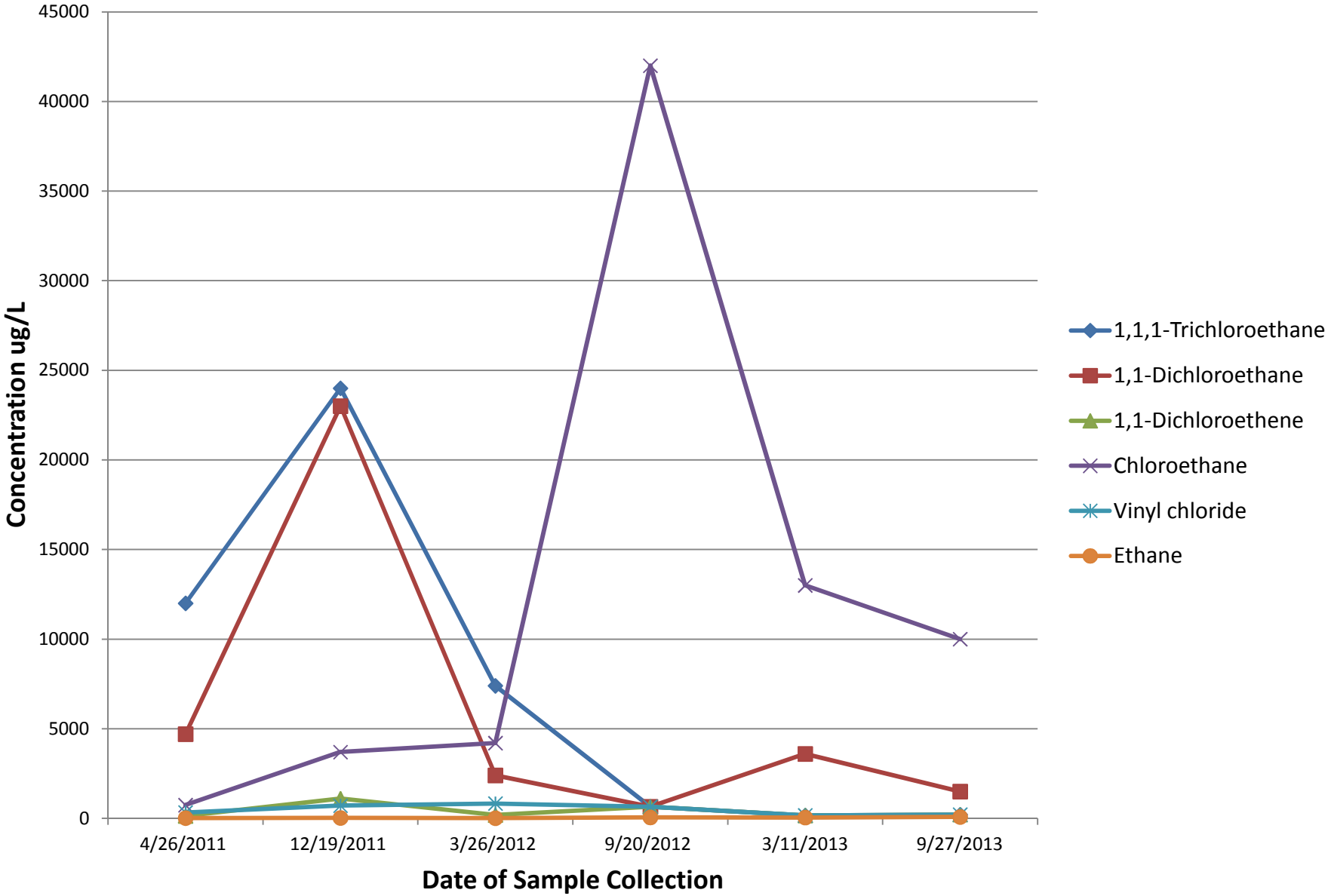


Figure 3. Concentration Versus Time Plot for Well MW-2

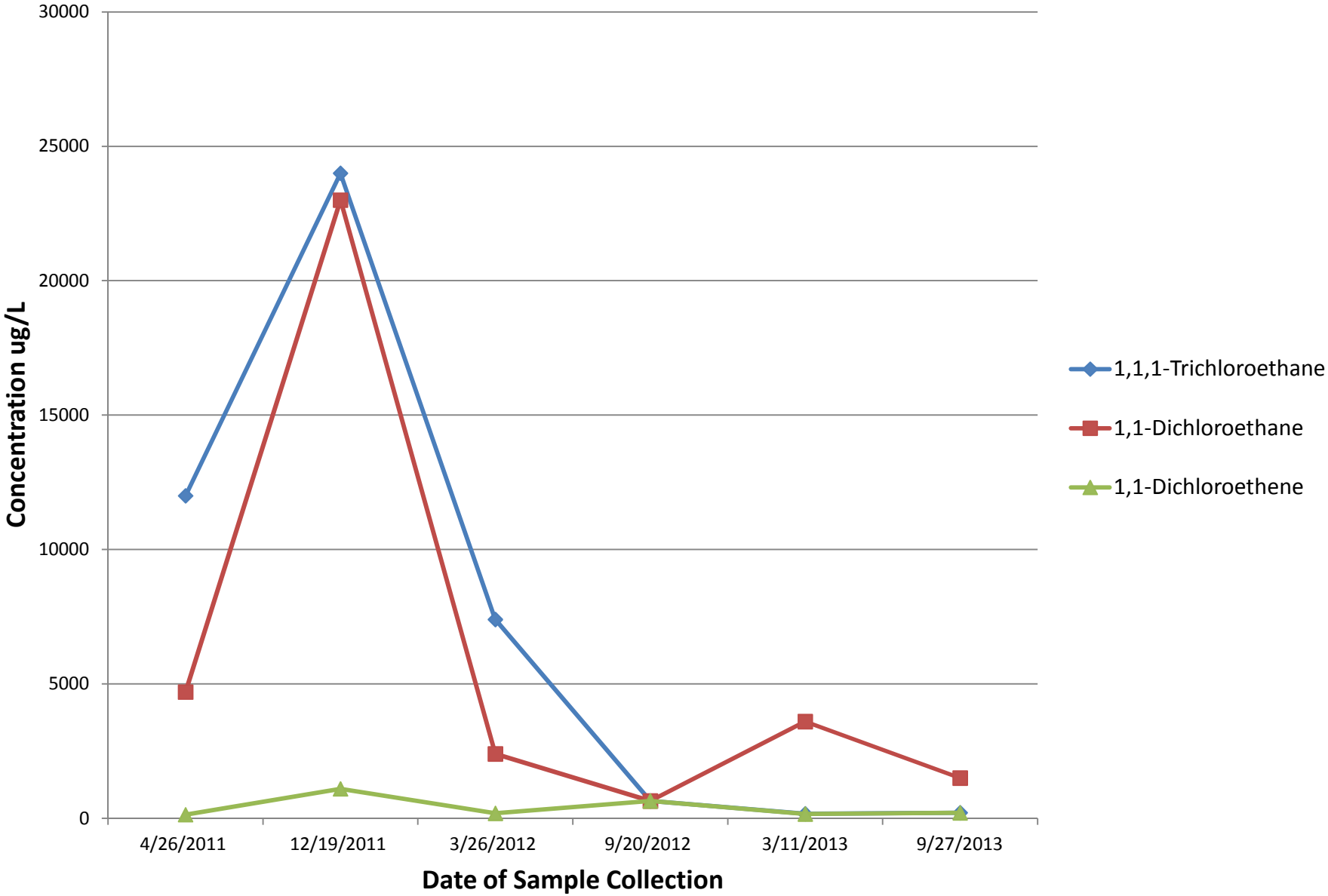


Figure 4. Concentration Versus Time Plot for Well MW-2

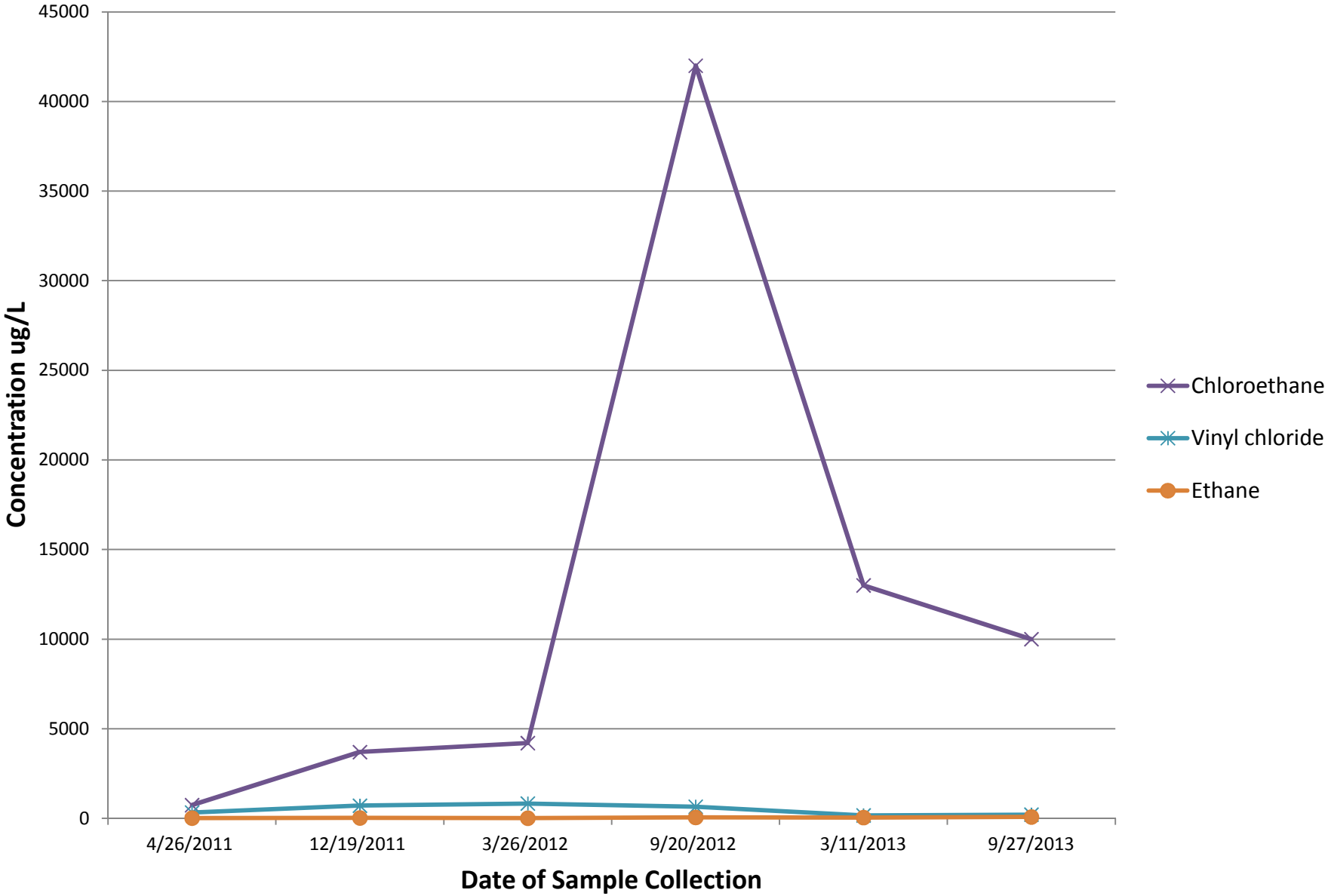


Figure 5. Concentration Versus Time Plot for Well MW-2

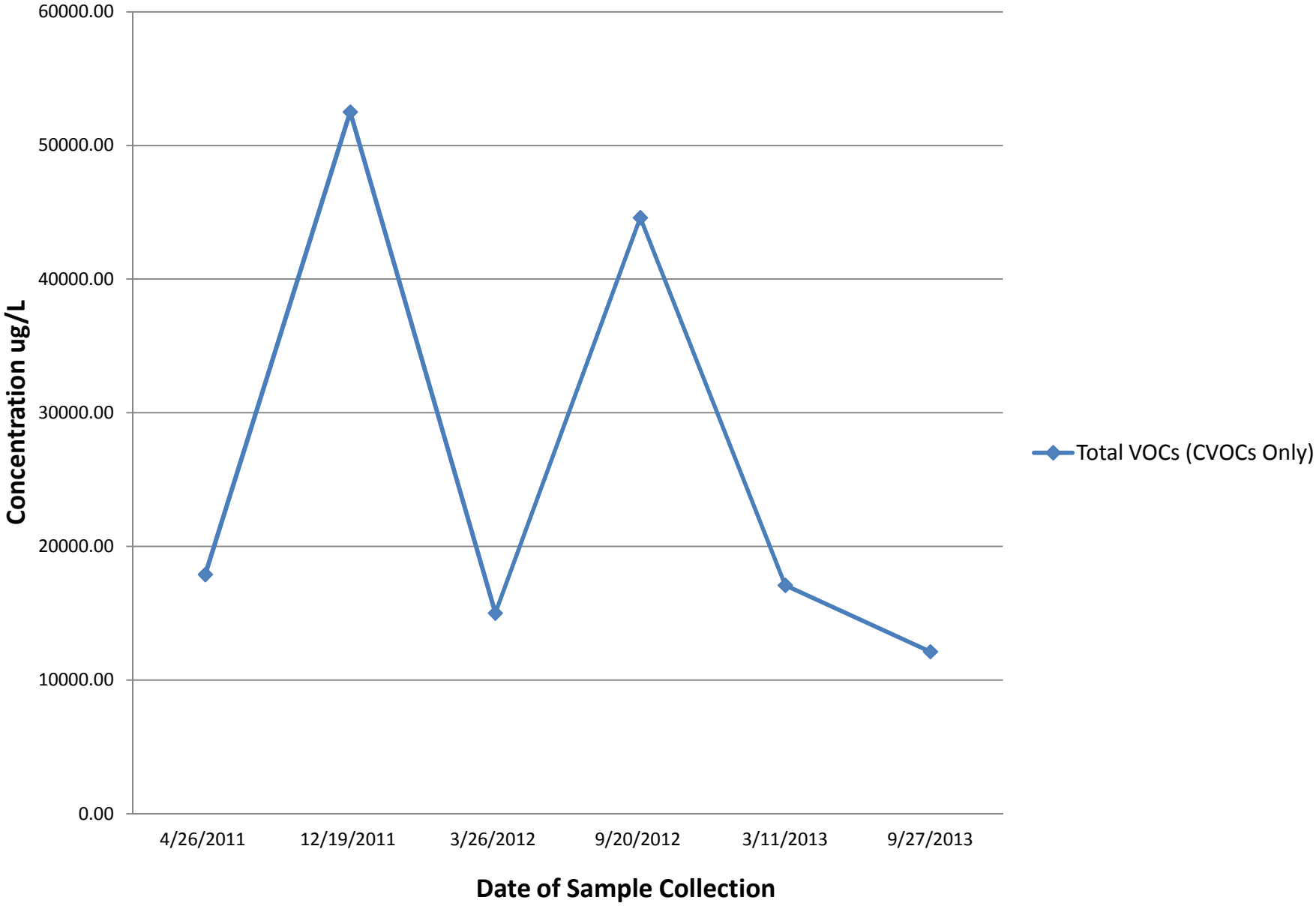


Figure6. Concentration Versus Time Plot for Well MW-11

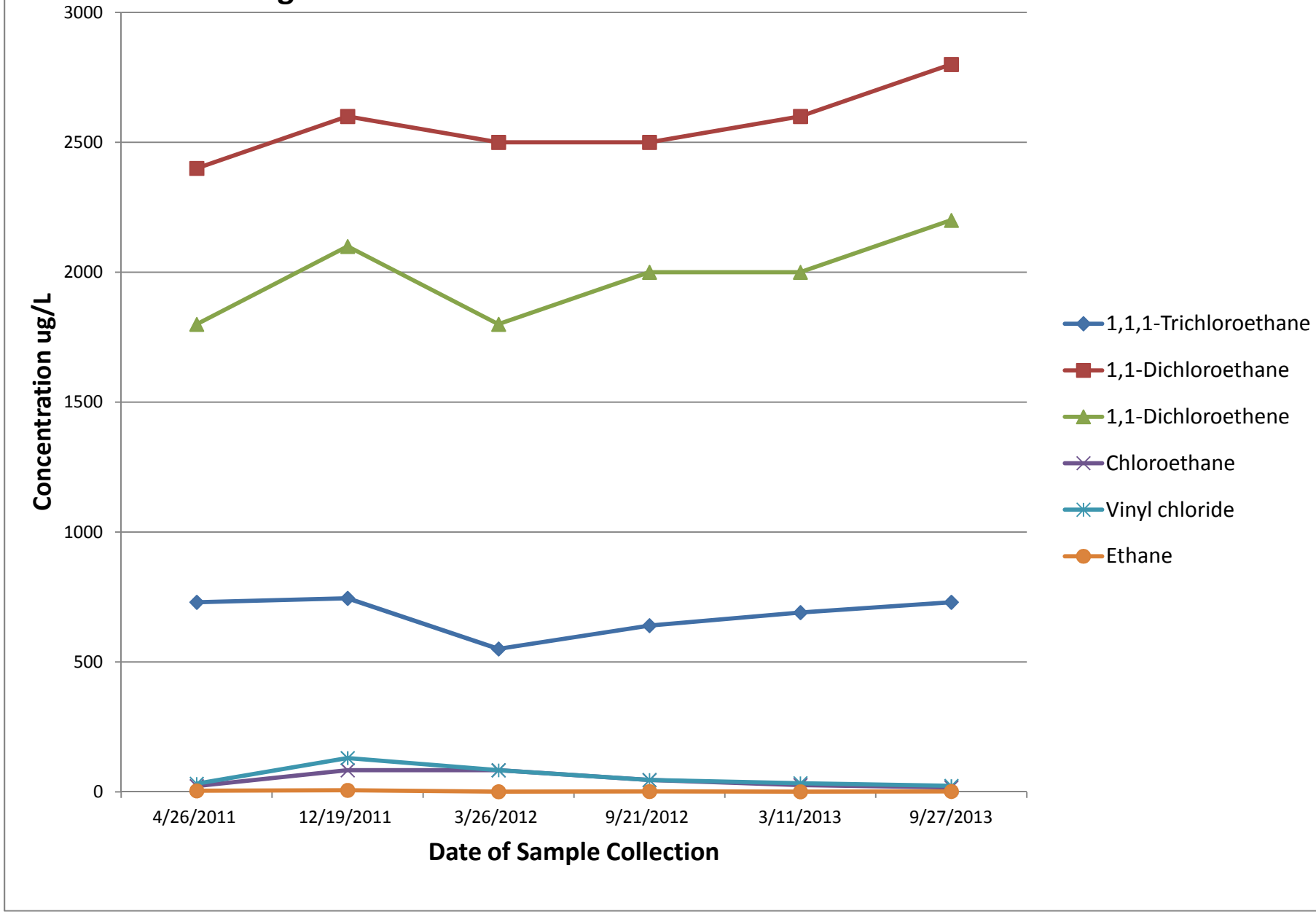


Figure 7. Concentration Versus Time Plot for Well MW-11

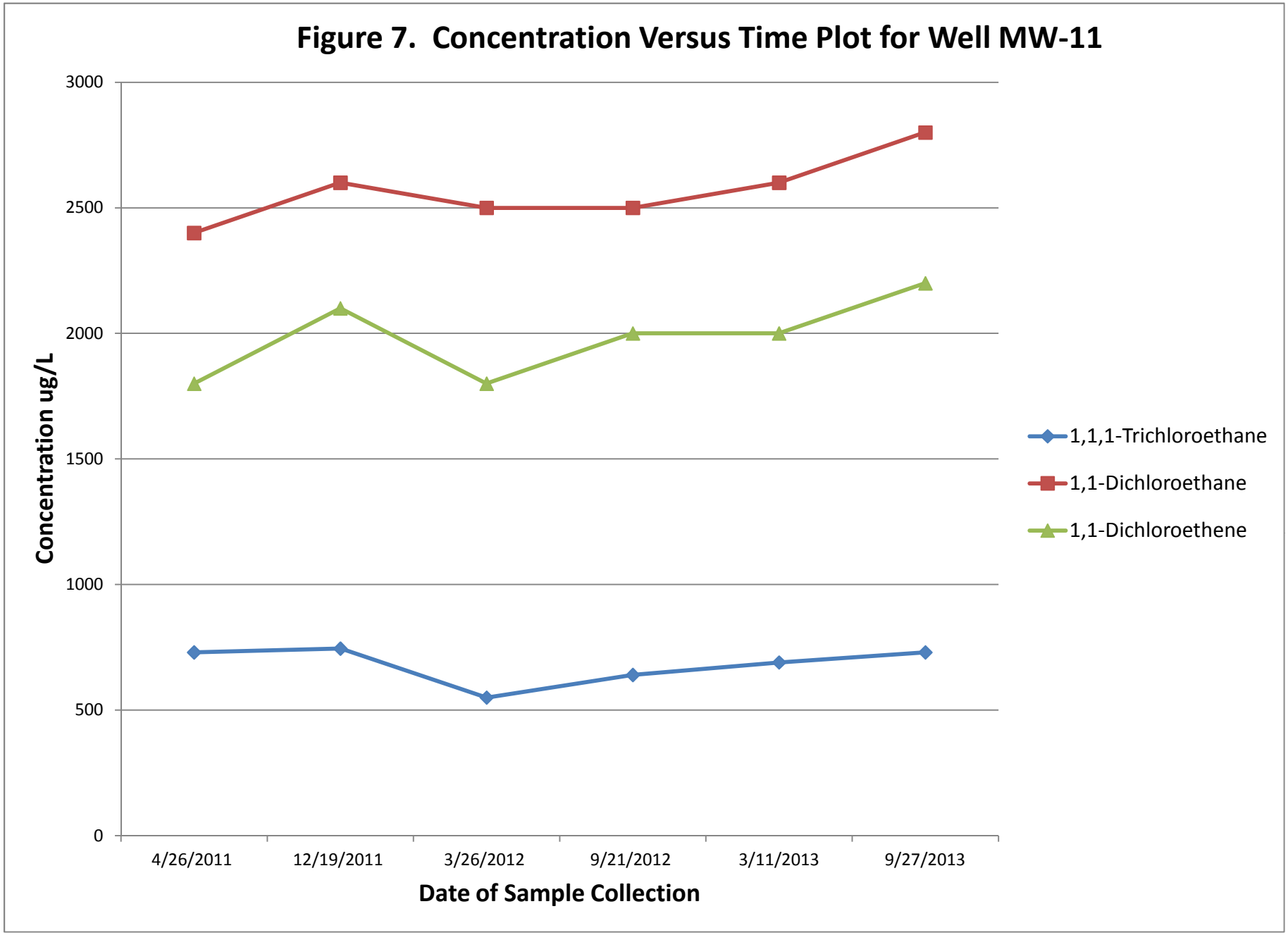


Figure 8. Concentration Versus Time Plot for Well MW-11

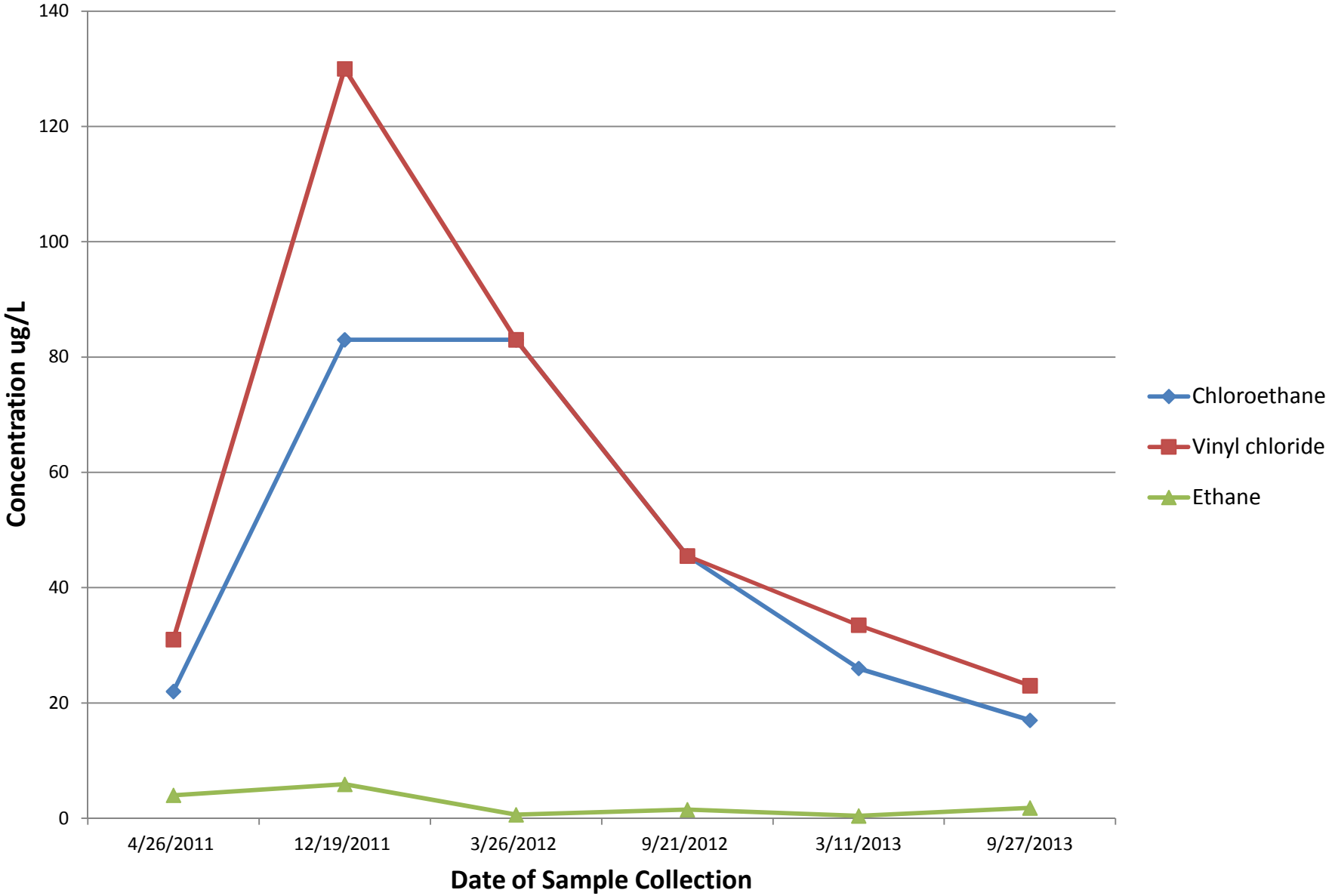


Figure 9. Concentration Versus Time Plot for Well MW-11

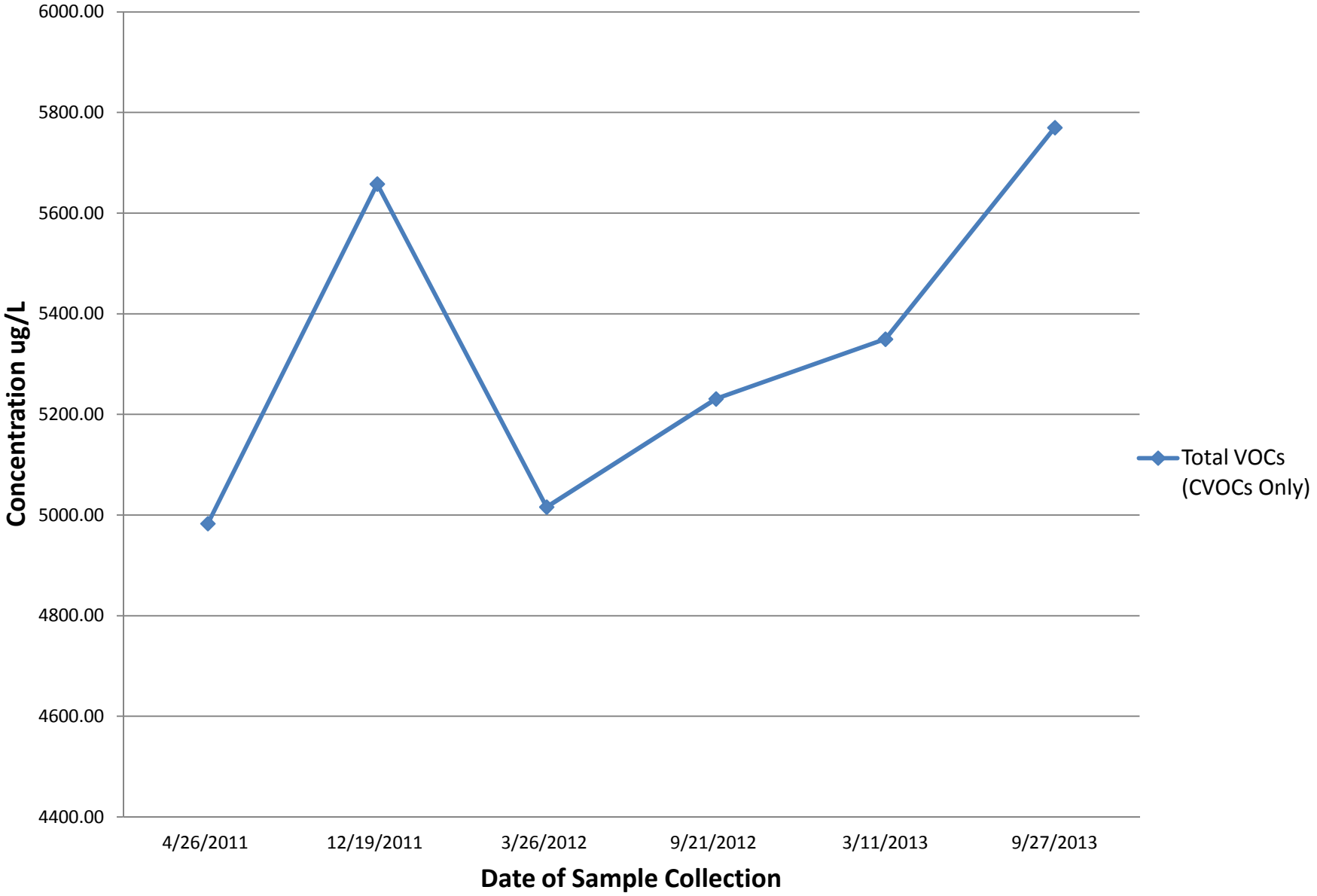


Figure 10. Concentration Versus Time Plot for Well MW-12

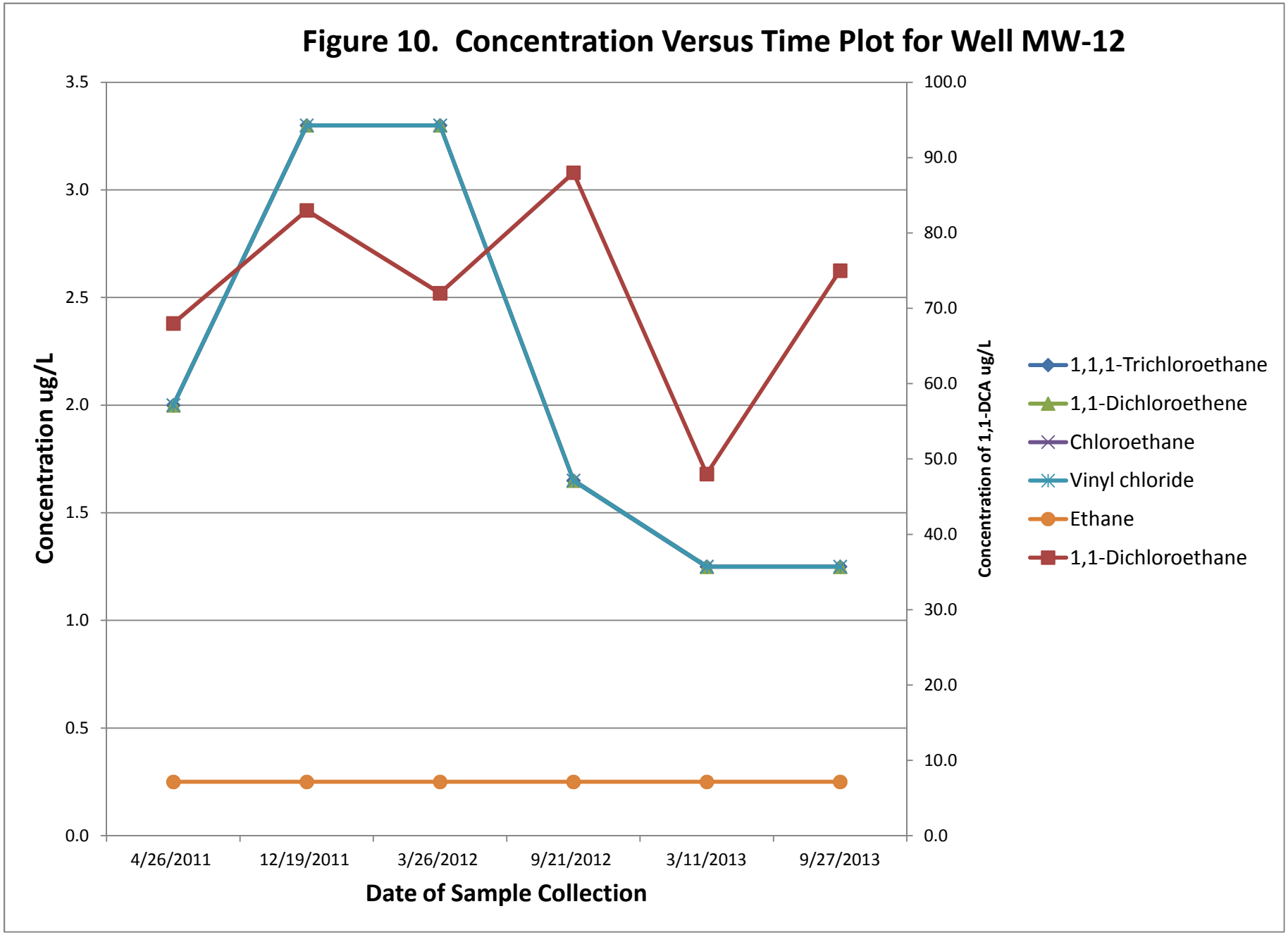


Figure 11. Concentration Versus Time Plot for Well MW-12

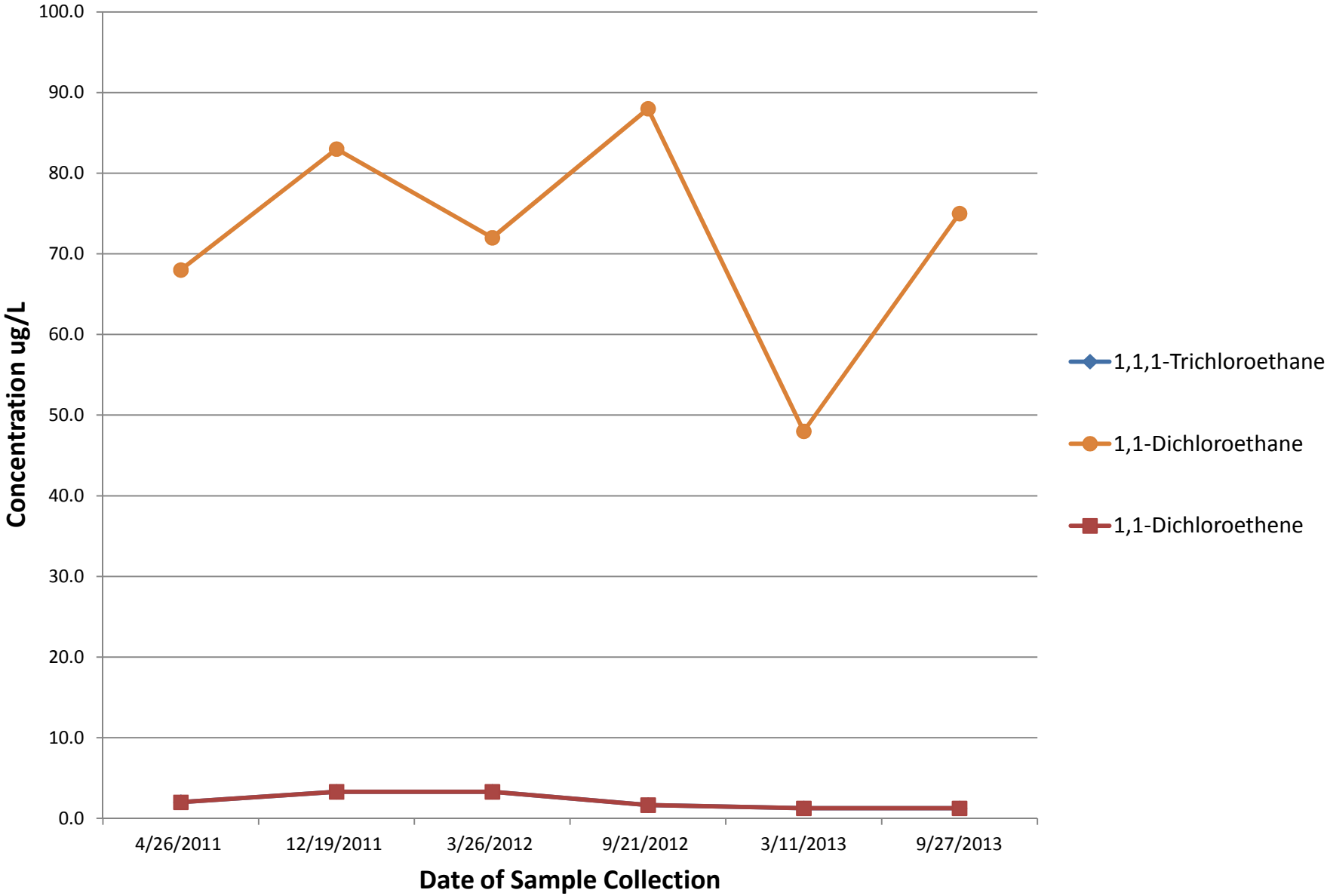


Figure 12. Concentration Versus Time Plot for Well MW-12

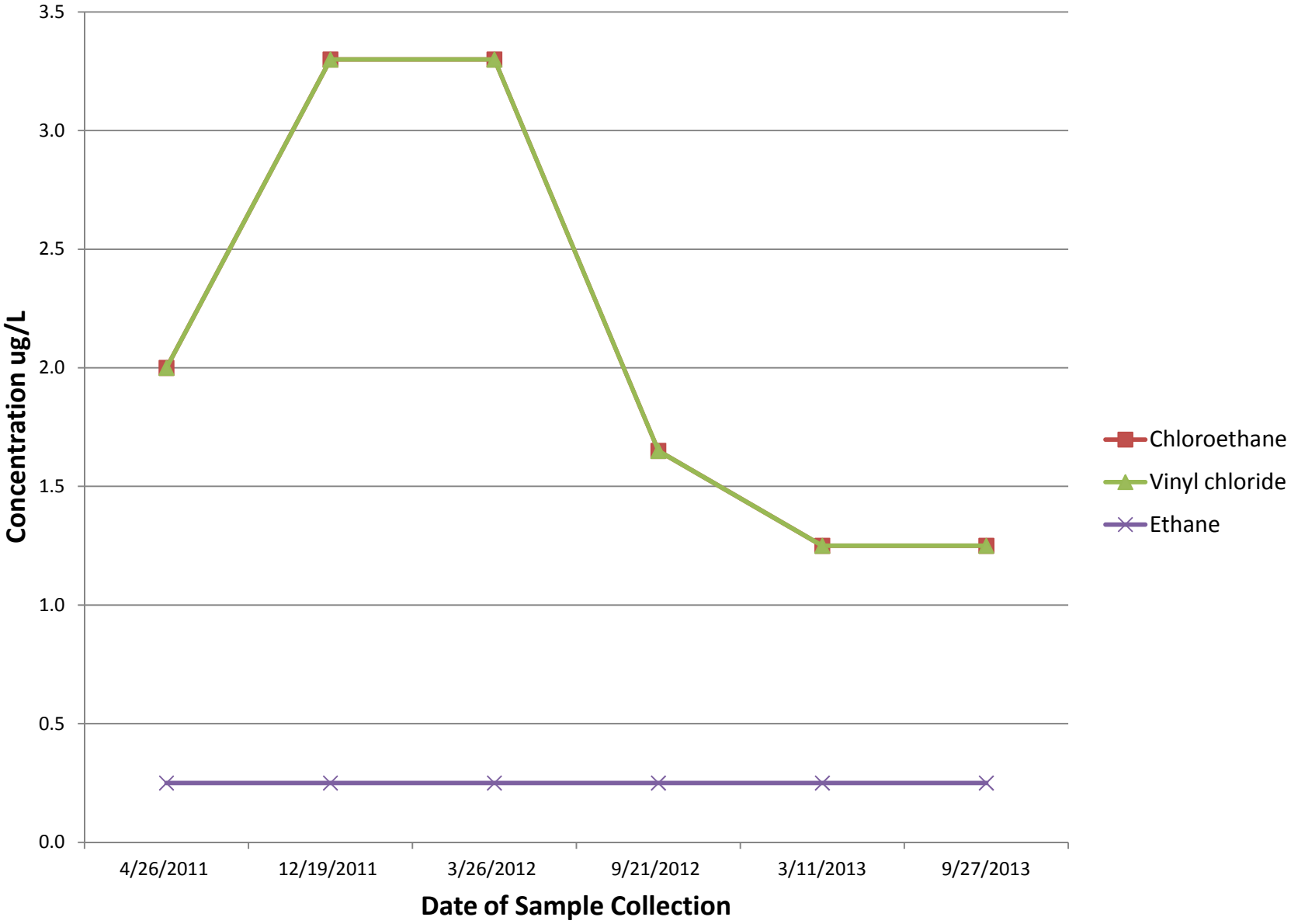
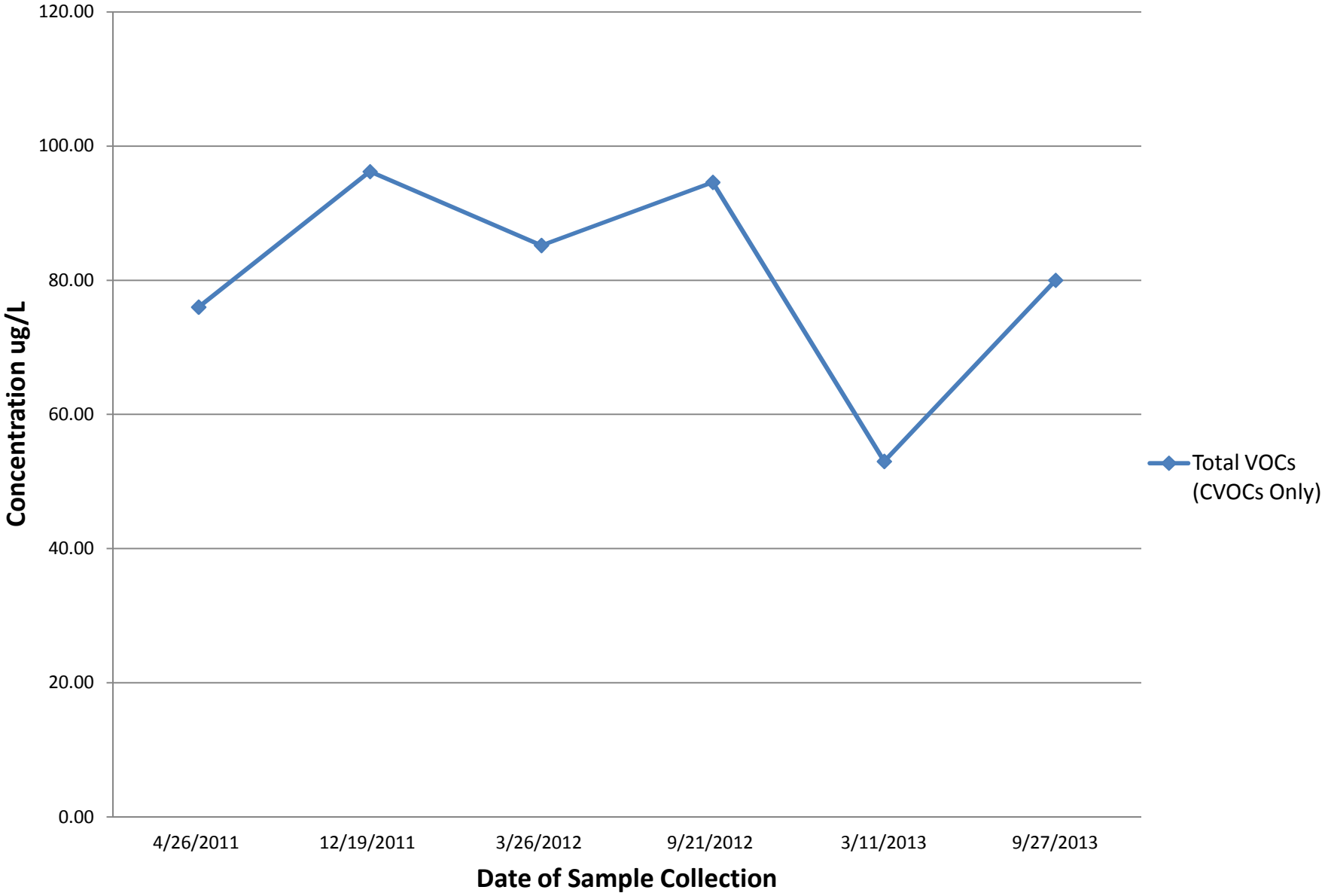
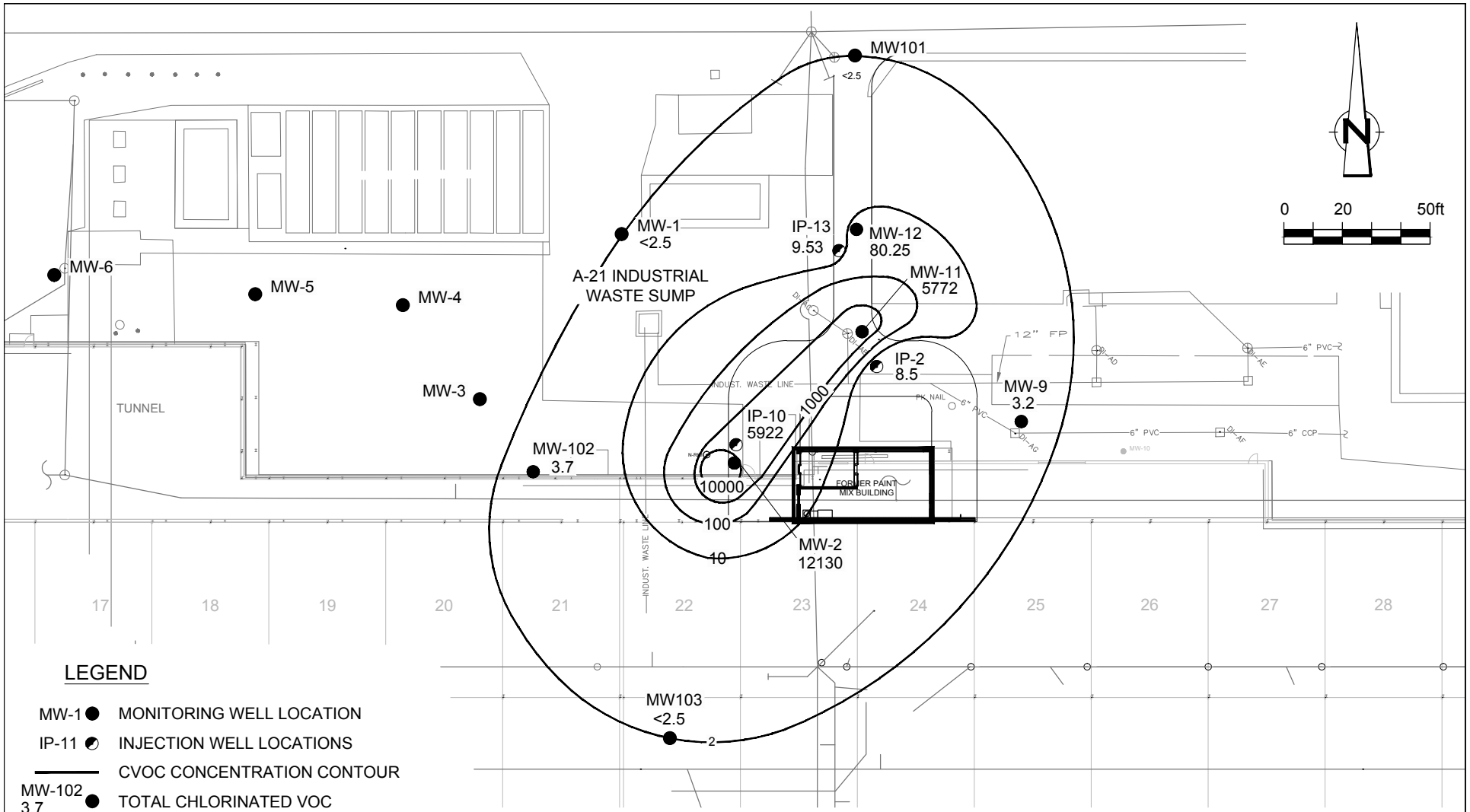


Figure 13. Concentration Versus Time Plot for Well MW-12





LEGEND

- MW-1 ● MONITORING WELL LOCATION
- IP-11 ◐ INJECTION WELL LOCATIONS
- CVOC CONCENTRATION CONTOUR
- MW-102 3.7 ● TOTAL CHLORINATED VOC CONCENTRATION IN GROUNDWATER (ppb)
- MW-1 <2.5 ● INDICATES TOTAL CVOC CONCENTRATION IS NON-DETECT

figure 14

TOTAL CVOC CONTOURS - SEPTEMBER 2013
ENHANCED ATTENUATION AT THE ENDOLINE AREA CHLORINATED SOLVENT PLUME
GENERAL MOTORS COMPANY TONAWANDA ENGINE PLANT
Tonawanda, New York

GRA

17390-00(006)GN-BU002 AUG 14/2014

Tables

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:				*MW-2*	*MW-2*	*MW-2*	*MW-2*	*MW-2*	*MW-2*	*MW-2*	*MW-11*
Sample Name:				*GW-17390-042611-KL-04*	*WG-17390-121911-KL-01*	*WG-17390-032612-KL-01*	*WG-17390-032612-KL-02*	*WG-17390-092012-001*	*WG-17390-031113-KL-002*	*WG-17390-092713-KL-010*	*GW-17390-042611-KL-07*
Sample Date:		*NYSDEC TOGs Groundwater*		*4/26/2011*	*12/19/2011*	*3/26/2012*	*3/26/2012 (Duplicate)*	*9/20/2012*	*3/11/2013*	*9/27/2013*	*4/26/2011*
Parameters	*Units*	*Guidance Value*	*Standard*								
Volatile Organic Compounds											
1,1,1-Trichloroethane	ug/L	NC	5	**12000**	**24000**	**7400**	**7500**	1300 U	**170 J**	420 U	**730**
1,1,2,2-Tetrachloroethane	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
1,1,2-Trichloroethane	ug/L	NC	1	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
1,1-Dichloroethane	ug/L	NC	5	**4700**	**23000**	**24000**	**22000**	1300 U	**3600**	**1500**	**2400**
1,1-Dichloroethene	ug/L	NC	5	**140 J**	**1100**	**190 J**	**170 J**	1300 U	330 U	420 U	**1800**
1,2,4-Trichlorobenzene	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
1,2,4-Trimethylbenzene	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	NC	0.04	-	1400 U	1700 U	1300 U	2500 U	670 U	830 U	-
1,2-Dibromoethane (Ethylene dibromide)	ug/L	NC	0.0006	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
1,2-Dichlorobenzene	ug/L	NC	3	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
1,2-Dichloroethane	ug/L	NC	0.6	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	**16 J**
1,2-Dichloroethene (total)	ug/L	5	NC	670 U	-	-	-	-	-	-	**98 J**
1,2-Dichloropropane	ug/L	NC	1	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
1,3,5-Trimethylbenzene	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
1,3-Dichlorobenzene	ug/L	NC	3	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
1,4-Dichlorobenzene	ug/L	NC	3	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
1,4-Dioxane	ug/L	NC	NC	17000 U	-	42000 U	31000 U	63000 U	17000 U	21000 U	3600 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	710 U
2-Hexanone	ug/L	50	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	710 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	NC	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	710 U
Acetone	ug/L	50	NC	3300 U	7100 U	**1200 J**	**980 J**	13000 U	3300 U	**1600 J**	710 U
Benzene	ug/L	NC	1	330 U	**200 J**	**270 J**	**260 J**	**320 J**	**190 J**	**170 J**	71 U
Bromodichloromethane	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Bromoform	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Bromomethane (Methyl bromide)	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Carbon disulfide	ug/L	60	60	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Carbon tetrachloride	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Chlorobenzene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Chloroethane	ug/L	NC	5	**740**	**3700**	**4200 J**	**2400 J**	**42000**	**13000**	**10000**	**22 J**
Chloroform (Trichloromethane)	ug/L	NC	7	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Chloromethane (Methyl chloride)	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
cis-1,2-Dichloroethene	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
cis-1,3-Dichloropropene	ug/L	NC	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Cyclohexane	ug/L	NC	NC	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
Dibromochloromethane	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Dichlorodifluoromethane (CFC-12)	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
Ethylbenzene	ug/L	NC	5	**80 J**	**120 J**	**160 J**	**140 J**	1300 U	**90 J**	**84 J**	71 U
Isopropyl benzene	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
Methyl acetate	ug/L	NC	NC	-	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	-
Methyl cyclohexane	ug/L	NC	NC	-	99 J	830 U	630 U	1300 U	330 U	420 U	-
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	3600 U	4200 U	3100 U	6300 U	330 U	420 U	-
Methylene chloride	ug/L	NC	5	330 U	710 U	**320 J**	**230 J**	1300 U	340 U	420 U	71 U
Naphthalene	ug/L	10	NC	-	-	830 U	-	-	330 U	-	-
N-Butylbenzene	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
N-Propylbenzene	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
Styrene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
tert-Butylbenzene	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-
Tetrachloroethene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Toluene	ug/L	NC	5	**68 J**	**190 J**	**180 J**	**170 J**	**390 J**	**220 J**	**200 J**	71 U
trans-1,2-Dichloroethene	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
trans-1,3-Dichloropropene	ug/L	NC	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Trichloroethene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	71 U
Trichlorofluoromethane (CFC-11)	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
Trifluorotrichloroethane (Freon 113)	ug/L	NC	5	-	710 U	830 U	630 U	1300 U	330 U	420 U	-
Vinyl chloride	ug/L	NC	2	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	**31 J**
Xylenes (total)	ug/L	NC	5	**380 J**	**590 J**	**680 J**	**600 J**	**410 J**	**450 J**	**480 J**	140 U
Dissolved Gases											
Ethane	ug/L	NC	NC	19	25	11	18	54	48	79	4.0

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:				***MW-2***	***MW-2***	***MW-2***	***MW-2***	***MW-2***	***MW-2***	***MW-2***	***MW-2***	***MW-11***
Sample Name:				***GW-17390-042611-KL-04***	***WG-17390-121911-KL-01***	***WG-17390-032612-KL-01***	***WG-17390-032612-KL-02***	***WG-17390-092012-001***	***WG-17390-031113-KL-002***	***WG-17390-092713-KL-010***	***GW-17390-042611-KL-07***	
Sample Date:		***NYSDEC TOGs Groundwater***		***4/26/2011***	***12/19/2011***	***3/26/2012***	***3/26/2012 (Duplicate)***	***9/20/2012***	***3/11/2013***	***9/27/2013***	***4/26/2011***	
Parameters	***Units***	***Guidance Value***	***Standard***									
Methane	ug/L	NC	NC	5800	3700	2700	3300	1200	6300	3500	860	
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	209000	240000	260000 J	280000	230000	330000	220000	422000	
Ammonia	ug/L	NC	2000	**3000**	**4200**	**3600**	**3600**	**4200**	**3400 J**	**2900**	2000 U	
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	1260	1470	10900	-	-	-	-	3360	
Biochemical oxygen demand (BOD)	ug/L	NC	NC	12000	43000 J	94000	98000	91000 J	71000	69000	2000 U	
Chemical oxygen demand (COD)	ug/L	NC	NC	35000	200000	190000 J	180000	210000	130000	84000	180000	
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	
Dehalobacter spp.	unknown	NC	NC	absent	present	present	-	-	-	-	present	
Dehalococcoides spp.	unknown	NC	NC	present	present	present	-	-	-	-	absent	
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	
Nitrate (as N)	ug/L	NC	10000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	
Nitrite (as N)	ug/L	NC	1000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	5000 U	
Orthophosphate	ug/L	NC	NC	-	-	61 J	54 J	40 J	45 J	500 U	-	
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-	
Phosphorus	ug/L	NC	NC	200	130	-	-	-	-	-	40 J	
Sulfate	ug/L	NC	250000	6000	1000	460 J	400 J	4700	850 J	4300	**1960000**	
Sulfide	ug/L	50	NC	**1400**	**2400**	**1100**	**960 J**	**2100**	1000 U	**470 J**	1000 U	
TOC averages	ug/L	NC	NC	-	-	46000	43000	-	-	-	-	
Total microbial population - aerobic	cfu/mL	NC	NC	56640	1770	15200	-	-	-	-	40800	
Total microbial population - anaerobic	cfu/mL	NC	NC	11880	3520	13900	-	-	-	-	6080	
Total organic carbon (TOC)	ug/L	NC	NC	10000	65000	-	-	78000	37000	22000	5000	
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-	
Field Parameters												
Conductivity	mS/cm	NC	NC	-	1.289	1.47	-	1.76	1.49	4.66	-	
Dissolved oxygen (DO)	ug/L	NC	NC	-	280	2800	-	5560	6580	420	-	
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-209.2	-119	-	-153	-148	-166	-	
pH	s.u.	NC	NC	-	6.82	7.11	-	6.77	7.32	7.29	-	
Temperature, field	Deg C	NC	NC	-	8.4	6.1	-	18	11	17.73	-	
Turbidity	NTU	NC	NC	-	1	5.8	-	1	11	0	-	

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the reporting limit
100 U - result is non-detect at the associated value

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		*MW-11*	*MW-11*	*MW-11*	*MW-11*	*MW-11*	*MW-11*	*MW-12*	*MW-12*	*MW-12*
Sample Name:		*WG-17390-121911-KL-02*	*WG-17390-121911-KL-03*	*WG-17390-032612-KL-03*	*WG-17390-092112-003*	*WG-17390-031113-KL-001*	*WG-17390-092713-KL-005*	*GW-17390-042611-KL-06*	*WG-17390-121911-KL-04*	*WG-17390-032712-KL-04*
Sample Date:		*12/19/2011*	*12/19/2011 (Duplicate)*	*3/26/2012*	*9/21/2012*	*3/11/2013*	*9/27/2013*	*4/26/2011*	*12/19/2011*	*3/27/2012*
Parameters	*Units*									
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/L	**760**	**730**	**550**	**640**	**690**	**730**	2.0 U	3.3 U	3.3 U
1,1,2,2-Tetrachloroethane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
1,1,2-Trichloroethane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
1,1-Dichloroethane	ug/L	**2600**	**2500**	**2500**	**2500**	**2600**	**2800**	**68**	**83**	**72**
1,1-Dichloroethene	ug/L	**2100**	**2100**	**1800**	**2000**	**2000**	**2200**	2.0 U	3.3 U	3.3 U
1,2,4-Trichlorobenzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
1,2,4-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	250 U	250 U	170 U	180 U	130 U	80 U	-	6.7 U	6.7 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
1,2-Dichlorobenzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
1,2-Dichloroethane	ug/L	130 U	130 U	83 U	91 U	67 U	**14 J**	2.0 U	3.3 U	3.3 U
1,2-Dichloroethene (total)	ug/L	-	-	-	-	-	-	4.0 U	-	-
1,2-Dichloropropane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
1,3,5-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
1,4-Dichlorobenzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
1,4-Dioxane	ug/L	-	-	4200 U	4500 U	3300 U	2000 U	100 U	-	170 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	1300 U	1300 U	830 U	910 U	670 U	400 U	20 U	33 U	33 U
2-Hexanone	ug/L	1300 U	1300 U	830 U	910 U	670 U	400 U	20 U	33 U	33 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	1300 U	1300 U	830 U	910 U	670 U	400 U	20 U	33 U	33 U
Acetone	ug/L	1300 U	1300 U	**130 J**	910 U	670 U	400 U	20 U	33 U	33 U
Benzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Bromodichloromethane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Bromoform	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Bromomethane (Methyl bromide)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Carbon disulfide	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Carbon tetrachloride	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Chlorobenzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Chloroethane	ug/L	130 U	**36 J**	83 U	91 U	**26 J**	**17 J**	2.0 U	3.3 U	3.3 U
Chloroform (Trichloromethane)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Chloromethane (Methyl chloride)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
cis-1,2-Dichloroethene	ug/L	**110 J**	**110 J**	**110**	**100**	**100**	**120**	-	3.3 U	3.3 U
cis-1,3-Dichloropropene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Cyclohexane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
Cymene (p-Isopropyltoluene)	ug/L	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Dichlorodifluoromethane (CFC-12)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	**8.6**	**8.2**
Ethylbenzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Isopropyl benzene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
Methyl acetate	ug/L	1300 U	1300 U	830 U	910 U	670 U	400 U	-	33 U	33 U
Methyl cyclohexane	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
Methyl tert butyl ether (MTBE)	ug/L	630 U	630 U	420 U	450 U	67 U	40 U	-	17 U	17 U
Methylene chloride	ug/L	130 U	130 U	83 U	91 U	83 U	40 U	2.0 U	3.3 U	3.3 U
Naphthalene	ug/L	-	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	-	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	-	-	-	-	-	-	-	-	-
Styrene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
tert-Butylbenzene	ug/L	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Toluene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
trans-1,2-Dichloroethene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
trans-1,3-Dichloropropene	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	2.0 U	3.3 U	3.3 U
Trichloroethene	ug/L	130 U	130 U	**16 J**	**16 J**	**20 J**	**19 J**	2.0 U	3.3 U	3.3 U
Trichlorofluoromethane (CFC-11)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
Trifluorotrichloroethane (Freon 113)	ug/L	130 U	130 U	83 U	91 U	67 U	40 U	-	3.3 U	3.3 U
Vinyl chloride	ug/L	130 U	130 U	83 U	91 U	67 U	**23 J**	2.0 U	3.3 U	3.3 U
Xylenes (total)	ug/L	250 U	250 U	170 U	180 U	130 U	80 U	4.0 U	6.7 U	6.7 U
Dissolved Gases										
Ethane	ug/L	5.9	6.2	0.65	1.5	0.42 J	1.8	0.50 U	0.50 U	0.50 U

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***MW-11***	***MW-11***	***MW-11***	***MW-11***	***MW-11***	***MW-11***	***MW-12***	***MW-12***	***MW-12***
Sample Name:		***WG-17390-121911-KL-02***	***WG-17390-121911-KL-03***	***WG-17390-032612-KL-03***	***WG-17390-092112-003***	***WG-17390-031113-KL-001***	***WG-17390-092713-KL-005***	***GW-17390-042611-KL-06***	***WG-17390-121911-KL-04***	***WG-17390-032712-KL-04***
Sample Date:		***12/19/2011***	***12/19/2011 (Duplicate)***	***3/26/2012***	***9/21/2012***	***3/11/2013***	***9/27/2013***	***4/26/2011***	***12/19/2011***	***3/27/2012***
Parameters	***Units***									
Methane	ug/L	1200	1200	93	280	59	340	0.50	8.1	1.1
Wet Chemistry										
Alkalinity, total (as CaCO3)	ug/L	450000	460000	440000 J	450000	470000	440000	484000	510000	500000
Ammonia	ug/L	2000 U	2000 U	2000 U	2000 U	2000 U	870 J	2000 U	2000 U	2000 U
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	115	-	200	-	-	-	490	0 U	10
Biochemical oxygen demand (BOD)	ug/L	2000 UJ	2000 UJ	2000 U	2000 U	2000 U	2000 U	2000 U	2000 UJ	2000 U
Chemical oxygen demand (COD)	ug/L	190000	160000	100000 J	160000	99000	220000	56000	72000	45000
Cyanide (total)	ug/L	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	present	-	present	-	-	-	present	present	present
Dehalococcoides spp.	unknown	absent	-	absent	-	-	-	absent	absent	absent
Ignitability	Deg F	-	-	-	-	-	-	-	-	-
Nitrate (as N)	ug/L	500 U	500 U	100 U	100 U	100 U	100 U	53 J	500 U	100 U
Nitrite (as N)	ug/L	500 U	5000 U	2500 U	100 U	2500 U	500 U	1000 U	500 U	2000 U
Orthophosphate	ug/L	-	-	100 U	R	100 U	500 U	-	-	100 U
pH, lab	s.u.	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	100 U	100 U	-	-	-	-	40 J	100 U	-
Sulfate	ug/L	**2000000**	**2000000**	**3100000**	**3900000**	**2600000**	**2300000**	**1020000**	130000	**1100000**
Sulfide	ug/L	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
TOC averages	ug/L	-	-	3100	-	-	-	-	-	5500
Total microbial population - aerobic	cfu/mL	1670	-	555	-	-	-	3440	10	80
Total microbial population - anaerobic	cfu/mL	1450	-	215	-	-	-	42400	10	10
Total organic carbon (TOC)	ug/L	6500	6900	-	4000	4800	4300	7000	8400	-
Total solids	ug/L	-	-	-	-	-	-	-	-	-
Field Parameters										
Conductivity	mS/cm	14.67	-	16.3	15.6	15.5	26.1	-	5.775	5.03
Dissolved oxygen (DO)	ug/L	230	-	-	5030	1120	420	-	1610	3700
Oxidation reduction potential (ORP)	millivolts	-12.7	-	97	-73	155	-58	-	43.8	79
pH	s.u.	6.12	-	6.27	6.23	7.08	6.86	-	6.52	6.99
Temperature, field	Deg C	10.04	-	10.1	19.4	9.74	18.62	-	10	8.5
Turbidity	NTU	5.2	-	-	0	3.4	0	-	0.2	140

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the re
100 U - result is non-detect at the associated value

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		*MW-12*	*MW-12*	*MW-12*	*MW-12*	*IP-2*	*IP-2*	*IP-2*	*IP-2*	*IP-10*
Sample Name:		*WG-17390-092112-004*	*WG-17390-031113-KL-003*	*WG-17390-092713-KL-006*	*WG-17390-092713-KL-007*	*WG-17390-032812-KL-16*	*WG-17390-031213-KL-007*	*WG-17390-031213-KL-008*	*WG-17390-092713-KL-009*	*WG-17390-032812-KL-17*
Sample Date:		*9/21/2012*	*3/11/2013*	*9/27/2013*	*9/27/2013* (Duplicate)	*3/28/2012*	*3/12/2013*	*3/12/2013* (Duplicate)	*9/27/2013*	*3/28/2012*
Parameters	*Units*									
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,1,2,2-Tetrachloroethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,1,2-Trichloroethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,1-Dichloroethane	ug/L	**88**	**48**	**75**	**76**	4.5	**220**	**210**	1.8	**290**
1,1-Dichloroethene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	**12**	**12**	1.0 U	130 U
1,2,4-Trichlorobenzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,2,4-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	6.7 U	5.0 U	5.0 U	6.7 U	6.7 U	13 U	13 U	2.0 U	250 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,2-Dichlorobenzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,2-Dichloroethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,2-Dichloroethene (total)	ug/L	-	-	-	-	-	-	-	-	-
1,2-Dichloropropane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,3,5-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,4-Dichlorobenzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
1,4-Dioxane	ug/L	170 U	130 U	130 U	170 U	170 U	330 U	330 U	50 U	6300 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	33 U	25 U	25 U	33 U	32 J	67 U	67 U	10 U	**79 J**
2-Hexanone	ug/L	33 U	25 U	25 U	33 U	1.6 J	67 U	67 U	10 U	1300 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	33 U	25 U	25 U	33 U	1.5 J	67 U	67 U	10 U	1300 U
Acetone	ug/L	33 U	25 U	25 U	33 U	**190**	67 U	67 U	1.8 J	**150 J**
Benzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	0.30 J	**31 J**
Bromodichloromethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Bromoform	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Bromomethane (Methyl bromide)	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Carbon disulfide	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	2.0 J	1.2 U	130 U
Carbon tetrachloride	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Chlorobenzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Chloroethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	**15**	6.7 U	6.7 U	3.9	**4500**
Chloroform (Trichloromethane)	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Chloromethane (Methyl chloride)	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
cis-1,2-Dichloroethene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	**13**	**12**	0.35 J	130 U
cis-1,3-Dichloropropene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Cyclohexane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Cymene (p-Isopropyltoluene)	ug/L	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Dichlorodifluoromethane (CFC-12)	ug/L	**5.2**	4.7	**5.3**	5.0	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Ethylbenzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Isopropyl benzene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Methyl acetate	ug/L	33 U	25 U	25 U	33 U	33 U	67 U	67 U	10 U	1300 U
Methyl cyclohexane	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Methyl tert butyl ether (MTBE)	ug/L	17 U	2.5 U	2.5 U	3.3 U	17 U	6.7 U	6.7 U	1.0 U	630 U
Methylene chloride	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	2.2 J	6.7 U	1.0 U	130 U
Naphthalene	ug/L	-	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	-	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	-	-	-	-	-	-	-	-	-
Styrene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
tert-Butylbenzene	ug/L	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Toluene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	0.13 J	130 U
trans-1,2-Dichloroethene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	0.20 J	130 U
trans-1,3-Dichloropropene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Trichloroethene	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Trichlorofluoromethane (CFC-11)	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Trifluorotrichloroethane (Freon 113)	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	6.7 U	6.7 U	1.0 U	130 U
Vinyl chloride	ug/L	3.3 U	2.5 U	2.5 U	3.3 U	3.3 U	**11**	**10**	1.0 U	**38 J**
Xylenes (total)	ug/L	6.7 U	5.0 U	5.0 U	6.7 U	6.7 U	13 U	13 U	2.0 U	250 U
Dissolved Gases										
Ethane	ug/L	0.50 U	0.50 U	0.50 U	-	11 U	-	2.7	1.3	15

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***MW-12***	***MW-12***	***MW-12***	***MW-12***	***IP-2***	***IP-2***	***IP-2***	***IP-2***	***IP-10***
Sample Name:		***WG-17390-092112-004***	***WG-17390-031113-KL-003***	***WG-17390-092713-KL-006***	***WG-17390-092713-KL-007***	***WG-17390-032812-KL-16***	***WG-17390-031213-KL-007***	***WG-17390-031213-KL-008***	***WG-17390-092713-KL-009***	***WG-17390-032812-KL-17***
Sample Date:		***9/21/2012***	***3/11/2013***	***9/27/2013***	***9/27/2013 (Duplicate)***	***3/28/2012***	***3/12/2013***	***3/12/2013 (Duplicate)***	***9/27/2013***	***3/28/2012***
Parameters	***Units***									
Methane	ug/L	5.1	5.8	14	-	7600	-	710	5400	5600
Wet Chemistry										
Alkalinity, total (as CaCO3)	ug/L	510000	450000	490000	-	1400000	-	920000	760000	610000
Ammonia	ug/L	2000 U	850 J	2000 U	-	**6400**	-	**5900**	**4600**	2000 U
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	-	-	-	-	100	-	-	-	40
Biochemical oxygen demand (BOD)	ug/L	2000 U	2000 U	2000 U	-	480000	-	39000	13000	220000 U
Chemical oxygen demand (COD)	ug/L	27000	25000	35000 U	-	950000	-	240000	700000	290000
Cyanide (total)	ug/L	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	-	-	-	-	present	-	-	-	present
Dehalococcoides spp.	unknown	-	-	-	-	present	-	-	-	present
Ignitability	Deg F	-	-	-	-	-	-	-	-	-
Nitrate (as N)	ug/L	100 U	150	100 U	-	500 U	-	100 U	100 U	100 U
Nitrite (as N)	ug/L	100 U	1000 U	500 U	-	5000 U	-	2500 U	500 U	100 U
Orthophosphate	ug/L	R	100 U	500 U	-	100 U	-	230	500 U	100 U
pH, lab	s.u.	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	-	-	-	-	-	-	-	-	-
Sulfate	ug/L	**1900000**	**1100000**	**1400000**	-	5000 U	-	**4500000**	17000	6900
Sulfide	ug/L	1000 U	1000 U	1000 U	-	1000 U	-	**2600**	1000 U	1000 U
TOC averages	ug/L	-	-	-	-	260000	-	-	-	110000
Total microbial population - aerobic	cfu/mL	-	-	-	-	2930	-	-	-	8800
Total microbial population - anaerobic	cfu/mL	-	-	-	-	32000	-	-	-	5980
Total organic carbon (TOC)	ug/L	5700	6100	6500	-	-	-	56000	41000	-
Total solids	ug/L	-	-	-	-	-	-	-	-	-
Field Parameters										
Conductivity	mS/cm	4.94	4.63	4.63	-	22.5	12.6	12.6	24.3	2.91
Dissolved oxygen (DO)	ug/L	6150	7530	2930	-	16740	1560	1560	360	650
Oxidation reduction potential (ORP)	millivolts	19	125	-13	-	-130	-287	-287	-134	-183
pH	s.u.	6.5	7.47	5.53	-	8.56	7.19	7.19	6.76	6.92
Temperature, field	Deg C	19.6	13.17	18.43	-	11.3	7.7	7.7	20.46	12.8
Turbidity	NTU	0	0	76.2	-	-	48	48	6.4	4.5

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the re
100 U - result is non-detect at the associated value

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***IP-10***	***IP-10***	***IP-13***	***IP-13***	***IP-13***
Sample Name:		***WG-17390-031113-KL-004***	***WG-17390-092713-KL-011***	***WG-17390-032812-KL-15***	***WG-17390-031213-KL-009***	***WG-17390-092713-KL-008***
Sample Date:		***3/11/2013***	***9/27/2013***	***3/28/2012***	***3/12/2013***	***9/27/2013***
Parameters	***Units***					
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/L	140 U	**110 J**	6.7 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	**220**	**1600**	3.4 J	1.6	3.2
1,1-Dichloroethene	ug/L	**71 J**	**550**	6.7 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	290 U	330 U	13 U	2.0 U	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	ug/L	-	-	-	-	-
1,2-Dichloropropane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	ug/L	-	-	-	-	-
1,3-Dichlorobenzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
1,4-Dioxane	ug/L	7100 U	8300 U	330 U	36 J	50 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	1400 U	1700 U	**130**	10 U	10 U
2-Hexanone	ug/L	1400 U	1700 U	67 U	10 U	10 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	1400 U	1700 U	67 U	10 U	10 U
Acetone	ug/L	1400 U	1700 U	**100**	10 U	10 U
Benzene	ug/L	**46 J**	**36 J**	6.7 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Bromoform	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Carbon disulfide	ug/L	140 U	170 U	6.7 U	0.40 J	1.5 U
Carbon tetrachloride	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Chlorobenzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Chloroethane	ug/L	**5300**	**3600**	**10**	**9.3**	4.4
Chloroform (Trichloromethane)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	140 U	170 U	6.7 U	1.2	0.76 J
cis-1,3-Dichloropropene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Cyclohexane	ug/L	140 U	170 U	6.7 U	0.17 J	0.40 J
Cymene (p-Isopropyltoluene)	ug/L	-	-	-	-	-
Dibromochloromethane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Ethylbenzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Methyl acetate	ug/L	1400 U	1700 U	67 U	10 U	10 U
Methyl cyclohexane	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	140 U	170 U	33 U	0.37 J	0.23 J
Methylene chloride	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Naphthalene	ug/L	-	-	-	-	-
N-Butylbenzene	ug/L	-	-	-	-	-
N-Propylbenzene	ug/L	-	-	-	-	-
Styrene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
tert-Butylbenzene	ug/L	-	-	-	-	-
Tetrachloroethene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Toluene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Trichloroethene	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Trifluorotrichloroethane (Freon 113)	ug/L	140 U	170 U	6.7 U	1.0 U	1.0 U
Vinyl chloride	ug/L	**54 J**	**52 J**	6.7 U	1.1	0.59 J
Xylenes (total)	ug/L	290 U	330 U	13 U	2.0 U	2.0 U
Dissolved Gases						
Ethane	ug/L	21	10	0.50	0.25 J	0.34 J

TABLE 1
ANALYTICAL RESULTS SUMMARY
ENHANCED ATTENUATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***IP-10***	***IP-10***	***IP-13***	***IP-13***	***IP-13***
Sample Name:		***WG-17390-031113-KL-004***	***WG-17390-092713-KL-011***	***WG-17390-032812-KL-15***	***WG-17390-031213-KL-009***	***WG-17390-092713-KL-008***
Sample Date:		***3/11/2013***	***9/27/2013***	***3/28/2012***	***3/12/2013***	***9/27/2013***
Parameters	***Units***					
Methane	ug/L	5900	1900	2800	9100	1800
Wet Chemistry						
Alkalinity, total (as CaCO3)	ug/L	710000	610000	1300000	1400000	1200000
Ammonia	ug/L	2000 U	2000 U	2000 U	850 J	1400 J
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	-	-	480	-	-
Biochemical oxygen demand (BOD)	ug/L	6600	5900	46000	2000 U	12000
Chemical oxygen demand (COD)	ug/L	56000	72000	290000	110000	99000
Cyanide (total)	ug/L	-	-	-	-	-
Dehalobacter spp.	unknown	-	-	present	-	-
Dehalococcoides spp.	unknown	-	-	absent	-	-
Ignitability	Deg F	-	-	-	-	-
Nitrate (as N)	ug/L	100 U	100 U	100 U	100 U	100 U
Nitrite (as N)	ug/L	1000 U	500 U	100 U	100 U	500 U
Orthophosphate	ug/L	100 U	500 U	100 U	120	500 U
pH, lab	s.u.	-	-	-	-	-
Phosphorus	ug/L	-	-	-	-	-
Sulfate	ug/L	190000	**580000**	**1100000**	**610000**	**980000**
Sulfide	ug/L	**740 J**	1000 U	1000 U	1000 U	1000 U
TOC averages	ug/L	-	-	39000	-	-
Total microbial population - aerobic	cfu/mL	-	-	2090	-	-
Total microbial population - anaerobic	cfu/mL	-	-	6120	-	-
Total organic carbon (TOC)	ug/L	14000	15000	-	38000	24000
Total solids	ug/L	-	-	-	-	-
Field Parameters						
Conductivity	mS/cm	3.3	15.5	4.81	4.03	4.87
Dissolved oxygen (DO)	ug/L	4570	650	760	1790	5810
Oxidation reduction potential (ORP)	millivolts	-217	-	-255	-229	-132
pH	s.u.	7.27	7.09	6.88	7	5.3
Temperature, field	Deg C	11.8	7.43	12.9	8.42	21.86
Turbidity	NTU	41	1.1	22.2	140	1.6

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the re
100 U - result is non-detect at the associated value

TABLE 2
ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:				*MW-1*	*MW-1*	*MW-1*	*MW-1*	*MW-1*	*MW-9*	*MW-9*	*MW-9*	*MW-9*
Sample Name:				*GW-17390-042511-KL-02*	*WG-17390-032712-KL-11*	*WG-17390-092112-007*	*WG-17390-031113-KL-006*	*WG-17390-092613-KL-002*	*GW-17390-042711-KL-10*	*GW-17390-042711-KL-11*	*WG-17390-032712-KL-05*	*WG-17390-092012-002*
Sample Date:		*NYSDEC TOGs Groundwater*		*4/25/2011*	*3/27/2012*	*9/21/2012*	*3/11/2013*	*9/26/2013*	*4/28/2011*	*4/28/2011 (Duplicate)*	*3/27/2012*	*9/20/2012*
Parameters	*Units*	*Guidance Value*	*Standard*									
Volatile Organic Compounds												
1,1,1-Trichloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	NC	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.3	1.3	1.7	1.5
1,1-Dichloroethene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	NC	0.04	-	2.0 U	2.0 U	2.0 U	2.0 U	-	-	2.0 U	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	NC	0.0006	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	NC	3	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	NC	0.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	ug/L	5	NC	2.0 U	-	-	-	-	2.0 U	2.0 U	-	-
1,2-Dichloropropane	ug/L	NC	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/L	NC	3	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	NC	3	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
1,4-Dioxane	ug/L	NC	NC	50 U	50 U	50 U	50 U	20 J	50 U	50 U	50 U	50 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	50	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	NC	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	ug/L	50	NC	10 U	10 U	1.1 J	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	ug/L	NC	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	50	NC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	50	NC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	60	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.87 J
Carbon tetrachloride	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	NC	7	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	NC	NC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	NC	NC	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	50	NC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
Ethylbenzene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
Methyl acetate	ug/L	NC	NC	-	10 U	10 U	10 U	10 U	-	-	10 U	10 U
Methyl cyclohexane	ug/L	NC	NC	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	1.1 J	1.3 J	1.3	1.3	-	-	5.0 U	5.0 U
Methylene chloride	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	ug/L	10	NC	-	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Styrene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	NC	NC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
Trifluorotrichloroethane (Freon 113)	ug/L	NC	5	-	1.0 U	1.0 U	1.0 U	1.0 U	-	-	1.0 U	1.0 U
Vinyl chloride	ug/L	NC	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	NC	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Dissolved Gases												
Ethane	ug/L	NC	NC	0.50 U	-	-	-	-	0.50 U	0.50 U	0.50 U	-
Methane	ug/L	NC	NC	8.7	-	-	-	-	0.71	0.68	0.15 J	-

TABLE 2
ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:				*MW-1*	*MW-1*	*MW-1*	*MW-1*	*MW-1*	*MW-9*	*MW-9*	*MW-9*	*MW-9*
Sample Name:				*GW-17390-042511-KL-02*	*WG-17390-032712-KL-11*	*WG-17390-092112-007*	*WG-17390-031113-KL-006*	*WG-17390-092613-KL-002*	*GW-17390-042711-KL-10*	*GW-17390-042711-KL-11*	*WG-17390-032712-KL-05*	*WG-17390-092012-002*
Sample Date:		*NYSDEC TOGs Groundwater*		*4/25/2011*	*3/27/2012*	*9/21/2012*	*3/11/2013*	*9/26/2013*	*4/28/2011*	*4/28/2011 (Duplicate)*	*3/27/2012*	*9/20/2012*
Parameters	*Units*	*Guidance Value*	*Standard*									
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	324000 J	-	-	-	-	317000	321000	360000	-
Ammonia	ug/L	NC	2000	2000 U	-	-	-	-	2000 U	2000 U	2000 U	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	2000 U	-	-	-	-	2000 U	2000 U	2000 U	-
Chemical oxygen demand (COD)	ug/L	NC	NC	16000	-	-	-	-	11000	16000	16000 J	-
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	-	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	-	-	-	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	-
Nitrate (as N)	ug/L	NC	10000	100 U	-	-	-	-	83 J	76 J	120	-
Nitrite (as N)	ug/L	NC	1000	500 U	-	-	-	-	500 UJ	500 UJ	100 U	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	100 U	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	57 J	-	-	-	-	33 J	100 U	-	-
Sulfate	ug/L	NC	250000	**809000**	-	-	-	-	**758000**	**711000**	**580000**	-
Sulfide	ug/L	50	NC	1000 U	-	-	-	-	1000 U	1000 U	1000 U	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	5100	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	9000	-	-	-	-	6000	6000	-	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
Field Parameters												
Conductivity	mS/cm	NC	NC	-	3.92	4.17	4.22	4.53	-	-	2.61	2.82
Dissolved oxygen (DO)	ug/L	NC	NC	-	20	4820	1260	4380	-	-	3870	5830
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-20	-127	176	-144	-	-	93	-36
pH	s.u.	NC	NC	-	7.05	6.44	7.1	6.65	-	-	7.35	7.05
Temperature, field	Deg C	NC	NC	-	11.7	21.2	10.45	20.2	-	-	4.9	19.3
Turbidity	NTU	NC	NC	-	0	0	12.2	73.9	-	-	0	0

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the reporting limit
100 U - result is non-detect at the associated value

TABLE 2
ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***MW-9***	***MW-9***	***MW-101***	***MW-101***	***MW-101***	***MW-101***	***MW-101***	***MW-101***
Sample Name:		***WG-17390-031213-KL-010***	***WG-17390-092613-KL-004***	***GW-17390-042611-KL-05***	***WG-17390-032812-KL-14***	***WG-17390-092112-005***	***WG-17390-092112-006***	***WG-17390-031113-KL-005***	***WG-17390-092613-KL-003***
Sample Date:		***3/12/2013***	***9/26/2013***	***4/26/2011***	***3/28/2012***	***9/21/2012***	***9/21/2012 (Duplicate)***	***3/11/2013***	***9/26/2013***
Parameters	***Units***								
Volatile Organic Compounds									
1,1,1-Trichloroethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.41 J
1,1,2,2-Tetrachloroethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	1.6	1.2	1.0 U	1.0 U	0.39 J	0.29 J	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	2.0 U	2.0 U	-	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	ug/L	-	-	2.0 U	-	-	-	-	-
1,2-Dichloropropane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	ug/L	50 U	50 U	50 U	-	50 U	50 U	50 U	50 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	10 U	10 U	0.98 J	10 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	ug/L	10 U	10 U	3.9 J	10 U	1.1 J	1.4 J	10 U	1.8 J
Benzene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0	0.53 J	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	ug/L	10 U	10 U	-	10 U	10 U	10 U	10 U	10 U
Methyl cyclohexane	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	1.0 U	1.0 U	-	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	ug/L	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	-	-	-	-	-	-	-	-
Styrene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	ug/L	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (Freon 113)	ug/L	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Dissolved Gases									
Ethane	ug/L	-	-	0.50 U	-	-	-	-	-
Methane	ug/L	-	-	14	-	-	-	-	-

TABLE 2
ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***MW-9***	***MW-9***	***MW-101***	***MW-101***	***MW-101***	***MW-101***	***MW-101***	***MW-101***
Sample Name:		***WG-17390-031213-KL-010***	***WG-17390-092613-KL-004***	***GW-17390-042611-KL-05***	***WG-17390-032812-KL-14***	***WG-17390-092112-005***	***WG-17390-092112-006***	***WG-17390-031113-KL-005***	***WG-17390-092613-KL-003***
Sample Date:		***3/12/2013***	***9/26/2013***	***4/26/2011***	***3/28/2012***	***9/21/2012***	***9/21/2012 (Duplicate)***	***3/11/2013***	***9/26/2013***
Parameters	***Units***								
Wet Chemistry									
Alkalinity, total (as CaCO3)	ug/L	-	-	311000	-	-	-	-	-
Ammonia	ug/L	-	-	2000 U	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	-	-	3000	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	-	-	790000	-	-	-	-	-
Cyanide (total)	ug/L	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	-	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	-	-	-	-	-	-	-	-
Ignitability	Deg F	-	-	-	-	-	-	-	-
Nitrate (as N)	ug/L	-	-	1900	-	-	-	-	-
Nitrite (as N)	ug/L	-	-	20000 UJ	-	-	-	-	-
Orthophosphate	ug/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-	-	-	-
Phosphorus	ug/L	-	-	35 J	-	-	-	-	-
Sulfate	ug/L	-	-	**805000**	-	-	-	-	-
Sulfide	ug/L	-	-	1000 U	-	-	-	-	-
TOC averages	ug/L	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	-	-	4000	-	-	-	-	-
Total solids	ug/L	-	-	-	-	-	-	-	-
Field Parameters									
Conductivity	mS/cm	2.71	97.6	-	26.7	24.9	24.9	69.6	34.9
Dissolved oxygen (DO)	ug/L	1330	6870	-	2160	4280	4280	1830	1020
Oxidation reduction potential (ORP)	millivolts	54	-64	-	70	-161	-161	66	21
pH	s.u.	7.68	6.87	-	7.16	6.67	6.67	7.22	6.98
Temperature, field	Deg C	7.16	18.01	-	11.2	22.7	22.7	10.96	22.04
Turbidity	NTU	3	14.53	-	0.4	20	20	9.4	5.8

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the rep
100 U - result is non-detect at the associated value

TABLE 2
ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***MW-102***	***MW-102***	***MW-102***	***MW-102***	***MW-102***	***MW-103***	***MW-103***	***MW-103***	***MW-103***	***MW-103***
Sample Name:		***GW-17390-042511-KL-01***	***WG-17390-032712-KL-09***	***WG-17390-092112-008***	***WG-17390-031213-KL-011***	***WG-17390-092613-KL-001***	***GW-17390-042711-KL-09***	***WG-17390-032812-KL-13***	***WG-17390-092112-009***	***WG-17390-031213-KL-015***	***WG-17390-092713-KL-012***
Sample Date:		***4/25/2011***	***3/27/2012***	***9/21/2012***	***3/12/2013***	***9/26/2013***	***4/28/2011***	***3/28/2012***	***9/21/2012***	***3/12/2013***	***9/27/2013***
Parameters	***Units***										
Volatile Organic Compounds											
1,1,1-Trichloroethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	2.6	2.7	3.2	2.1	1.7	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-	-	-
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	-	3.3 U	3.1 U	2.0 U	2.0 U	-	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	ug/L	2.0 U	-	-	-	-	2.0 U	-	-	-	-
1,2-Dichloropropane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	ug/L	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	ug/L	50 U	84 U	77 U	50 U	50 U	50 U	-	50 U	50 U	50 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	10 U	17 U	15 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	10 U	17 U	15 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	-	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	10 U	17 U	15 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	ug/L	10 U	17 U	2.1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	ug/L	1.0 U	1.7 U	1.5 U	**1.1**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.17 J	1.0 U
Carbon tetrachloride	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	-	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	ug/L	-	17 U	15 U	10 U	10 U	-	10 U	10 U	10 U	10 U
Methyl cyclohexane	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	-	**41**	**45**	**27**	**28**	-	5.0 U	5.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Naphthalene	ug/L	-	-	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	-	-	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	-	-	-	-	-	-	-	-	-	-
Styrene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
tert-Butylbenzene	ug/L	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.14 J
trans-1,2-Dichloroethene	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (Freon 113)	ug/L	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	2.0 U	3.3 U	3.1 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Dissolved Gases											
Ethane	ug/L	0.50 U	-	-	-	-	0.50 U	-	-	-	-
Methane	ug/L	61	-	-	-	-	1.1	-	-	-	-

TABLE 2
ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
APRIL 2011 THROUGH SEPTEMBER 2013

Location ID:		***MW-102***	***MW-102***	***MW-102***	***MW-102***	***MW-102***	***MW-103***	***MW-103***	***MW-103***	***MW-103***	***MW-103***
Sample Name:		***GW-17390-042511-KL-01***	***WG-17390-032712-KL-09***	***WG-17390-092112-008***	***WG-17390-031213-KL-011***	***WG-17390-092613-KL-001***	***GW-17390-042711-KL-09***	***WG-17390-032812-KL-13***	***WG-17390-092112-009***	***WG-17390-031213-KL-015***	***WG-17390-092713-KL-012***
Sample Date:		***4/25/2011***	***3/27/2012***	***9/21/2012***	***3/12/2013***	***9/26/2013***	***4/28/2011***	***3/28/2012***	***9/21/2012***	***3/12/2013***	***9/27/2013***
Parameters	***Units***										
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	395000 J	-	-	-	-	-	-	-	-	-
Ammonia	ug/L	2000 U	-	-	-	-	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	2000 U	-	-	-	-	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	16000	-	-	-	-	-	-	-	-	-
Cyanide (total)	ug/L	-	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	-	-	-	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	-	-	-	-	-	-	-	-	-	-
Ignitability	Deg F	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	ug/L	110	-	-	-	-	-	-	-	-	-
Nitrite (as N)	ug/L	100 U	-	-	-	-	-	-	-	-	-
Orthophosphate	ug/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	72 J	-	-	-	-	-	-	-	-	-
Sulfate	ug/L	239000	-	-	-	-	-	-	-	-	-
Sulfide	ug/L	1000 U	-	-	-	-	-	-	-	-	-
TOC averages	ug/L	-	-	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	-	-	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	-	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	9000	-	-	-	-	14000	-	-	-	-
Total solids	ug/L	-	-	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	-	1.6	1.8	1.57	13.4	-	3.62	3.13	3.18	2.98
Dissolved oxygen (DO)	ug/L	-	210	5250	2110	480	-	640	4770	2150	3660
Oxidation reduction potential (ORP)	millivolts	-	-100	-136	-5	-159	-	-65	-47	-52	-45
pH	s.u.	-	7.24	6.59	7.25	7.01	-	7.78	6.38	7.12	5.4
Temperature, field	Deg C	-	10.1	19.5	8.5	19.31	-	16.8	20.2	18.6	21.16
Turbidity	NTU	-	0	12	17	0	-	-	16	0	5.8

Notes:
ug/L - micrograms per liter or parts per billion (ppb)
cfu/ml - Colony forming units per milliliter
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the rep
100 U - result is non-detect at the associated value

TABLE 3
ANALYTICAL RESULTS SUMMARY
PETROLEUM IMPACTS MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
OCTOBER 2009 THROUGH MARCH 2013

Location ID:				*MW-2*	*MW-2*	*MW-2*	*MW-2*	*MW-3*	*MW-3*	*MW-3*	*MW-4*
Sample Name:				*WG-017390-101909-002*	*WG-17390-032612-KL-01*	*WG-17390-032612-KL-02*	*WG-17390-031113-KL-002*	*WG-017390-101909-005*	*WG-17390-032712-KL-08*	*WG-17390-031213-KL-012*	*WG-017390-101909-006*
Sample Date:		*NYSDEC TOGs [1] Groundwater*		*10/19/2009*	*3/26/2012*	*3/26/2012 (Duplicate) [2]*	*3/11/2013*	*10/19/2009*	*3/27/2012*	*3/12/2013*	*10/19/2009*
Parameters	*Units*	*Guidance Value*	*Standard*								
Volatile Organic Compounds											
1,2,4-Trimethylbenzene	ug/L	NC	5	**19 J**	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
1,3,5-Trimethylbenzene	ug/L	NC	5	420 U	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	420 U	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
Benzene	ug/L	NC	1	**220**	**270 J**	**260 J**	**190 J**	**3.9**	**6.1 J**	**4.2 J**	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	420 U	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
Ethylbenzene	ug/L	NC	5	**86 J**	**160 J**	**140 J**	**90 J**	5.0 U	10 U	13 U	5.0 U
Isopropyl benzene	ug/L	NC	5	420 U	830 U	630 U	330 U	0.21 J	10 U	13 U	5.0 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	830 U	4200 U	3100 U	330 U	**160**	**300**	**360**	**12**
Naphthalene	ug/L	10	NC	830 U	830 U	-	330 U	10 U	10 U	13 U	10 U
N-Butylbenzene	ug/L	NC	5	420 U	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
N-Propylbenzene	ug/L	NC	5	420 U	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
tert-Butylbenzene	ug/L	NC	5	420 U	830 U	-	330 U	5.0 U	10 U	13 U	5.0 U
Toluene	ug/L	NC	5	**120 J**	**180 J**	**170 J**	**220 J**	5.0 U	10 U	2.0 J	5.0 U
Xylenes (total)	ug/L	NC	5	620	**680 J**	**600 J**	**450 J**	5.0 U	20 U	25 U	5.0 U

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, dated June 1998 and addenda.
[2] - Duplicate analysis was run on the TCL VOC list of compounds
ug/L - micrograms per liter or parts per billion (ppb)
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the reporting limit
100 U - result is non-detect at the associated value

TABLE 3
ANALYTICAL RESULTS SUMMARY
PETROLEUM IMPACTS MONITORING
GM TONAWANDA ENGINE PLANT - ENDOLINE AREA
OCTOBER 2009 THROUGH MARCH 2013

Location ID:		***MW-4***	***MW-4***	***MW-5***	***MW-5***	***MW-5***
Sample Name:		***WG-17390-032712-KL-10***	***WG-17390-031213-KL-013***	***WG-017390-101909-007***	***WG-17390-032712-KL-12***	***WG-17390-031213-KL-014***
Sample Date:		***3/27/2012***	***3/12/2013***	***10/19/2009***	***3/27/2012***	***3/12/2013***
Parameters	***Units***					
Volatile Organic Compounds						
1,2,4-Trimethylbenzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
1,3,5-Trimethylbenzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Benzene	ug/L	1.0 U	1.0 U	1.0 U	0.38 J	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	**18**	**14**	7.3 J	4.3 J	6.9
Naphthalene	ug/L	1.0 U	1.0 U	10 U	1.0 U	1.0 U
N-Butylbenzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
N-Propylbenzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
tert-Butylbenzene	ug/L	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Toluene	ug/L	1.0 U	1.0 U	5.0 U	1.9	1.0 U
Xylenes (total)	ug/L	2.0 U	2.0 U	5.0 U	0.93 J	2.0 U

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Tec
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Val
June 1998 and addenda.
[2] - Duplicate analysis was run on the TCL VOC list of compounds
ug/L - micrograms per liter or parts per billion (ppb)
NC - No Criteria
3.1 J - Estimated Concentration. Analyte was detected at a concentration below the re
100 U - result is non-detect at the associated value

TABLE 4

MONITORING PARAMETERS
ENDOLINE AREA CHLORINATED SOLVENT PLUME MONITORING PROGRAM
GM TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK

Monitoring Parameters

Volatile Organic Compounds
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2,4-Trimethylbenzene
1,2-Dichloroethane
1,2-Dichloroethene (total)
1,2-Dichloropropane
1,3,5-Trimethylbenzene
1,4-Dioxane
2-Butanone (Methyl ethyl ketone) (MEK)
2-Hexanone
2-Phenylbutane (sec-Butylbenzene)
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)
Acetone
Benzene
Bromodichloromethane
Bromoform
Bromomethane (Methyl bromide)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform (Trichloromethane)
Chloromethane (Methyl chloride)
cis-1,2-Dichloroethene
cis-1,3-Dichloropropene
Cymene (p-Isopropyltoluene)
Dibromochloromethane
Ethylbenzene
Isopropyl benzene
m&p-Xylene
Methyl tert butyl ether (MTBE)
Methylene chloride
Naphthalene
N-Butylbenzene
N-Propylbenzene
o-Xylene
Styrene
tert-Butylbenzene
Tetrachloroethene
Toluene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene
Trichloroethene
Vinyl chloride
Xylene (total)

Dissolved Gas
Ethane
Methane

Field Parameters
Conductivity
Dissolved oxygen (DO)
Oxidation reduction potential (ORP)
pH
Temperature, field
Turbidity

Wet Chemistry
Aerobic 1,1,1-TCA specific microbial population
Ammonia
Alkalinity, total (as CaCO3)
Anaerobic 1,1,1-TCA specific microbial population
Biochemical oxygen demand (BOD)
Nitrate (as N)
Nitrite (as N)
Orthophosphate
Phosphate, total
Sulfate
Sulfite
Chemical oxygen demand (COD)
Total microbial population - aerobic
Total microbial population - anaerobic
Total organic carbon (TOC)
Dehalobacter TCA-1

Notes:
The parameters for the 180-day monitoring event are subject to change based on the results from the 90-day event; additional sampling may be needed after the 180-day event.

TABLE 5

SUMMARY OF PROPOSED SAMPLING SCHEDULE
ENDOLINE AREA CHLORINATED SOLVENT PLUME MONITORING PROGRAM
GM TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK

Monitoring Event	*Parameters*	*MW-1*	*MW-2*	*MW-3*	*MW-4*	*MW-5*	*MW-9*	*MW-10*	*MW-11*	*MW-12*	*MW-101*	*MW-102*	*MW-103*
90 Day Performance Monitoring	All Table 1 Parameters		X						X	X			
180 Day Performance Monitoring/Round 1 of Semiannual	All Table 1 Parameters		X	X			X		X	X			
	TCL VOCs and Field Parameters	X									X	X	X
	STARS VOCs and Field Parameters		X	X	X	X							
Round 2 Semiannual	All Table 1 Parameters		X						X	X			
	TCL VOCs and Field Parameters	X					X				X	X	X
Round 3 Semiannual	All Table 1 Parameters		X						X	X			
	TCL VOCs and Field Parameters	X					X				X	X	X
	STARS VOCs and Field Parameters		X	X	X	X							
Round 4 Semiannual	All Table 1 Parameters		X						X	X			
	TCL VOCs and Field Parameters	X					X				X	X	X