February 8, 2018

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 Second Evaluation of Enhanced Attenuation

On behalf of General Motors, LLC (GM), GHD has completed a second 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 (GHD) if you should have any questions or comments.

Sincerely,

GHD

Katherine Galanti
Project Manager

KBG/ck/10

Encl.

cc: Jim Hartnett (GM)
Casey Essary (GM)
Greg Kulka (GM)
Christine Barton (GHD)

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Second Evaluation of Enhanced Attenuation for the Endoline Area Chlorinated Solvent Plume

General Motors LLC
Tonawanda Engine Plant
Tonawanda New York

General Motors LLC

GHD | 285 Delaware Avenue Suite 500 Buffalo New York 14202

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1. Introduction

On behalf of General Motors, LLC (GM), GHD Services, Inc. (GHD) has completed a second round of in situ enhanced biodegradation (ISEB) injections and groundwater monitoring as part of the 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

GHD (formerly 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. GHD 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.

The MNA groundwater monitoring program 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 to promote attenuation 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, followed by 2 years of 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.

An evaluation of the ISEB program was prepared and submitted to NYSDEC in August 2014. The evaluation report recommended a second round of injections followed by another 2 years of monitoring and evaluation. The NYSDEC approved the injections in an email dated May 15, 2015. This report summarizes the second round of injections and evaluates the data from the post-injection groundwater monitoring programs.

The second round of injections were completed in November and December 2015. 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 May 2016, November 2016, May 2017, and November 2017.

In addition to the second round of post-injection monitoring, samples were also collected in May of 2016 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 2015

ISEB injection Round 2 was completed in November/December 2015 using a combination of existing injection wells and direct push (DP) technology to allow targeted injections in the areas around MW-2, MW-11, and MW-12. The direct push method allowed the substrate to be injected at varying depths including at the fill clay interface.

Table 1.1 Injection Locations

Area	Injection Location	Number of Points
MW-2 Area	IP-B	
	IP-17	
	IP-18	
	DP Location North of MW-2	1
	Shallow DP Locations	3
MW-11 Area	IP-2	
	IP-6	
	IP-12	
	DP Locations	2
MW-12 Area	DP Locations	4

Figure 1 shows the locations of the existing injection wells and the approximate locations of the direct push locations.

A 5.5-percent solution of EDS-ER™, an emulsified vegetable oil (EVO) product was mixed with nitrogen and phosphorus and vitamin B12 nutrients, and applied at each location. The targeted injection amount was 450 gallons each for the deeper locations and 225 gallons each for the shallow DP locations. Although the full targeted volume of 6,525 gallons of solution was injected, some of the material was redistributed based on how the locations were accepting the material.

2. Groundwater Sampling Program

The groundwater sampling program was designed to monitor the 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. Monitoring wells MW-1, MW-9, MW-101, MW-102, and MW-103 were sampled to monitor the plume migration. 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. Sampling to evaluate the petroleum impacts was conducted in May 2016.

The groundwater samples collected from MW-2, MW-11, and MW-12 were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), and the following natural attenuation 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 at plume monitoring wells MW-2, MW-11, and MW-12 between April 2011 and October 2017 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 April 2011 and October 2017 are presented on Table 2.

The samples collected from monitoring wells MW-2, MW-3, MW-4, and MW-5 were analyzed for the 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 GHD. 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.

3. Monitoring Results

3.1 Monitoring Well MW-2

Chlorinated Volatile Organic Compounds

An increase in chlorinated VOC (CVOC) concentrations was observed between the baseline and 90-day monitoring events after the first round of injections. 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 as follows:

- 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
- 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 Round 1 180-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.

One year after injection Round 1(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 Round 1 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 increase in CA noted at the one-year mark along with the ethane data discussed below indicates that CA biodegraded to ethane relatively quickly. Therefore once CA was no longer being produced by the biodegradation of other CVOCs, residual CA was degraded to ethane causing the concentration of CA at well MW-2 to decrease.

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.

At the baseline monitoring event performed in September 2015 before the Round 2 injection event, 1,1,1-TCA remained below the detection limit and the concentration of 1,1-DCA had been further reduced to 710 ug/L, which is a 53 percent reduction over the September 2013 level. An increase in CA to 22,000 ug/L was observed likely due to conversion of 1,1-DCA to CA as expected.

In February 2016, 3 months after the Round 2 injection, the concentration of 1,1,1-TCA was estimated at 620 ug/L because the concentration was below the reporting limit, 1,1-DCA had increased to 11,000 ug/Land CA had increased to 26,000 ug/L. These increases are likely due to desorption of these compounds from soil into groundwater as a result of the Round 2 injections. A similar trend was observed after the first round of injections.

By May 2016, 6 months after the Round 2 injection event, 1,1,1-TCA was again, below the detection limit and the concentration of 1,1-DCA had decreased to 8,900 ug/L. CA had increased to 34,000 likely caused by the biodegradation of 1,1,1-TCA and 1,1-DCA.

By November 2016, one year after the Round 2 injection event, 1,1,1-TCA remained below the detection limit and the concentration of 1,1-DCA had further decreased to 2,600 ug/L, which is a 76 percent reduction over the February 2016 level. CA increased further to 49,000 ug/L, indicating that CA was degrading more slowly than the rate at which it was produced and was therefore accumulating.

By May 2017, 18 months after the Round 2 injection event, 1,1,1-TCA remained below the detection limit and the concentration of 1,1-DCA was reduced to 630 ug/L which is a 94 percent reduction

over the February 2016 level. The concentration of CA decreased to 38,000 indicating that conversion of CA to ethane was now occurring.

By October 2017, 2 years after the second round of injections, 1,1,1-TCA remained below the detection limit however, the concentration of 1,1-DCA had rebounded to 4,200 ug/L and the concentration of CA also increased to 60,000 ug/L. These increases may indicate that the injected EVO was becoming depleted. These data are shown in Table 1 and graphically on Figures 2 through 5.

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.

The methane concentration at well MW-2 was high throughout the monitoring period after the first injection round and further increased after the Round 2 injection event.

The ethane concentration increased significantly at MW-2 one year after the Round 1 injections. The ethane concentration remained high at well MW-2 for the rest of the monitoring period.

Natural Attenuation Parameters

Alkalinity did not change during the monitoring period in any of the monitoring wells. Nitrate and nitrite were not detected above their detection limits in any of the wells either before or after EVO treatment, which indicates that the conditions were anaerobic.

At well MW-2, ammonia-nitrogen remained at concentrations ranging between 1.5 mg/L and 4.2 mg/L throughout the monitoring periods after both the Round 1 and Round 2 injections. 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 EVO solution, an increase in microbial activity had been expected.

BOD, COD, and TOC all showed increases between the baseline and 3-month post injection monitoring events after both the Round 1 and Round 2 injections. After the Round 1 injections, concentrations of these parameters decreased by the 18-month and 2-year monitoring events, indicating that the EVO may have become depleted by this time. After the Round 2 injections, the concentrations continued to increase until the 1-year monitoring event. Fluctuations were observed after the 1-year event but there was no clear evidence that the carbon source had become depleted. The highest TOC concentration observed at well MW-2 after the Round 2 injections was 75 mg/L, which is a similar concentration to what was observed after the Round 1 injection event in 2011. This concentration was low compared to the amount of organic carbon that was injected and may indicate that only a small amount of the injected material impacted well MW-2.

The sulfate concentration at well MW-2 was low initially (5.6 mg/L), and decreased further to non-detect levels. Sulfide was detected during some monitoring events. Sulfate is reduced to sulfide under anaerobic conditions; therefore, the sulfate/sulfide data suggested that anaerobic conditions were established at this well.

Total aerobic and anaerobic microbial counts increased after each of the injection events but then stabilized and remained at close to the pre-injection levels for throughout the monitoring period. Since anaerobic conditions were present in this well prior to the injections, a large change in microbial numbers was not expected. Dehalobacter bacteria were absent at the 2011 baseline event but present at all post injection and Round 2 monitoring events at this well indicating that the Dehalobacter population increased after the first injection event and has been maintained ever since.

Field Parameters

At well MW-2, the pH remained in the neutral range throughout the monitoring periods after both injection events showing that the EVO injection did not cause a drop in pH. The ORP at well MW-2 was highly negative prior to both EVO injections at -250 millivolts (mV) and -134 mV before the first and second injection events, respectively, and remained in the negative range throughout the monitoring periods. The ORP levels observed are in the optimum range for reductive dechlorination. The DO at well MW-2 was low, suggesting the presence of anaerobic conditions.

3.2 Monitoring Well MW-11

Chlorinated Volatile Organic Compounds

At well MW-11, no changes in the concentrations of CVOCs were observed after the Round 1 injection event in 2011. It was concluded that the injected material did not reach this well. In September 2015 at the baseline monitoring event performed before the Round 2 injection event, 1,1,1-TCA was present at 460 ug/L, and 1,1-DCA and 1,1-dichlorothene (1,1-DCE) were present at 2,200 ug/L and 1,500 ug/L, respectively. Chloroethane was not detected in this well.

In March 2016, 3 months after the Round 2 injection event, concentrations of 1,1,1-TCA, 1,1-DCA, and 1,1-DCE remained similar to their levels at the September 2015 monitoring event. A slightly lower detection limit was achieved for these analyses, which allowed 110 ug/L of cis-1,2-DCE and 260 ug/L of vinyl chloride to be detected.

Concentrations of all CVOCs remained similar at the May 2016 and November 2016 monitoring event. In May 2017, the concentration of vinyl chloride decreased to 74 ug/L and in October 2017, it was further reduced to 58 ug/L. No other significant changes in CVOC concentrations were observed. It appears that similar to the first injection event, the injected material did not impact this well. These data are shown in Table 1 and graphically on Figures 6 through 9.

Dissolved Gases

Small increases in the methane concentration were observed at well MW-11 at the 90-day monitoring event after the Round 1 injection, however, decreases in methane concentrations were observed during the 180-day monitoring event. Methane concentrations continued to fluctuate at MW-11 during the monitoring period. No further increases in methane were observed at well MW-11 after the Round 2 injection event.

The ethane concentration remained low but detectable at MW-11 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 impact at this well.

Natural Attenuation Parameters

Alkalinity did not change during the monitoring period in any of the monitoring wells. Nitrate and nitrite were not detected above their detection limits in any of the wells either before or after EVO treatment, which indicates that the conditions were anaerobic.

At well MW-11, ammonia-nitrogen was not detected during the Round 1 monitoring events but was present at 6.3 mg/L at the September 2015 baseline event. The concentration, however, decreased to less than 1 mg/L at all post-injection monitoring events. These data suggest that the injected nutrients have had no impact in the area around MW-11.

BOD, COD, and TOC concentrations remained unchanged after the Round 1 injections. The concentrations increased at the 2015 baseline monitoring event but then decreased to low levels throughout the Round 2 post injection monitoring events, again suggesting that the injected organic substrate did not impact this well.

The sulfate concentration at well MW-11 was much higher than that observed at well MW-2 at the baseline sampling event and remained high throughout the monitoring period. Sulfide was either not detected or present at low levels both before and after the injections.

Total aerobic and anaerobic heterotrophic microbial counts and anaerobic 1,1,1-TCA specific microbial counts fluctuated during the monitoring period; however, no increasing or decreasing trends were observed, which also supported the conclusion that the injected organic substrate did not impact this well. Dehalobacter bacteria were present during the Round 1 monitoring events, not present at the 2015 baseline monitoring event, but were present at all Round 2 post-injection monitoring events. Although Dehalobacter was present in the area of well MW-11, the lack of organic carbon in the area may have limited biodegradation.

Field Parameters

At well MW-11, the pH fluctuated, but remained in the neutral range throughout the monitoring periods. The ORP fluctuated at this location suggesting that ORP in the area was affected by changes in the water level resulting from infiltration of precipitation. The DO was generally low but fluctuated. These data suggested that these parameters were not affected by the EVO injections.

3.3 Monitoring Well MW-12

Chlorinated Volatile Organic Compounds

In well MW-12, no CVOCs were detected prior to the September 2011 injections except for a low concentration of 1,1-DCA (68 µg/L). This concentration remained relatively unchanged throughout the monitoring period after the first round of injections.

At the baseline sampling event prior to the second set of injections in September 2015, 1,1-DCA was present at 58 µg/L in this well and no other CVOCs were present. Concentrations of 1,1-DCA fluctuated between 58 µg/L and 82 µg/L throughout the 2-year monitoring period, and no increasing or decreasing trend was observed. These data suggest that the injected material also had no impact on this well.

These data are shown in Table 1 and graphically on Figures 10 through 13.

Dissolved Gases

Similar to MW-11, small increases in the methane concentration were observed at well MW-12 at the 90-day monitoring event after the Round 1 injection, however, decreases in methane concentrations were observed during the 180-day monitoring event. Methane concentrations continued to fluctuate at MW-12 during the monitoring periods. The methane concentration at MW-12 increased after the Round 2 injection from 3.1 µg/L at the 2015 baseline event to 3,200 µg/L at the October 2017 monitoring event. Significant concentrations of ethane were not observed at well MW-12 due to the very low concentrations of CVOCs in the area of this well.

At MW-12, ethane was not detected at the September 2015 baseline event and the methane concentration was very low at 3.1 µg/L. Over the 2-year monitoring period, the methane concentration at this well increased significantly to 3,200 µg/L at the October 2017 monitoring event. Significant concentrations of ethane were not observed in this well.

Natural Attenuation Parameters

Alkalinity did not change during the monitoring period in any of the monitoring wells. Nitrate and nitrite were not detected above their detection limits in any of the wells either before or after EVO treatment, which indicates that the conditions were anaerobic.

At well MW-12, ammonia-nitrogen and orthophosphate phosphorus were not detected either before or after the Round 1 or Round 2 injection events until May 2017 when a small amount of ammonia-nitrogen was detected. By October 2017, the ammonia-nitrogen concentration had increased slightly and a small amount or orthophosphate-phosphorus was also detected.

BOD, COD, and TOC concentrations remained low after the Round 1 and Round 2 injection events until the October 2017 monitoring event when a slight increase in all of these parameters was observed.

Sulfate concentrations remained similar at each monitoring event, sulfide was present at either low or non-detect levels. These data suggest that the injected material took 18 months to 2 years after the second injection event to impact MW-12 and anaerobic conditions were enhanced.

Total anaerobic heterotrophic microbial counts increased after the EVO injections with the highest count observed at the October 2017 monitoring event. This supports the conclusion that anaerobic conditions were enhanced in this well towards the end of the monitoring period. Dehalobacter were present in this well at all sampling events.

Field Parameters

At well MW-12, the pH remained in the neutral range throughout the monitoring period. The ORP fluctuated after the Round 1 injections and was positive at 65 mV at the 2015 baseline monitoring event, however negative values were observed at all post-Round 2 injection monitoring events. The DO was also low at all post-injection monitoring events. These data suggested that anaerobic conditions are becoming more established at this well.

3.4 Petroleum Impacts

The samples collected in May 2016 at MW-2, MW-3, MW-4, and MW-5 were also analyzed for STARS VOCs. The analytical results for the sampling related to the petroleum impacts are presented on Table 3. The data show that the concentrations of the residual petroleum compounds remain stagnant.

4. Conclusions and Recommendations

4.1 Conclusions

4.1.1 Enhanced Attenuation Evaluation

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 EVO injections. Groundwater in the area of well MW-11 did not exhibit the same level of reducing conditions; however, at MW-12, the enhancement of anaerobic conditions was observed during the monitoring period.
- At monitoring well MW-2, an increase in CVOC concentrations was observed after the EVO injection likely due to desorption from the soil. These concentrations decreased over the monitoring period. 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, degradation of CA to ethane was also observed during the monitoring period. Although a rebound in concentrations of 1,1-DCA and CA was observed at the 2-year monitoring event, 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 although it appears to have taken approximately 18 months for the substrate to reach the area of MW-12. There has been no observable impact on the concentrations at MW-11. Since it took nearly 2 years after the second injection for impacts to be observed at MW-12 it is expected that the injected material will impact MW-11 in time. The results of the injection program showed that treatment with EVO and nutrients was very effective in areas where the injected material made contact with CVOCs in groundwater. Natural attenuation appears to be occurring in areas where EVO did have significant impact; however, the degradation rate under natural conditions is slower than under enhanced conditions.

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.

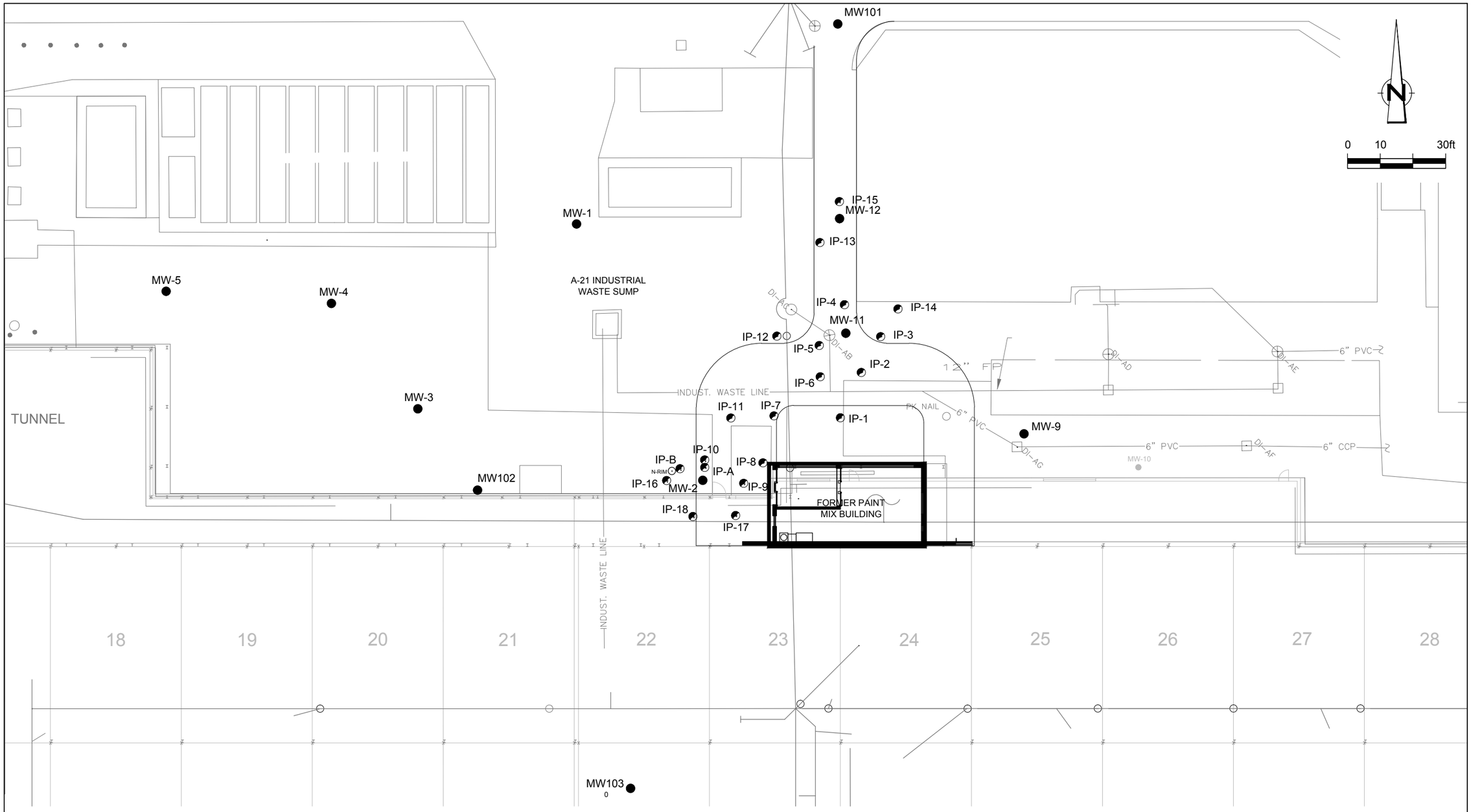
4.2 Recommendations

The clay matrix at the Site is tight, and groundwater flow is slow. Although fluctuations are observed, conditions appear to be generally anaerobic at the Site and the presence of degradation products such as chloroethane and ethane show that natural attenuation is occurring. The ISEB treatments performed in this area have been effective in reducing the higher CVOC concentrations present at the Site; however, the tight clay matrix limits the dispersion and therefore the effectiveness of any injected amendments. Since the clay matrix is so tight at the site, impacted groundwater is not migrating, but is remaining on Site and slowly attenuating. Based on this information, no further injections are recommended for the Site and it is recommended that groundwater continue to be monitored. Annual groundwater monitoring is recommended based on the slow rate of degradation and absence of groundwater migration.

Sampling will be completed annually in October for 3 years. The monitoring parameters for the plume wells MW-2, MW-11, and MW-12 are presented on Table 4. Samples from the perimeter wells, MW-1, MW-9, MW-101, MW-102, and MW-103 will only be analyzed for the VOC parameters listed on Table 4. A groundwater monitoring report letter will be submitted after each sample event. After the third annual monitoring event the effectiveness of the remedy will be evaluated.

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 significant change from the October 2009 event through the October 2017 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.

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

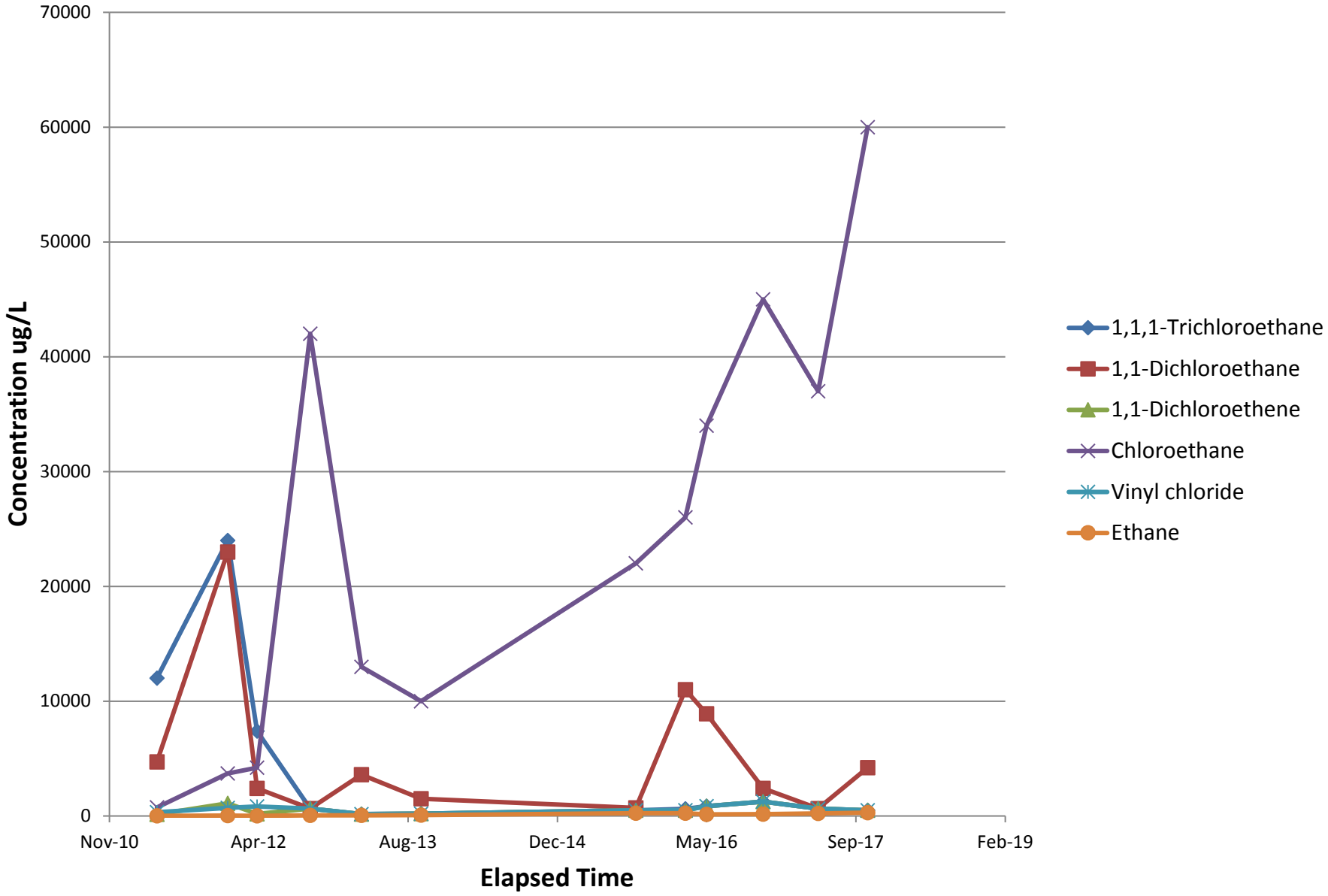


Figure 3. Concentration Versus Time Plot for Well MW-2

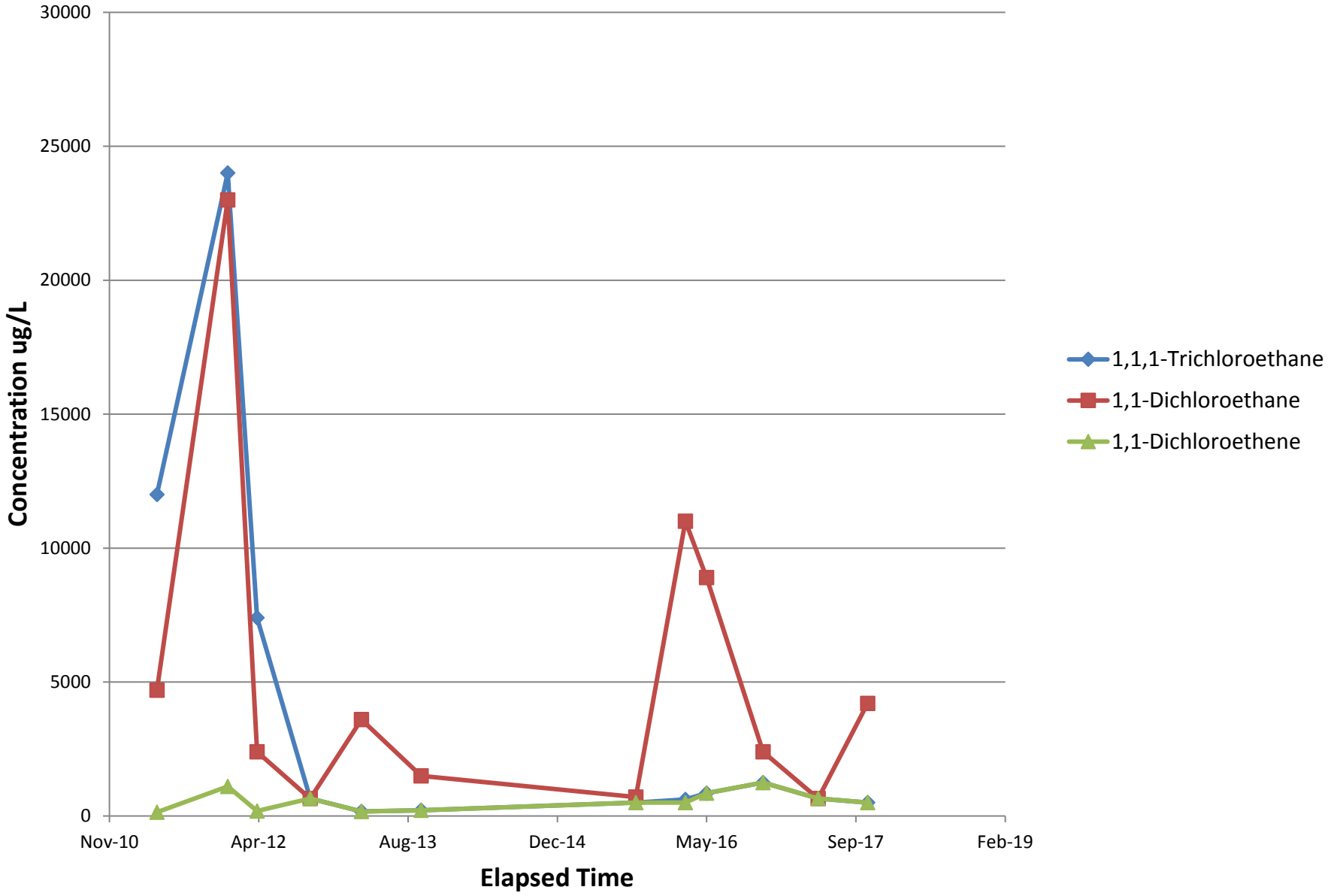


Figure 4. Concentration Versus Time Plot for Well MW-2

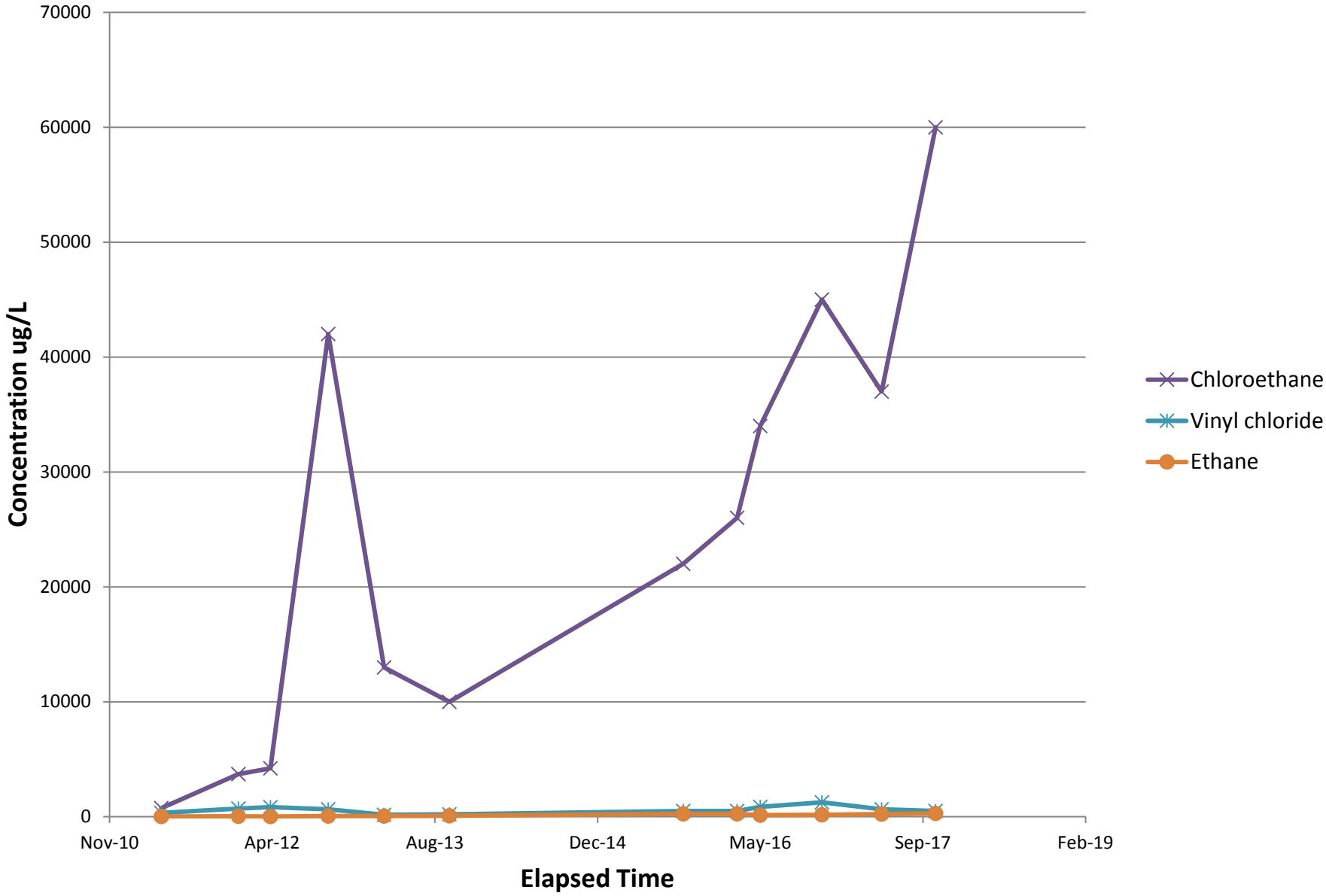


Figure 5. Concentration Versus Time Plot for Well MW-2

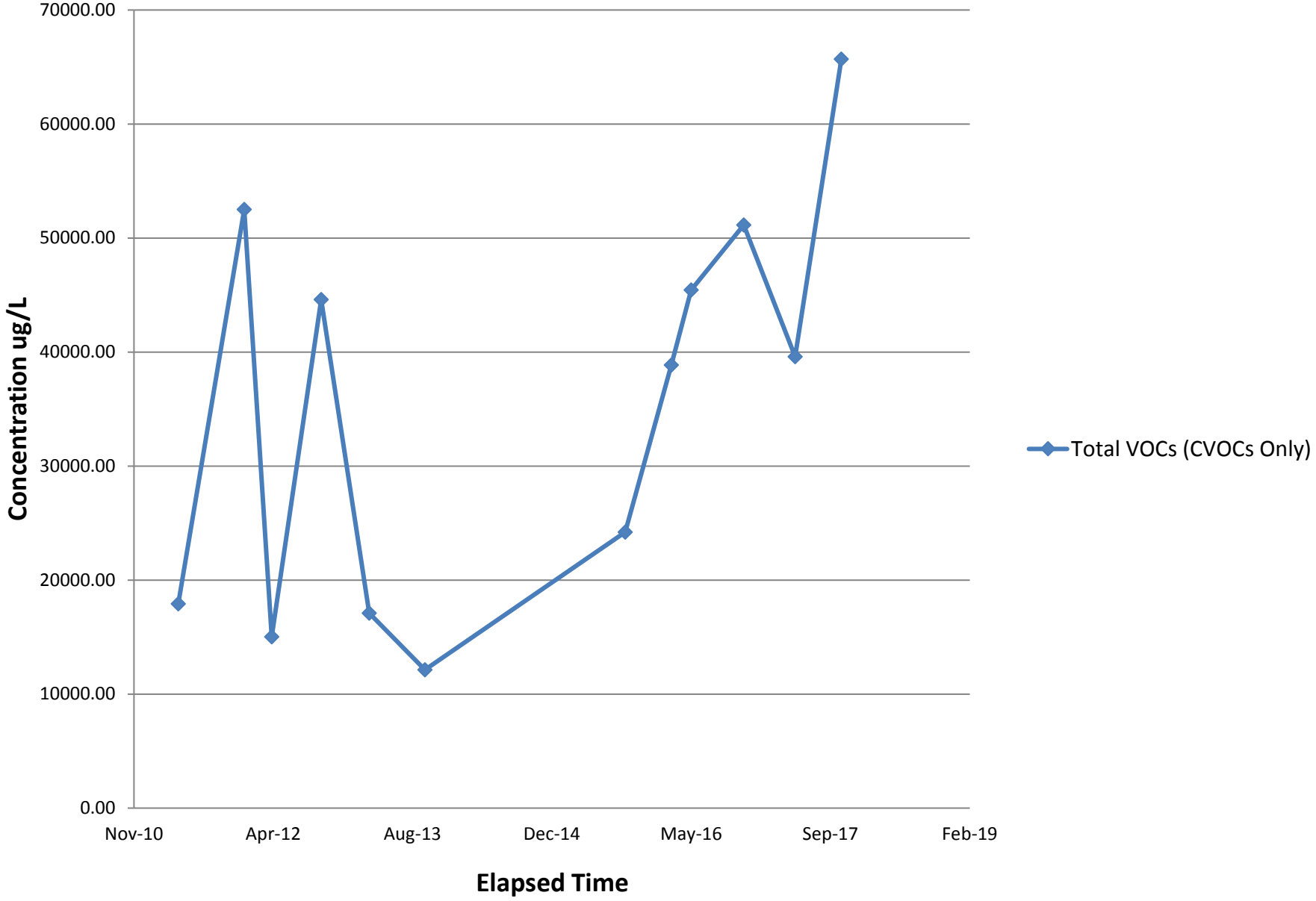


Figure 6. Concentration Versus Time Plot for Well MW-11

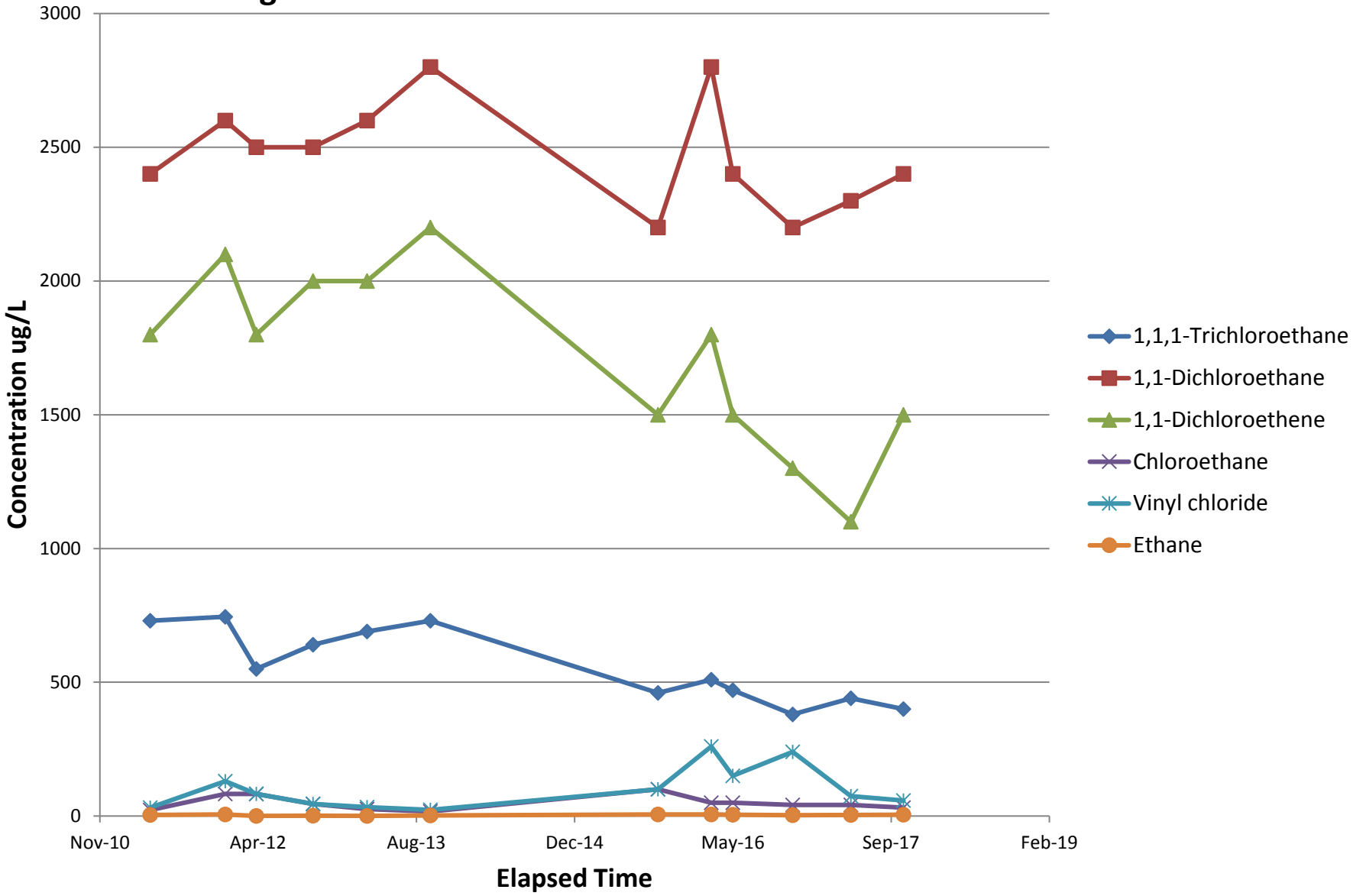


Figure 7. Concentration Versus Time Plot for Well MW-11

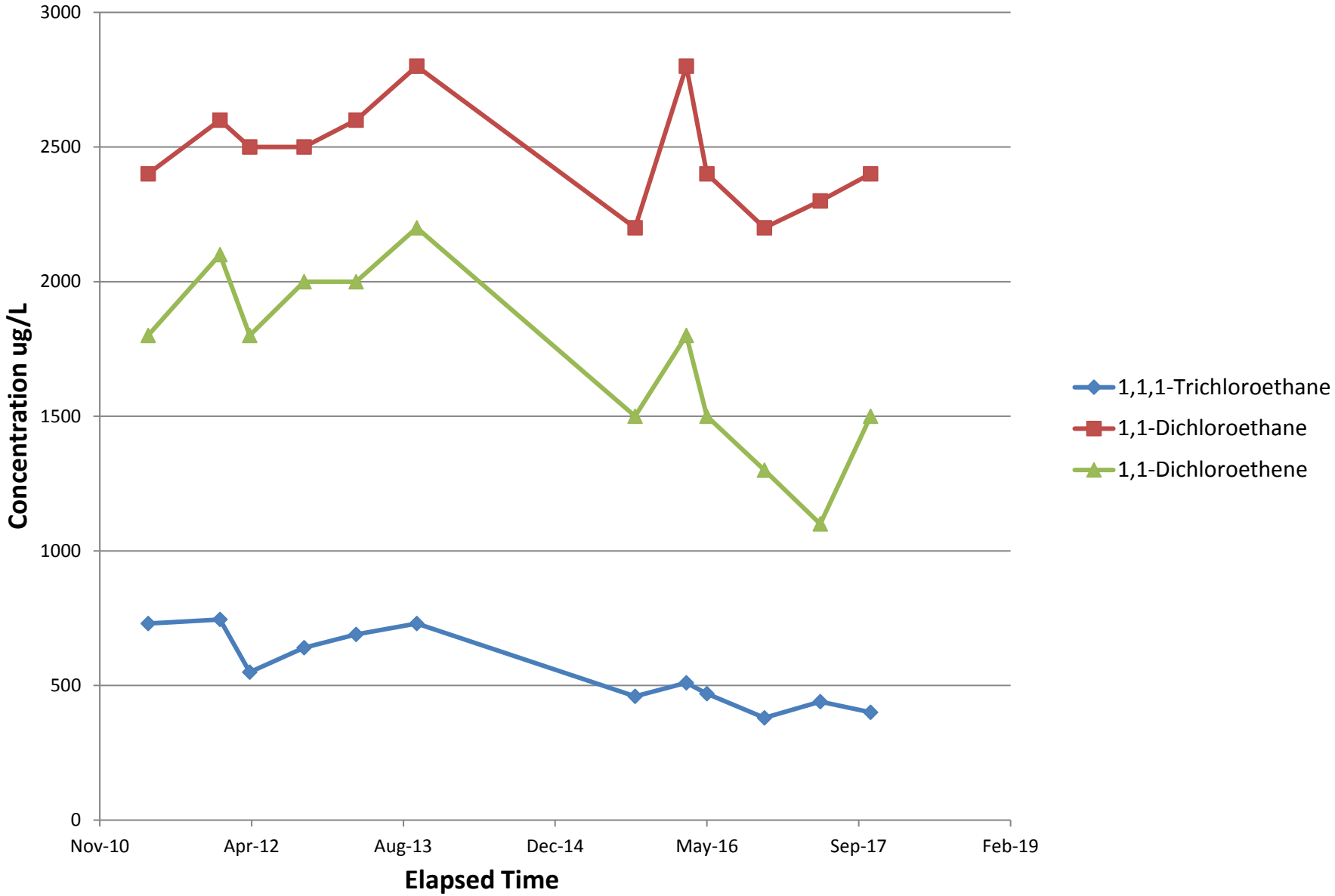


Figure 8. Concentration Versus Time Plot for Well MW-11

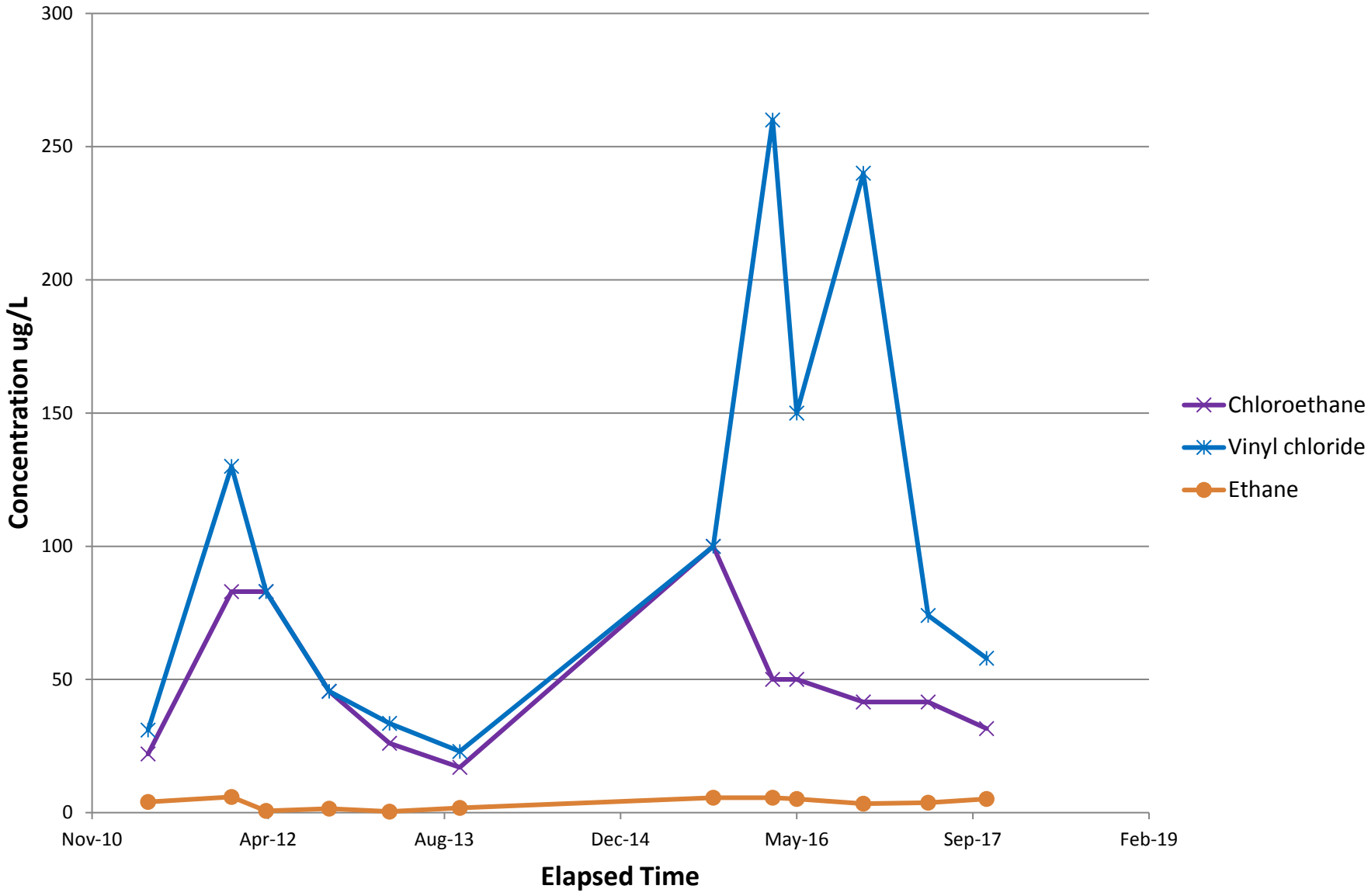


Figure 9. Concentration Versus Time Plot for Well MW-11

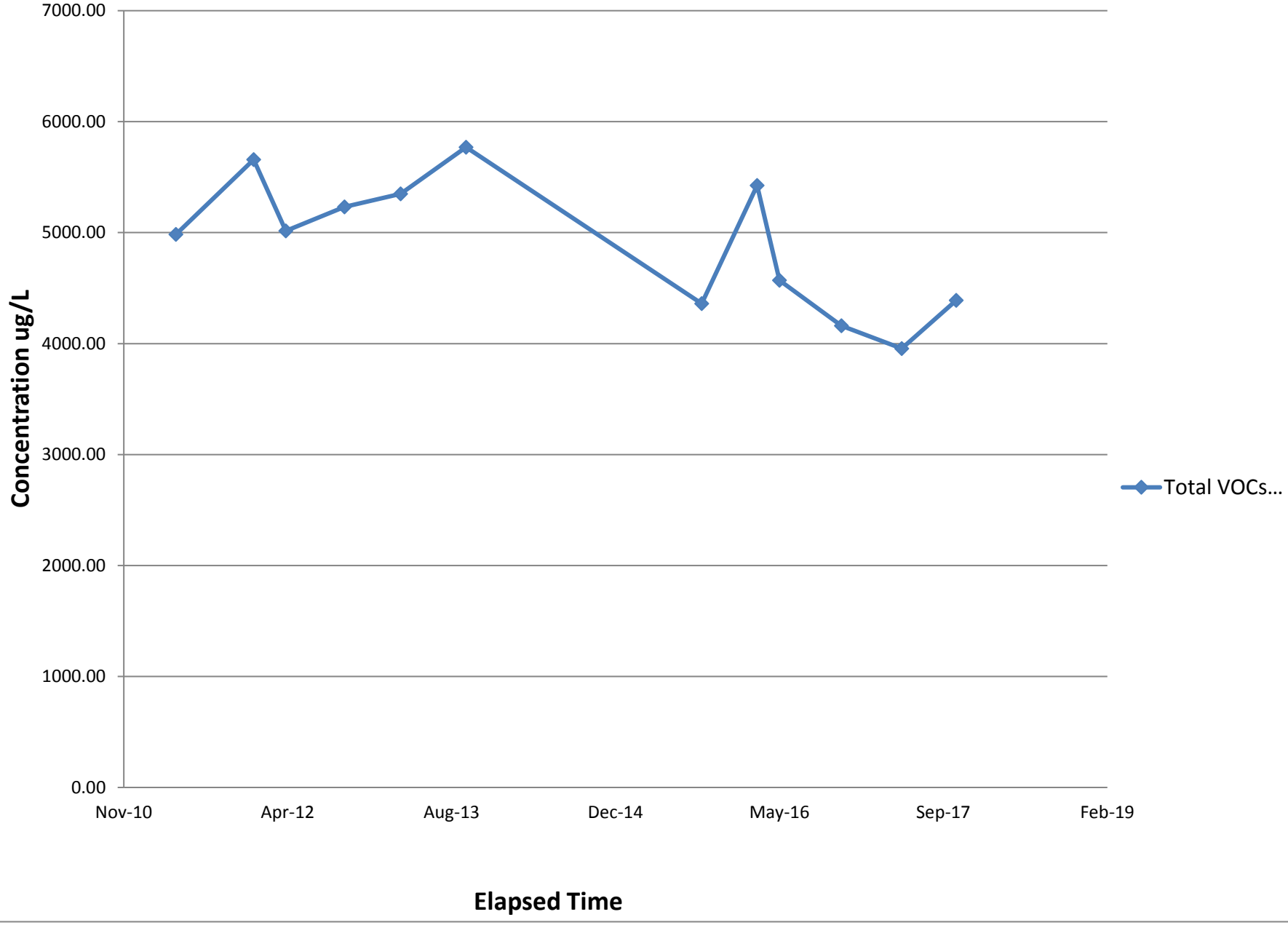


Figure 10. Concentration Versus Time Plot for Well MW-12

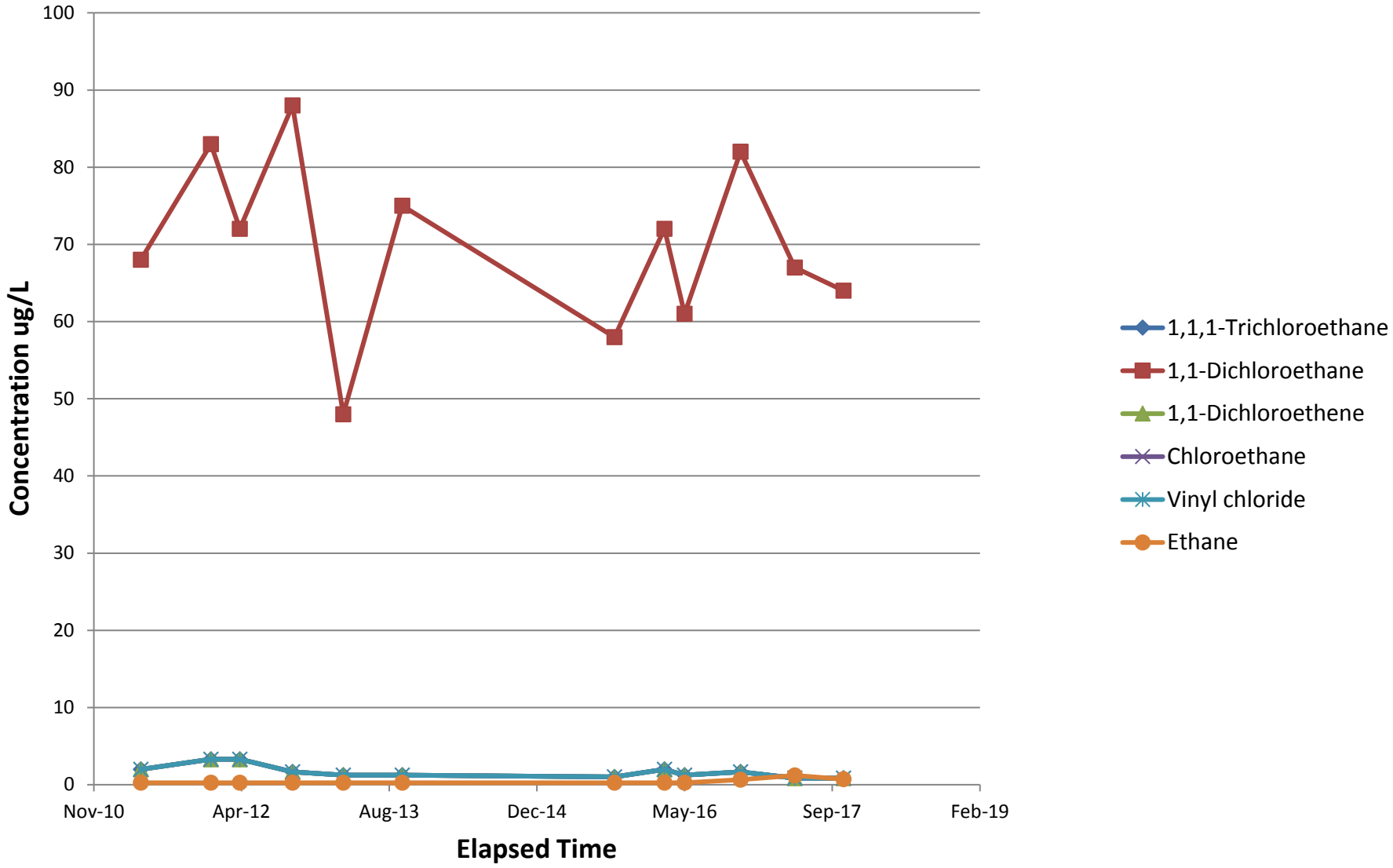


Figure 11. Concentration Versus Time Plot for Well MW-12

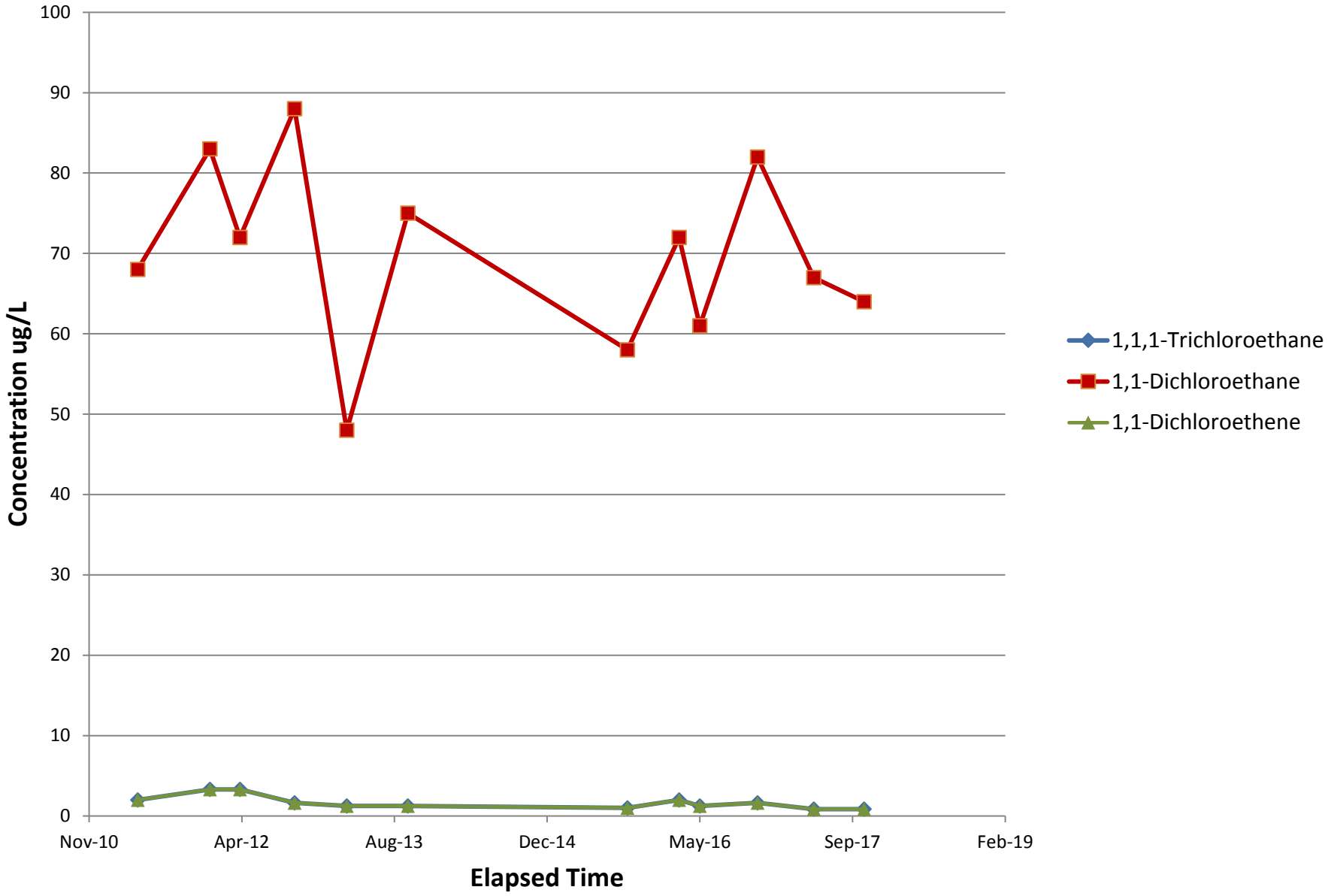


Figure 12. Concentration Versus Time Plot for Well MW-12

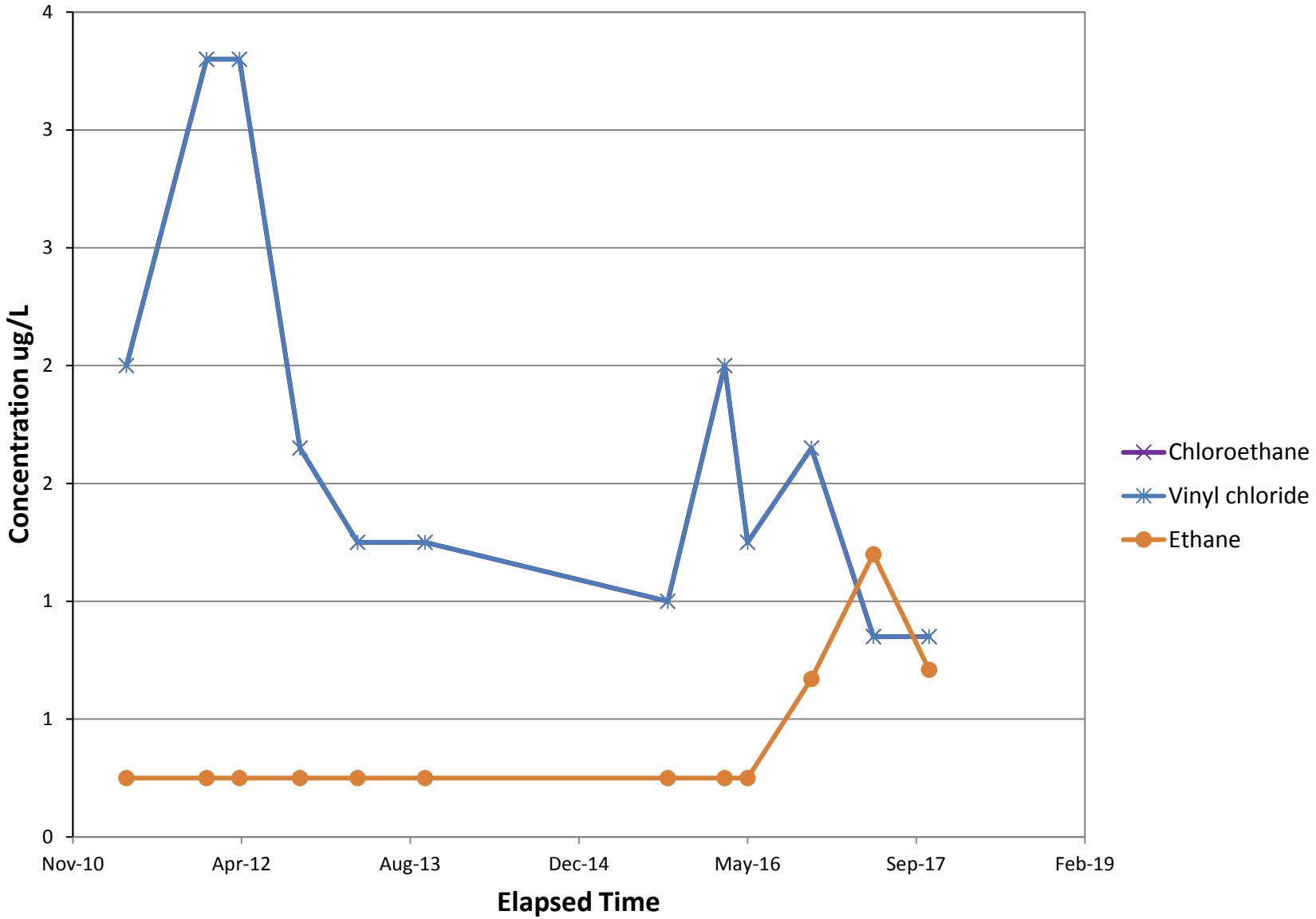
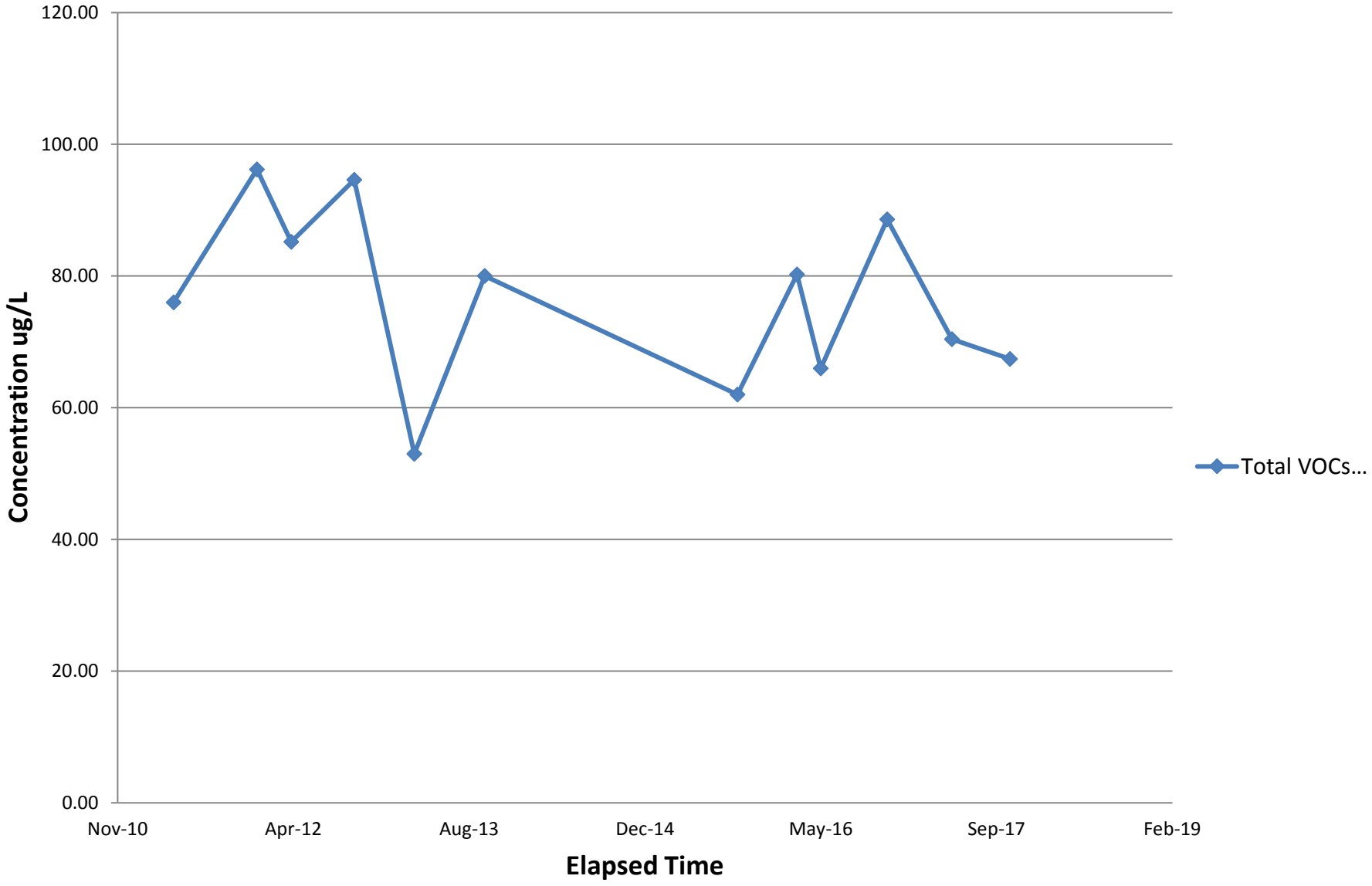


Figure 13. Concentration Versus Time Plot for Well MW-12



Tables

Table 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
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	WG-17390-091615-006	WG-17390-022916-001
Sample Date:		NYSDEC TOGs1 Groundwater		4/26/2011	12/19/2011	3/26/2012	3/26/2012 (Duplicate)	9/20/2012	3/11/2013	9/27/2013	9/16/2015	2/29/2016
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	1000 U	620 J
1,1,2,2-Tetrachloroethane	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,1,2-Trichloroethane	ug/L	NC	1	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,1-Dichloroethane	ug/L	NC	5	4700	23000	24000	22000	1300 U	3600	1500	710 J	11000
1,1-Dichloroethene	ug/L	NC	5	140 J	1100	190 J	170 J	1300 U	330 U	420 U	1000 U	1000 U
1,2-Dichloroethane	ug/L	NC	0.6	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,2-Dichloroethene (total)	ug/L	5	NC	670 U	-	-	-	-	-	-	2000 U	2000 U
1,2-Dichloropropane	ug/L	NC	1	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,4-Dioxane	ug/L	NC	NC	17000 U	-	42000 U	31000 U	63000 U	17000 U	21000 U	50000 U	50000 U
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	10000 U	10000 U
2-Hexanone	ug/L	50	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	10000 U	10000 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-	-
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	10000 U	10000 U
Acetone	ug/L	50	NC	3300 U	7100 U	1200 J	980 J	13000 U	3300 U	1600 J	10000 U	1100 JB
Benzene	ug/L	NC	1	330 U	200 J	270 J	260 J	320 J	190 J	170 J	1000 U	1000 U
Bromodichloromethane	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Bromoform	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Bromomethane (Methyl bromide)	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Carbon disulfide	ug/L	60	60	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Carbon tetrachloride	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Chlorobenzene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Chloroethane	ug/L	NC	5	740	3700	4200 J	2400 J	42000	13000	10000	22000	26000
Chloroform (Trichloromethane)	ug/L	NC	7	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Chloromethane (Methyl chloride)	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 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	1000 U	1000 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	1000 U	1000 U
Ethylbenzene	ug/L	NC	5	80 J	120 J	160 J	140 J	1300 U	90 J	84 J	1000 U	1000 U
Isopropyl benzene	ug/L	NC	5	-	710 U	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	1000 U	1000 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	1000 U	1000 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	1000 U	1000 U
Toluene	ug/L	NC	5	68 J	190 J	180 J	170 J	390 J	220 J	200 J	1000 U	1000 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	1000 U	1000 U
Trichloroethene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Vinyl chloride	ug/L	NC	2	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Xylenes (total)	ug/L	NC	5	380 J	590 J	680 J	600 J	410 J	450 J	480 J	2000 U	2000 U
Dissolved Gases												
Ethane	ug/L	NC	NC	19	25	11	18	54	48	79	240	-
Methane	ug/L	NC	NC	5800	3700	2700	3300	1200	6300	3500	5100	-
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	209000	240000	260000 J	280000	230000	330000	220000	310000	350000
Ammonia	ug/L	NC	2000	3000	4200	3600	3600	4200	3400 J	2900	2100	1500
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	1260	1470	10900	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	12000	43000 J	94000	98000	91000 J	71000	69000	24000 U	26000
Chemical oxygen demand (COD)	ug/L	NC	NC	35000	200000	190000 J	180000	210000	130000	84000	81000	120000
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	absent	present	present	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	present	present	present	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	-

Table 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
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	WG-17390-091615-006	WG-17390-022916-001
Sample Date:		NYSDEC TOGs1 Groundwater		4/26/2011	12/19/2011	3/26/2012	3/26/2012 (Duplicate)	9/20/2012	3/11/2013	9/27/2013	9/16/2015	2/29/2016
Parameters	**Units**	**Guidance Value**	**Standard**									
Nitrate (as N)	ug/L	NC	10000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	500 U	100 U
Nitrite (as N)	ug/L	NC	1000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	500 U	100 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	-	-	-	-	-	80 J	100 U
Sulfate	ug/L	NC	250000	6000	1000	460 J	400 J	4700	850 J	4300	5600	1400
Sulfide	ug/L	50	NC	**1400**	**2400**	**1100**	**960 J**	**2100**	1000 U	**470 J**	**5500**	1000 U
TOC averages	ug/L	NC	NC	-	-	46000	43000	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	56640	1770	15200	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	11880	3520	13900	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	10000	65000	-	-	78000	37000	22000	24000	29000
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
Field Parameters												
Conductivity	mS/cm	NC	NC	-	1.289	1.47	-	1.76	1.49	4.66	1.03	1.51
Dissolved oxygen (DO)	ug/L	NC	NC	-	280	2800	-	-	6580	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-	-	-	-	5560	-	420	540	0
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-209.2	-119	-	-	-148	-	-	-
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-	-	-	-	-153	-	-166	-134	-152
pH	s.u.	NC	NC	-	6.82	7.11	-	-	7.32	-	-	-
pH, field	s.u.	NC	NC	-	-	-	-	6.77	-	7.29	7.08	7.67
Temperature, field	Deg C	NC	NC	-	8.4	6.1	-	18	11	17.73	18.67	8.02
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	-	1	5.8	-	1	11	0	1.37	4.04

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.
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 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-11	MW-11
Sample Name:				WG-17390-051016-002	WG-17390-111516-KL-08	WG-17390-111516-KL-09	WG-17390-051817-DO-005	WG-17390-051817-DO-006	WG-17390-103117-005	GW-17390-042611-KL-07	WG-17390-121911-KL-02
Sample Date:		NYSDEC TOGs1 Groundwater		5/10/2016	11/15/2016	11/15/2016 (Duplicate)	5/18/2017	5/18/2017 Duplicate	10/31/17	4/26/2011	12/19/2011
Parameters	**Units**	**Guidance Value**	**Standard**								
Volatile Organic Compounds											
1,1,1-Trichloroethane	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	730	760
1,1,2,2-Tetrachloroethane	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
1,1,2-Trichloroethane	ug/L	NC	1	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
1,1-Dichloroethane	ug/L	NC	5	8900	2400 J	2600	1300 U	630 J	4200	2400	2600
1,1-Dichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	1800	2100
1,2-Dichloroethane	ug/L	NC	0.6	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	16 J	130 U
1,2-Dichloroethene (total)	ug/L	5	NC	3300 U	5000 U	5000 U	2500 U	2500 U	2000 U	98 J	-
1,2-Dichloropropane	ug/L	NC	1	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
1,4-Dioxane	ug/L	NC	NC	83000 U	130000 U	130000 U	63000 U	63000 U	50000 U	3600 U	-
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	710 U	1300 U
2-Hexanone	ug/L	50	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	710 U	1300 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	-
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	710 U	1300 U
Acetone	ug/L	50	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	710 U	1300 U
Benzene	ug/L	NC	1	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Bromodichloromethane	ug/L	50	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Bromoform	ug/L	50	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Bromomethane (Methyl bromide)	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Carbon disulfide	ug/L	60	60	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Carbon tetrachloride	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Chlorobenzene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Chloroethane	ug/L	NC	5	34000	45000	49000	37000	38000	60000	22 J	130 U
Chloroform (Trichloromethane)	ug/L	NC	7	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Chloromethane (Methyl chloride)	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
cis-1,2-Dichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	-	110 J
cis-1,3-Dichloropropene	ug/L	NC	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	-
Dibromochloromethane	ug/L	50	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Ethylbenzene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Isopropyl benzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	130 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	-	-	1300 U	1300 U	-	-	630 U
Methylene chloride	ug/L	NC	5	1700 U	2500 U	3850 U	1300 U	1300 U	1000 U	71 U	130 U
Naphthalene	ug/L	10	NC	-	-	-	1300 U	1300 U	-	-	-
N-Butylbenzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	-
N-Propylbenzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	-
Styrene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
tert-Butylbenzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	-
Tetrachloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Toluene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
trans-1,2-Dichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	-	130 U
trans-1,3-Dichloropropene	ug/L	NC	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Trichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	71 U	130 U
Vinyl chloride	ug/L	NC	2	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	31 J	130 U
Xylenes (total)	ug/L	NC	5	3300 U	5000 U	5000 U	2500 U	2500 U	350 J	140 U	250 U
Dissolved Gases											
Ethane	ug/L	NC	NC	140	170	180	230	230	290	4.0	5.9
Methane	ug/L	NC	NC	6300	4400	5200	9600	9000	9800	860	1200
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	360000	310000	320000	280000	290000	260000	422000	450000
Ammonia	ug/L	NC	2000	1700 B	2800 B	2800 B	--	--	3500	2000 U	2000 U
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	-	-	-	--	--	--	3360	115
Biochemical oxygen demand (BOD)	ug/L	NC	NC	43000	60000 B	68000 B	95000 J	82000 J	35000	2000 U	2000 UJ
Chemical oxygen demand (COD)	ug/L	NC	NC	140000	250000 J	240000 J	230000	220000	250000	180000	190000
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	-	-	-	-	-	present	present
Dehalococcoides spp.	unknown	NC	NC	-	-	-	-	-	-	absent	absent
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-

Table 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-11	MW-11
Sample Name:				WG-17390-051016-002	WG-17390-111516-KL-08	WG-17390-111516-KL-09	WG-17390-051817-DO-005	WG-17390-051817-DO-006	WG-17390-103117-005	GW-17390-042611-KL-07	WG-17390-121911-KL-02
Sample Date:		NYSDEC TOGs1 Groundwater		5/10/2016	11/15/2016	11/15/2016 (Duplicate)	5/18/2017	5/18/2017 Duplicate	10/31/17	4/26/2011	12/19/2011
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrate (as N)	ug/L	NC	10000	100 U	100 U	100 U	100 UJ	100 UJ	100 U	100 U	500 U
Nitrite (as N)	ug/L	NC	1000	500 U	100 U	100 U	100 UJ	100 UJ	100 U	5000 U	500 U
Orthophosphate	ug/L	NC	NC	-	-	-	--	--	--	-	-
pH, lab	s.u.	NC	NC	-	-	-	--	--	--	-	-
Phosphorus	ug/L	NC	NC	-	61 J	100 U	96 J	68 J	54 J	40 J	100 U
Sulfate	ug/L	NC	250000	810 J	760 J	1300	1000 U	1000 U	1000 U	1960000	2000000
Sulfide	ug/L	50	NC	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	40800	1670
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	6080	1450
Total organic carbon (TOC)	ug/L	NC	NC	30000	68000	66000	37000	36000	75000	5000	6500
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	1.36	1.65	1.65	1.48	1.48	1.86	-	14.67
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-	--	--	--	-	230
Dissolved oxygen (DO), field	ug/L	NC	NC	3800	580	580	0.24	0.24	0.98	-	-
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-	--	--	--	-	-12.7
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-	-101	-101	-145	-145	-52	-	-
pH	s.u.	NC	NC	-	-	-	--	--	--	-	6.12
pH, field	s.u.	NC	NC	7.43	7.71	7.71	7.29	7.29	7.11	-	-
Temperature, field	Deg C	NC	NC	14.87	14.0	14.0	17.58	17.58	13.77	-	10.04
Temperature, field	Deg F	NC	NC	-	-	-	--	--	--	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	--	--	--	-	-
Turbidity	NTU	NC	NC	3.8	3.6	3.6	2.52	2.52	28.6	-	5.2

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, d
June 1998 and addenda.
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 reportin
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 October 2017

Location ID:				MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11
Sample Name:				WG-17390-121911-KL-03	WG-17390-032612-KL-03	WG-17390-092112-003	WG-17390-031113-KL-001	WG-17390-092713-KL-005	WG-17390-091615-009	WG-17390-030316-004	WG-17390-051016-001	WG-17390-111516-KL-07
Sample Date:		NYSDEC TOGs1 Groundwater		12/19/2011 (Duplicate)	3/26/2012	9/21/2012	3/11/2013	9/27/2013	9/16/2015	3/3/2016	5/10/2016	11/15/2016
Parameters	**Units**	**Guidance Value**	**Standard**									
Volatile Organic Compounds												
1,1,1-Trichloroethane	ug/L	NC	5	730	550	640	690	730	460	510	470	380
1,1,2,2-Tetrachloroethane	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
1,1,2-Trichloroethane	ug/L	NC	1	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
1,1-Dichloroethane	ug/L	NC	5	2500	2500	2500	2600	2800	2200	2800	2400	2200
1,1-Dichloroethene	ug/L	NC	5	2100	1800	2000	2000	2200	1500	1800	1500	1300
1,2-Dichloroethane	ug/L	NC	0.6	130 U	83 U	91 U	67 U	14 J	200 U	100 U	100 U	83 U
1,2-Dichloroethene (total)	ug/L	5	NC	-	-	-	-	-	89 J	110 J	100 J	89 J
1,2-Dichloropropane	ug/L	NC	1	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
1,4-Dioxane	ug/L	NC	NC	-	4200 U	4500 U	3300 U	2000 U	10000 U	5000 U	5000 U	4170 U
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	1300 U	830 U	910 U	670 U	400 U	2000 U	1000 U	1000 U	830 U
2-Hexanone	ug/L	50	NC	1300 U	830 U	910 U	670 U	400 U	2000 U	1000 U	1000 U	830 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	1300 U	830 U	910 U	670 U	400 U	2000 U	1000 U	1000 U	830 U
Acetone	ug/L	50	NC	1300 U	130 J	910 U	670 U	400 U	2000 U	110 JB	1000 U	830 U
Benzene	ug/L	NC	1	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Bromodichloromethane	ug/L	50	NC	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Bromoform	ug/L	50	NC	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Bromomethane (Methyl bromide)	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Carbon disulfide	ug/L	60	60	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Carbon tetrachloride	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Chlorobenzene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Chloroethane	ug/L	NC	5	36 J	83 U	91 U	26 J	17 J	200 U	100 U	100 U	83 U
Chloroform (Trichloromethane)	ug/L	NC	7	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Chloromethane (Methyl chloride)	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
cis-1,2-Dichloroethene	ug/L	NC	5	110 J	110	100	100	120	-	-	100	89
cis-1,3-Dichloropropene	ug/L	NC	NC	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	50	NC	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Ethylbenzene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Isopropyl benzene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	-	-	-	-
Methyl tert butyl ether (MTBE)	ug/L	10	NC	630 U	420 U	450 U	67 U	40 U	-	-	-	-
Methylene chloride	ug/L	NC	5	130 U	83 U	91 U	83 U	40 U	200 U	100 U	100 U	83 U
Naphthalene	ug/L	10	NC	-	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Styrene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
tert-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Toluene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
trans-1,2-Dichloroethene	ug/L	NC	5	130 U	83 U	91 U	67 U	40 U	-	-	100 U	83 U
trans-1,3-Dichloropropene	ug/L	NC	NC	130 U	83 U	91 U	67 U	40 U	200 U	100 U	100 U	83 U
Trichloroethene	ug/L	NC	5	130 U	16 J	16 J	20 J	19 J	200 U	100 U	100 U	83 U
Vinyl chloride	ug/L	NC	2	130 U	83 U	91 U	67 U	23 J	200 U	260	150	240
Xylenes (total)	ug/L	NC	5	250 U	170 U	180 U	130 U	80 U	400 U	200 U	200 U	170 U
Dissolved Gases												
Ethane	ug/L	NC	NC	6.2	0.65	1.5	0.42 J	1.8	5.6	-	5.1	3.4
Methane	ug/L	NC	NC	1200	93	280	59	340	1200	-	1200	670
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	460000	440000 J	450000	470000	440000	480000	490000	460000	440000
Ammonia	ug/L	NC	2000	2000 U	2000 U	2000 U	2000 U	870 J	6300	670	170 JB	260 B
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	-	200	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	2000 UJ	2000 U	2000 U	2000 U	2000 U	3500	2000 U	2000 U	2000 U
Chemical oxygen demand (COD)	ug/L	NC	NC	160000	100000 J	160000	99000	220000	150000	17000	62000	52000 J
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	present	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	-	absent	-	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	-

Table 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11	MW-11
Sample Name:				WG-17390-121911-KL-03	WG-17390-032612-KL-03	WG-17390-092112-003	WG-17390-031113-KL-001	WG-17390-092713-KL-005	WG-17390-091615-009	WG-17390-030316-004	WG-17390-051016-001	WG-17390-111516-KL-07
Sample Date:		NYSDEC TOGs1 Groundwater		12/19/2011 (Duplicate)	3/26/2012	9/21/2012	3/11/2013	9/27/2013	9/16/2015	3/3/2016	5/10/2016	11/15/2016
Parameters	**Units**	**Guidance Value**	**Standard**									
Nitrate (as N)	ug/L	NC	10000	500 U	100 U	100 U	100 U	100 U	5000 U	500 U	100 U	1000 U
Nitrite (as N)	ug/L	NC	1000	5000 U	2500 U	100 U	2500 U	500 U	5000 U	500 U	2500 U	1000 U
Orthophosphate	ug/L	NC	NC	-	100 U	R	100 U	500 U	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	100 U	-	-	-	-	82 J	100 U	-	100 U
Sulfate	ug/L	NC	250000	**2000000**	**3100000**	**3900000**	**2600000**	**2300000**	**1700000**	**930000**	**2000000**	**2200000**
Sulfide	ug/L	50	NC	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
TOC averages	ug/L	NC	NC	-	3100	-	-	-	-	-	1300	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	555	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	215	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	6900	-	4000	4800	4300	28000	1600	1300	2300
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
Field Parameters												
Conductivity	mS/cm	NC	NC	-	16.3	15.6	15.5	26.1	13.9	18.4	14.2	20.5
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-	1120	-	5120	0	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-	-	5030	-	420	-	-	8100	460
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	97	-	155	-	-	-	-	-
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-	-	-73	-	-58	-146	-110	-	15
pH	s.u.	NC	NC	-	6.27	-	7.08	-	-	-	-	-
pH, field	s.u.	NC	NC	-	-	6.23	-	6.86	6.75	7.53	6.86	7.15
Temperature, field	Deg C	NC	NC	-	10.1	19.4	9.74	18.62	24.99	7.75	12.59	15.7
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	-	-	0	3.4	0	4.84	1.07	11.2	1.6

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, d
June 1998 and addenda.
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 reportin
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 October 2017

Location ID:				MW-11	MW-11	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12
Sample Name:				WG-17390-051817-DO-007	WG-17390-103017-001	GW-17390-042611-KL-06	WG-17390-121911-KL-04	WG-17390-032712-KL-04	WG-17390-092112-004	WG-17390-031113-KL-003	WG-17390-092713-KL-006	WG-17390-092713-KL-007
Sample Date:		NYSDEC TOGs1 Groundwater		5/18/2017	10/30/17	4/26/2011	12/19/2011	3/27/2012	9/21/2012	3/11/2013	9/27/2013	9/27/2013 (Duplicate)
Parameters	**Units**	**Guidance Value**	**Standard**									
Volatile Organic Compounds												
1,1,1-Trichloroethane	ug/L	NC	5	440	400	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
1,1,2,2-Tetrachloroethane	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
1,1,2-Trichloroethane	ug/L	NC	1	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
1,1-Dichloroethane	ug/L	NC	5	2300	2400	68	83	72	88	48	75	76
1,1-Dichloroethene	ug/L	NC	5	1100	1500	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
1,2-Dichloroethane	ug/L	NC	0.6	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
1,2-Dichloroethene (total)	ug/L	5	NC	83 J	94 J	4.0 U	-	-	-	-	-	-
1,2-Dichloropropane	ug/L	NC	1	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
1,4-Dioxane	ug/L	NC	NC	4200 U	3100 U	100 U	-	170 U	170 U	130 U	130 U	170 U
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	830 U	630 U	20 U	33 U	33 U	33 U	25 U	25 U	33 U
2-Hexanone	ug/L	50	NC	830 U	630 U	20 U	33 U	33 U	33 U	25 U	25 U	33 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	830 U	630 U	20 U	33 U	33 U	33 U	25 U	25 U	33 U
Acetone	ug/L	50	NC	830 U	630 U	20 U	33 U	33 U	33 U	25 U	25 U	33 U
Benzene	ug/L	NC	1	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Bromodichloromethane	ug/L	50	NC	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Bromoform	ug/L	50	NC	83 UJ	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Bromomethane (Methyl bromide)	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Carbon disulfide	ug/L	60	60	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Carbon tetrachloride	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Chlorobenzene	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Chloroethane	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Chloroform (Trichloromethane)	ug/L	NC	7	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Chloromethane (Methyl chloride)	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
cis-1,2-Dichloroethene	ug/L	NC	5	83	94	-	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
cis-1,3-Dichloropropene	ug/L	NC	NC	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Dibromochloromethane	ug/L	50	NC	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Ethylbenzene	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Isopropyl benzene	ug/L	NC	5	-	-	-	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	-	-	17 U	17 U	17 U	2.5 U	2.5 U	3.3 U
Methylene chloride	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Naphthalene	ug/L	10	NC	-	-	-	-	-	-	-	-	-
N-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
N-Propylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Styrene	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
tert-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Toluene	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
trans-1,2-Dichloroethene	ug/L	NC	5	83 U	63 U	-	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
trans-1,3-Dichloropropene	ug/L	NC	NC	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Trichloroethene	ug/L	NC	5	83 U	63 U	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Vinyl chloride	ug/L	NC	2	74 J	58 J	2.0 U	3.3 U	3.3 U	3.3 U	2.5 U	2.5 U	3.3 U
Xylenes (total)	ug/L	NC	5	170 U	130 U	4.0 U	6.7 U	6.7 U	6.7 U	5.0 U	5.0 U	6.7 U
Dissolved Gases												
Ethane	ug/L	NC	NC	3.7	5.1	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	-
Methane	ug/L	NC	NC	840	1100	0.50	8.1	1.1	5.1	5.8	14	-
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	410000	410000	484000	510000	500000	510000	450000	490000	-
Ammonia	ug/L	NC	2000	350	350	2000 U	2000 U	2000 U	2000 U	850 J	2000 U	-
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	-	-	490	0 U	10	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	2600 J	2600 J	2000 U	2000 UJ	2000 U	2000 U	2000 U	2000 U	-
Chemical oxygen demand (COD)	ug/L	NC	NC	56000	56000	56000	72000	45000	27000	25000	35000 U	-
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	-	present	present	present	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	-	-	absent	absent	absent	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	-

Table 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-11	MW-11	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12
Sample Name:				WG-17390-051817-DO-007	WG-17390-103017-001	GW-17390-042611-KL-06	WG-17390-121911-KL-04	WG-17390-032712-KL-04	WG-17390-092112-004	WG-17390-031113-KL-003	WG-17390-092713-KL-006	WG-17390-092713-KL-007
Sample Date:		NYSDEC TOGs1 Groundwater		5/18/2017	10/30/17	4/26/2011	12/19/2011	3/27/2012	9/21/2012	3/11/2013	9/27/2013	9/27/2013 (Duplicate)
Parameters	**Units**	**Guidance Value**	**Standard**									
Nitrate (as N)	ug/L	NC	10000	100 UJ	100 UJ	53 J	500 U	100 U	100 U	150	100 U	-
Nitrite (as N)	ug/L	NC	1000	100 UJ	100 UJ	1000 U	500 U	2000 U	100 U	1000 U	500 U	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	100 U	R	100 U	500 U	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	100 U	100 U	40 J	100 U	-	-	-	-	-
Sulfate	ug/L	NC	250000	**2000000**	**2000000**	**1020000**	130000	**1100000**	**1900000**	**1100000**	**1400000**	-
Sulfide	ug/L	50	NC	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	-
TOC averages	ug/L	NC	NC	-	-	-	-	5500	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	3440	10	80	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	42400	10	10	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	3200	3200	7000	8400	-	5700	6100	6500	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
Field Parameters												
Conductivity	mS/cm	NC	NC	14.7	18.3	-	5.775	5.03	4.94	4.63	4.63	-
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-	1610	3700	-	7530	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	0.26	0.88	-	-	-	6150	-	2930	-
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-	43.8	79	-	125	-	-
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-33	43	-	-	-	19	-	-32	-
pH	s.u.	NC	NC	-	-	-	6.52	6.99	-	7.47	-	-
pH, field	s.u.	NC	NC	7.01	6.66	-	-	-	6.5	-	5.53	-
Temperature, field	Deg C	NC	NC	16.44	14.27	-	10	8.5	19.6	13.17	18.43	-
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	2.41	3.3	-	0.2	140	0	0	76.2	-

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, d
June 1998 and addenda.
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 reportin
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 October 2017

Location ID:				MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12
Sample Name:				WG-17390-091615-007	WG-17390-091615-008	WG-17390-030316-002	WG-17390-030316-003	WG-17390-051016-003	WG-17390-051016-004	WG-17390-111516-KL-0(	WG-17390-051817-DO-008	WG-17390-103017-003
Sample Date:		NYSDEC TOGs1 Groundwater		9/16/2015	9/16/2015 (Duplicate)	3/3/2016	3/3/2016 (Duplicate)	5/10/2016	5/10/2016 (Duplicate)	11/15/2016	5/18/2017	10/30/17
Parameters	Units	Guidance Value	Standard									
Volatile Organic Compounds												
1,1,1-Trichloroethane	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
1,1,2,2-Tetrachloroethane	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
1,1,2-Trichloroethane	ug/L	NC	1	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
1,1-Dichloroethane	ug/L	NC	5	58	53	72	72	61	64	82	67	64
1,1-Dichloroethene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
1,2-Dichloroethane	ug/L	NC	0.6	2.0 U	2.0 U	4.0 U	2.2	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
1,2-Dichloroethene (total)	ug/L	5	NC	4.0 U	4.0 U	8.0 U	4.0 U	5.0 U	5.0 U	6.7 U	3.3 U	3.3 U
1,2-Dichloropropane	ug/L	NC	1	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
1,4-Dioxane	ug/L	NC	NC	100 U	100 U	200 U	100 U	130 U	130 U	170 U	34 J	62 J
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	20 U	20 U	40 U	20 U	25 U	25 U	33 U	17 U	17 U
2-Hexanone	ug/L	50	NC	20 U	20 U	40 U	20 U	25 U	25 U	33 U	17 U	17 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	-	-	-	-	-	--	--
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	20 U	20 U	40 U	20 U	25 U	25 U	33 U	17 U	17 U
Acetone	ug/L	50	NC	20 U	20 U	4.7 JB	2.9 JB	25 U	25 U	33 U	17 U	18 U
Benzene	ug/L	NC	1	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.2 J
Bromodichloromethane	ug/L	50	NC	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Bromoform	ug/L	50	NC	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Bromomethane (Methyl bromide)	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Carbon disulfide	ug/L	60	60	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Carbon tetrachloride	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Chlorobenzene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Chloroethane	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Chloroform (Trichloromethane)	ug/L	NC	7	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Chloromethane (Methyl chloride)	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
cis-1,2-Dichloroethene	ug/L	NC	5	-	-	-	-	2.5 U	2.5 U	3.3 U	1.7 U	0.50 J
cis-1,3-Dichloropropene	ug/L	NC	NC	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-	-	-	-	-	--	--
Dibromochloromethane	ug/L	50	NC	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Ethylbenzene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Isopropyl benzene	ug/L	NC	5	-	-	-	-	-	-	-	--	--
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	-	-	-	-	-	-	--	--
Methylene chloride	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Naphthalene	ug/L	10	NC	-	-	-	-	-	-	-	--	--
N-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	--	--
N-Propylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	--	--
Styrene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
tert-Butylbenzene	ug/L	NC	5	-	-	-	-	-	-	-	--	--
Tetrachloroethene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Toluene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
trans-1,2-Dichloroethene	ug/L	NC	5	-	-	-	-	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
trans-1,3-Dichloropropene	ug/L	NC	NC	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Trichloroethene	ug/L	NC	5	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Vinyl chloride	ug/L	NC	2	2.0 U	2.0 U	4.0 U	2.0 U	2.5 U	2.5 U	3.3 U	1.7 U	1.7 U
Xylenes (total)	ug/L	NC	5	4.0 U	4.0 U	8.0 U	4.0 U	5.0 U	5.0 U	6.7 U	3.3 U	3.3 U
Dissolved Gases												
Ethane	ug/L	NC	NC	0.50 U	-	-	-	0.25 J	0.33 J	0.67	1.2	0.71 J
Methane	ug/L	NC	NC	3.1	-	-	-	32	51	590	1300	3200
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	460000	-	430000	-	480000	490000	540000	480000	480000
Ammonia	ug/L	NC	2000	200 U	-	200 U	-	64 JB	44 JB	200 U	-	-
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	2000 U	-	2000 U	-	2000 U	2000 U	2000 U	2000 UJ	2000 UJ
Chemical oxygen demand (COD)	ug/L	NC	NC	37000	-	30000	-	20000	20000	30000 J	19000	19000
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	-	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	-	-	-	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	-

Table 1
Analytical Results Summary
Enhanced Attenuation Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12	MW-12
Sample Name:				WG-17390-091615-007	WG-17390-091615-008	WG-17390-030316-002	WG-17390-030316-003	WG-17390-051016-003	WG-17390-051016-004	WG-17390-111516-KL-0	WG-17390-051817-DO-008	WG-17390-103017-003
Sample Date:		NYSDEC TOGs1 Groundwater		9/16/2015	9/16/2015 (Duplicate)	3/3/2016	3/3/2016 (Duplicate)	5/10/2016	5/10/2016 (Duplicate)	11/15/2016	5/18/2017	10/30/17
Parameters	**Units**	**Guidance Value**	**Standard**									
Nitrate (as N)	ug/L	NC	10000	2500 U	-	500 U	-	100 U	100 U	2000 U	100 UJ	100 UJ
Nitrite (as N)	ug/L	NC	1000	2500 U	-	500 U	-	2500 U	2500 U	2000 U	100 UJ	100 UJ
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	100 U	-	100 U	-	-	-	100 U	100 U	100 U
Sulfate	ug/L	NC	250000	780000	-	900000	-	960000	950000	1000000	1600000	1600000
Sulfide	ug/L	50	NC	1000 U	-	1000 U	-	1000 U	1000 U	1000 U	1000 U	1000 U
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	1800	-	1900	-	1400	1300	3800	2200	2200
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-		
Field Parameters												
Conductivity	mS/cm	NC	NC	8.22		7.57	-	6.5	-	6.23	4.93	6.66
Dissolved oxygen (DO)	ug/L	NC	NC	4170		0	-	-	-	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-		-	-	4480	-	540	0.32	0
Oxidation reduction potential (ORP)	millivolts	NC	NC	-		-	-	-	-	-	-	-
Oxidation reduction potential (ORP), f	millivolts	NC	NC	65		-147	-	-	-	-19	-76	.61
pH	s.u.	NC	NC	-		-	-	-	-	-	-	-
pH, field	s.u.	NC	NC	6.97		7.79	-	7.21	-	6.67	7.14	6.69
Temperature, field	Deg C	NC	NC	20.93		9.56	-	15.02	-	16.4	18.12	14.5
Temperature, field	Deg F	NC	NC	-		-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-		-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	0.61		1.2	-	1.71	-	1.8	1.09	15

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, d
June 1998 and addenda.
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 reportin
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 October 2017

Location ID:				MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
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	WG-17390-091515-001	WG-17390-051016-005	WG-17390-111416-KL-03
Sample Date:		NYSDEC TOGs[1] Groundwater		4/25/2011	3/27/2012	9/21/2012	3/11/2013	9/26/2013	9/15/2015	5/10/2016	11/14/2016
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
1,1,2,2-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
1,1,2-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
1,1-Dichloroethane	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
1,1-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
1,2-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
1,2-Dichloroethene (total)	ug/L	5	NC	2.0 U	-	-	-	-	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
1,4-Dioxane	ug/L	NC	NC	50 U	50 U	50 U	50 U	20 J	50 U	50 U	26 J
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
2-Hexanone	ug/L	50	NC	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
Acetone	ug/L	50	NC	10 U	10 U	1.1 J	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
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
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
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
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
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
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
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
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
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
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
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
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
Isopropyl benzene	ug/L	NC	5	-	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	-	-	-
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
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
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
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
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
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
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
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
Dissolved Gases											
Ethane	ug/L	NC	NC	0.50 U	-	-	-	-	-	-	-
Methane	ug/L	NC	NC	8.7	-	-	-	-	-	-	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	324000 J	-	-	-	-	-	-	-
Ammonia	ug/L	NC	2000	2000 U	-	-	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	2000 U	-	-	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	16000	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1	MW-1
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	WG-17390-091515-001	WG-17390-051016-005	WG-17390-111416-KL-03
Sample Date:		NYSDEC TOGs[1] Groundwater		4/25/2011	3/27/2012	9/21/2012	3/11/2013	9/26/2013	9/15/2015	5/10/2016	11/14/2016
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrite (as N)	ug/L	NC	1000	500 U	-	-	-	-	-	-	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	57 J	-	-	-	-	-	-	-
Sulfate	ug/L	NC	250000	**809000**	-	-	-	-	-	-	-
Sulfide	ug/L	50	NC	1000 U	-	-	-	-	-	-	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	-	3.92	4.17	4.22	4.53	4.77	6.07	6.65
Dissolved oxygen (DO)	ug/L	NC	NC	-	20	-	1260	-	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-	-	4820	-	4380	3220	6730	1130
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-20	-	176	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	NC	NC	-	-	-127	-	-144	-163	-	160
pH	s.u.	NC	NC	-	7.05	-	7.1	-	-	-	-
pH, field	s.u.	NC	NC	-	-	6.44	-	6.65	6.54	6.96	6.62
Temperature, field	Deg C	NC	NC	-	11.7	21.2	10.45	20.2	22.46	17.26	14.5
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	-	0	0	12.2	73.9	1.5	2.84	2.40

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.
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 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-1	MW-1	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9
Sample Name:				WG-17390-051717-DO-001	WG-17390-103017-004	GW-17390-042711-KL-10	GW-17390-042711-KL-11	WG-17390-032712-KL-05	WG-17390-092012-002	WG-17390-031213-KL-010	WG-17390-092613-KL-004
Sample Date:		NYSDEC TOGs[1] Groundwater		5/17/2017	10/30/17	4/28/2011	4/28/2011 (Duplicate)	3/27/2012	9/20/2012	3/12/2013	9/26/2013
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
1,1,2,2-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
1,1,2-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
1,1-Dichloroethane	ug/L	NC	5	1.0 U	1.0 U	1.3	1.3	1.7	1.5	1.6	1.2
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
1,2-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
1,2-Dichloroethene (total)	ug/L	5	NC	2.0 U	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
1,4-Dioxane	ug/L	NC	NC	36 J	34 J	50 U	50 U	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
2-Hexanone	ug/L	50	NC	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
Acetone	ug/L	50	NC	10 U	10 U	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
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
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
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
Carbon disulfide	ug/L	60	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.87 J	1.0 U	1.0 U
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
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
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
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
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
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
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
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
Isopropyl benzene	ug/L	NC	5	--	--	-	-	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	--	--	-	-	5.0 U	5.0 U	1.0 U	1.0 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
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
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
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
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
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
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
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
Dissolved Gases											
Ethane	ug/L	NC	NC	--	--	0.50 U	0.50 U	0.50 U	-	-	-
Methane	ug/L	NC	NC	--	--	0.71	0.68	0.15 J	-	-	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	--	--	317000	321000	360000	-	-	-
Ammonia	ug/L	NC	2000	--	--	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	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	--	--	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	--	--	83 J	76 J	120	-	-	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-1	MW-1	MW-9	MW-9	MW-9	MW-9	MW-9	MW-9
Sample Name:				WG-17390-051717-DO-001	WG-17390-103017-004	GW-17390-042711-KL-10	GW-17390-042711-KL-11	WG-17390-032712-KL-05	WG-17390-092012-002	WG-17390-031213-KL-010	WG-17390-092613-KL-004
Sample Date:		NYSDEC TOGs[1] Groundwater		5/17/2017	10/30/17	4/28/2011	4/28/2011 (Duplicate)	3/27/2012	9/20/2012	3/12/2013	9/26/2013
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrite (as N)	ug/L	NC	1000	--	--	500 UJ	500 UJ	100 U	-	-	-
Orthophosphate	ug/L	NC	NC	--	--	-	-	100 U	-	-	-
pH, lab	s.u.	NC	NC	--	--	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	--	--	33 J	100 U	-	-	-	-
Sulfate	ug/L	NC	250000	--	--	**758000**	**711000**	**580000**	-	-	-
Sulfide	ug/L	50	NC	--	--	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	--	--	6000	6000	-	-	-	-
Total solids	ug/L	NC	NC			-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	6.51	8.06	-	-	2.61	2.82	2.71	97.6
Dissolved oxygen (DO)	ug/L	NC	NC	--	--	-	-	3870	-	1330	-
Dissolved oxygen (DO), field	ug/L	NC	NC	0.26	0.41	-	-	-	5830	-	6870
Oxidation reduction potential (ORP)	millivolts	NC	NC	--	--	-	-	93	-	54	-
Oxidation reduction potential (ORP), field	millivolts	NC	NC	-3	2	-	-	-	-36	-	-64
pH	s.u.	NC	NC	--	--	-	-	7.35	-	7.68	-
pH, field	s.u.	NC	NC	7.03	6.71	-	-	-	7.05	-	6.87
Temperature, field	Deg C	NC	NC	18.82	15.05	-	-	4.9	19.3	7.16	18.01
Temperature, field	Deg F	NC	NC	--	--	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	--	--	-	-	-	-	-	-
Turbidity	NTU	NC	NC	1.65	4.2	-	-	0	0	3	14.53

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.
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 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-9	MW-9R	MW-9R	MW-9R	MW-9R	MW-10	MW-101	MW-101
Sample Name:				WG-17390-091515-005	WG-17390-051116-010	WG-17390-111416-KL-01	WG-17390-051717-DO-003	WG-17390-103117-009	GW-17390-042511-KL-03	GW-17390-042611-KL-05	WG-17390-032812-KL-14
Sample Date:		NYSDEC TOGs[1] Groundwater		9/15/2015	5/11/2016	11/14/2016	5/17/2017	10/31/17	4/25/2011	4/26/2011	3/28/2012
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
1,1,2,2-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
1,1,2-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
1,1-Dichloroethane	ug/L	NC	5	1.2	1.9	1.8	1.5	0.69 J	1.0 U	1.0 U	1.0 U
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
1,2-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
1,2-Dichloroethene (total)	ug/L	5	NC	2.0 U	2.0 U	2.0 U	2.0 U	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
1,4-Dioxane	ug/L	NC	NC	50 U	50 U	50 U	50 U	50 U	50 U	50 U	-
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	NC	10 U	2.7 J	10 U	10 U	10 U	10 U	0.98 J	10 U
2-Hexanone	ug/L	50	NC	10 U	1.2 J	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
Acetone	ug/L	50	NC	10 U	5.6 J	10 U	1.9 J	10 U	10 U	3.9 J	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
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
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
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
Carbon disulfide	ug/L	60	60	1.0 U	11	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
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
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
Chloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	0.68 J	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
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
cis-1,2-Dichloroethene	ug/L	NC	5		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
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
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
Isopropyl benzene	ug/L	NC	5	-	-	-	--	--	-	-	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	-	-	--	--	-	-	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
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
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
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
trans-1,2-Dichloroethene	ug/L	NC	5		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
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
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
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
Dissolved Gases											
Ethane	ug/L	NC	NC	-	-	-	--	--	0.50 U	0.50 U	-
Methane	ug/L	NC	NC	-	-	-	--	--	0.13 J	14	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	-	-	-	-	-	478000 J	311000	-
Ammonia	ug/L	NC	2000	-	-	-	-	-	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	3000	-
Chemical oxygen demand (COD)	ug/L	NC	NC	-	-	-	-	-	20000 U	790000	-
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	-	-	-	-	-	36 J	1900	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-9	MW-9R	MW-9R	MW-9R	MW-9R	MW-10	MW-101	MW-101
Sample Name:				WG-17390-091515-005	WG-17390-051116-010	WG-17390-111416-KL-01	WG-17390-051717-DO-003	WG-17390-103117-009	GW-17390-042511-KL-03	GW-17390-042611-KL-05	WG-17390-032812-KL-14
Sample Date:		NYSDEC TOGs[1] Groundwater		9/15/2015	5/11/2016	11/14/2016	5/17/2017	10/31/17	4/25/2011	4/26/2011	3/28/2012
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrite (as N)	ug/L	NC	1000	-	-	-	-	-	100 U	20000 UJ	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	-	-	-	-	-	42 J	35 J	-
Sulfate	ug/L	NC	250000	-	-	-	-	-	**5870000**	**805000**	-
Sulfide	ug/L	50	NC	-	-	-	-	-	1000 U	1000 U	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	-	-	-	-	-	7000	4000	-
Total solids	ug/L	NC	NC						-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	1.95	5.7	6.29	5.19	5.34	-	-	26.7
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-	-	-	-	-	2160
Dissolved oxygen (DO), field	ug/L	NC	NC	230	3600	620	0.1	1.31	-	-	-
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-	-	-	-	-	70
Oxidation reduction potential (ORP), field	millivolts	NC	NC	17	-	-49	-126	-43	-	-	-
pH	s.u.	NC	NC	-	-	-	-	-	-	-	7.16
pH, field	s.u.	NC	NC	7.36	6.88	6.36	7.12	6.89	-	-	-
Temperature, field	Deg C	NC	NC	22.82	13.77	14.8	16.74	15.14	-	-	11.2
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	18.2	12.9	29	6.17	0.2	-	-	0.4

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.
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 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101
Sample Name:				WG-17390-092112-005	WG-17390-092112-006	WG-17390-031113-KL-005	WG-17390-092613-KL-003	WG-17390-091515-003	WG-17390-051016-007	WG-17390-111416-KL-02	WG-17390-051717-DO-004
Sample Date:		NYSDEC TOGs[1] Groundwater		9/21/2012	9/21/2012 (Duplicate)	3/11/2013	9/26/2013	9/15/2015	5/10/2016	11/14/2016	5/17/2017
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	0.41 J	1.0 U	1.0 U	0.31 J	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
1,1,2-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
1,1-Dichloroethane	ug/L	NC	5	0.39 J	0.29 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
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
1,2-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
1,2-Dichloroethene (total)	ug/L	5	NC	-	-	-	-	2.0 U	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
1,4-Dioxane	ug/L	NC	NC	50 U	50 U	50 U	50 U	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	0.99 J	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
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
Acetone	ug/L	50	NC	1.1 J	1.4 J	10 U	1.8 J	2.4 J	1.5 J	1.0 U	2.0 J
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
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
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
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
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
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
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
Chloroethane	ug/L	NC	5	1.0	0.53 J	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
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
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	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
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
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
Isopropyl benzene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	-	-	-	--
Methyl tert butyl ether (MTBE)	ug/L	10	NC	5.0 U	5.0 U	1.0 U	1.0 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
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
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
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
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	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
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
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
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
Dissolved Gases											
Ethane	ug/L	NC	NC	-	-	-	-	-	-	-	-
Methane	ug/L	NC	NC	-	-	-	-	-	-	-	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Ammonia	ug/L	NC	2000	-	-	-	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101	MW-101
Sample Name:				WG-17390-092112-005	WG-17390-092112-006	WG-17390-031113-KL-005	WG-17390-092613-KL-003	WG-17390-091515-003	WG-17390-051016-007	WG-17390-111416-KL-02	WG-17390-051717-DO-004
Sample Date:		NYSDEC TOGs[1] Groundwater		9/21/2012	9/21/2012 (Duplicate)	3/11/2013	9/26/2013	9/15/2015	5/10/2016	11/14/2016	5/17/2017
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrite (as N)	ug/L	NC	1000	-	-	-	-	-	-	-	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	-	-	-	-	-	-	-	-
Sulfate	ug/L	NC	250000	-	-	-	-	-	-	-	-
Sulfide	ug/L	50	NC	-	-	-	-	-	-	-	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	24.9	24.9	69.6	34.9	49.2	58.4	62	39.5
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	1830	-	-	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	4280	4280	-	1020	2900	3430	720	0.64
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	66	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	NC	NC	-161	-161	-	21	-136	-	-48	-64
pH	s.u.	NC	NC	-	-	7.22	-	-	-	-	-
pH, field	s.u.	NC	NC	6.67	6.67	-	6.98	6.81	7.47	7.37	7.36
Temperature, field	Deg C	NC	NC	22.7	22.7	10.96	22.04	28.35	15.97	15.1	20.72
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	20	20	9.4	5.8	19.6	4.2	24	4.65

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.
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 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-101	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102
Sample Name:				WG-17390-103117-007	GW-17390-042511-KL-01	WG-17390-032712-KL-09	WG-17390-092112-008	WG-17390-031213-KL-011	WG-17390-092613-KL-001	WG-17390-091515-002	WG-17390-051016-006
Sample Date:		NYSDEC TOGs[1] Groundwater		10/31/17	4/25/2011	3/27/2012	9/21/2012	3/12/2013	9/26/2013	9/15/2015	5/10/2016
Parameters	**Units**	**Guidance Value**	**Standard**								
Volatile Organic Compounds											
1,1,1-Trichloroethane	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 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	1.7 U	1.5 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	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	NC	5	1.0 U	2.6	2.7	3.2	2.1	1.7	1.5	1.9
1,1-Dichloroethene	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 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	1.7 U	1.5 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	2.0 U
1,2-Dichloropropane	ug/L	NC	1	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	ug/L	NC	NC	50 U	50 U	84 U	77 U	50 U	50 U	50 U	50 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	NC	10 U	10 U	17 U	15 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	50	NC	10 U	10 U	17 U	15 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	17 U	15 U	10 U	10 U	10 U	10 U
Acetone	ug/L	50	NC	10 U	10 U	17 U	2.1 J	10 U	10 U	10 U	10 U
Benzene	ug/L	NC	1	1.0 U	1.0 U	1.7 U	1.5 U	**1.1**	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	50	NC	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	50	NC	1.0 U	1.0 U	1.7 U	1.5 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	1.7 U	1.5 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	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 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	1.7 U	1.5 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	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U
cis-1,2-Dichloroethene	ug/L	NC	5	1.0 U	-	1.7 U	1.5 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	1.7 U	1.5 U	1.0 U	1.0 U	-	-
Cymene (p-Isopropyltoluene)	ug/L	NC	5	--	-	-	-	-	-	1.0 U	1.0 U
Dibromochloromethane	ug/L	50	NC	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	-	-
Ethylbenzene	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	NC	5	--	-	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	--	-	**41**	**45**	**27**	**28**	-	-
Methylene chloride	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 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	1.7 U	1.5 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	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	NC	5	1.0 U	-	1.7 U	1.5 U	1.0 U	1.0 U	-	1.0 U
trans-1,3-Dichloropropene	ug/L	NC	NC	1.0 U	1.0 U	1.7 U	1.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	NC	5	1.0 U	1.0 U	1.7 U	1.5 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	1.7 U	1.5 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	3.3 U	3.1 U	2.0 U	2.0 U	2.0 U	2.0 U
Dissolved Gases											
Ethane	ug/L	NC	NC	-	0.50 U	-	-	-	-	-	-
Methane	ug/L	NC	NC	-	61	-	-	-	-	-	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	-	395000 J	-	-	-	-	-	-
Ammonia	ug/L	NC	2000	-	2000 U	-	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	-	2000 U	-	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	-	16000	-	-	-	-	-	-
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	-	110	-	-	-	-	-	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-101	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102	MW-102
Sample Name:				WG-17390-103117-007	GW-17390-042511-KL-01	WG-17390-032712-KL-09	WG-17390-092112-008	WG-17390-031213-KL-011	WG-17390-092613-KL-001	WG-17390-091515-002	WG-17390-051016-006
Sample Date:		NYSDEC TOGs[1] Groundwater		10/31/17	4/25/2011	3/27/2012	9/21/2012	3/12/2013	9/26/2013	9/15/2015	5/10/2016
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrite (as N)	ug/L	NC	1000	-	100 U	-	-	-	-	-	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	-	72 J	-	-	-	-	-	-
Sulfate	ug/L	NC	250000	-	239000	-	-	-	-	-	-
Sulfide	ug/L	50	NC	-	1000 U	-	-	-	-	-	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	49.1	-	1.6	1.8	1.57	13.4	0.884	1.46
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	210	-	2110	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	0.91	-	-	5250	-	480	530	8060
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-100	-	-5	-	-	-
Oxidation reduction potential (ORP), field	millivolts	NC	NC	-12	-	-	-136	-	-159	-128	-
pH	s.u.	NC	NC	-	-	7.24	-	7.25	-	-	-
pH, field	s.u.	NC	NC	6.9	-	-	6.59	-	7.01	7.22	7.12
Temperature, field	Deg C	NC	NC	10.61	-	10.1	19.5	8.5	19.31	19.92	15.52
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	16.9	-	0	12	17	0	1.25	8.76

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.
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 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-102	MW-102	MW-102	MW-103	MW-103	MW-103	MW-103	MW-103
Sample Name:				WG-17390-111416-KL-04	WG-17390-051717-DO-002	WG-17390-103117-006	WG-17390-032812-KL-13	WG-17390-092112-009	WG-17390-031213-KL-015	WG-17390-092713-KL-012	WG-17390-091515-004
Sample Date:		NYSDEC TOGs[1] Groundwater		11/14/2016	5/17/2017	10/31/17	3/28/2012	9/21/2012	3/12/2013	9/27/2013	9/15/2015
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
1,1,2,2-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
1,1,2-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
1,1-Dichloroethane	ug/L	NC	5	2.6	1.8	0.40 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
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
1,2-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
1,2-Dichloroethene (total)	ug/L	5	NC	2.0 U	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
1,4-Dioxane	ug/L	NC	NC	50 U	50 U	50 U	-	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
2-Hexanone	ug/L	50	NC	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
Acetone	ug/L	50	NC	10 U	10 U	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
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
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
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
Carbon disulfide	ug/L	60	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.17 J	1.0 U	1.0 U
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
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
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
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
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
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	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
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
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
Isopropyl benzene	ug/L	NC	5	-	--	--	1.0 U	1.0 U	1.0 U	1.0 U	-
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	--	--	5.0 U	5.0 U	1.0 U	1.0 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
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
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
Toluene	ug/L	NC	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.14 J	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	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
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
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
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
Dissolved Gases											
Ethane	ug/L	NC	NC	-	-	-	-	-	-	-	-
Methane	ug/L	NC	NC	-	-	-	-	-	-	-	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Ammonia	ug/L	NC	2000	-	-	-	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	-	-	-	-	-	-	-	-
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	-	-	-	-	-	-	-	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-102	MW-102	MW-102	MW-103	MW-103	MW-103	MW-103	MW-103
Sample Name:				WG-17390-111416-KL-04	WG-17390-051717-DO-002	WG-17390-103117-006	WG-17390-032812-KL-13	WG-17390-092112-009	WG-17390-031213-KL-015	WG-17390-092713-KL-012	WG-17390-091515-004
Sample Date:		NYSDEC TOGs[1] Groundwater		11/14/2016	5/17/2017	10/31/17	3/28/2012	9/21/2012	3/12/2013	9/27/2013	9/15/2015
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrite (as N)	ug/L	NC	1000	-	-	-	-	-	-	-	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	-	-	-	-	-	-	-	-
Sulfate	ug/L	NC	250000	-	-	-	-	-	-	-	-
Sulfide	ug/L	50	NC	-	-	-	-	-	-	-	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	1.82	1.42	1.42	3.62	3.13	3.18	2.98	2.85
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-	640	-	2150	-	3510
Dissolved oxygen (DO), field	ug/L	NC	NC	810	0.33	0.8	-	4770	-	3660	-
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-	-65	-	-52	-	-102
Oxidation reduction potential (ORP), field	millivolts	NC	NC	-21	108	-30	-	-47	-	-45	-
pH	s.u.	NC	NC	-	-	-	7.78	-	7.12	-	6.81
pH, field	s.u.	NC	NC	6.42	7.21	7.07	-	6.38	-	5.4	-
Temperature, field	Deg C	NC	NC	13.7	21.26	11.34	16.8	20.2	18.6	21.16	24.89
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	2.75	1.23	5.4	-	16	0	5.8	2.23

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.
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 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-103	MW-103	MW-103
Sample Name:				WG-17390-051116-012	WG-17390-111416-KL-05	WG-17390-103117-008
Sample Date:		NYSDEC TOGs[1] Groundwater		5/11/2016	11/14/2016	10/31/17
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
1,1,2,2-Tetrachloroethane	ug/L	NC	5	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
1,1-Dichloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	NC	5	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
1,2-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
1,4-Dioxane	ug/L	NC	NC	50 U	18 J	50 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	NC	10 U	10 U	10 U
2-Hexanone	ug/L	50	NC	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
Acetone	ug/L	50	NC	10 U	10 U	10 U
Benzene	ug/L	NC	1	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	50	NC	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	50	NC	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
Carbon disulfide	ug/L	60	60	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	NC	5	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	NC	5	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	NC	5	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	NC	7	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
cis-1,2-Dichloroethene	ug/L	NC	5	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
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-
Dibromochloromethane	ug/L	50	NC	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	NC	5	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	NC	5	-	-	-
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	-	-
Methylene chloride	ug/L	NC	5	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
tert-Butylbenzene	ug/L	NC	5	-	-	-
Tetrachloroethene	ug/L	NC	5	1.0 U	1.0 U	1.0 U
Toluene	ug/L	NC	5	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
trans-1,3-Dichloropropene	ug/L	NC	NC	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	NC	5	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	NC	2	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	NC	5	2.0 U	2.0 U	2.0 U
Dissolved Gases						
Ethane	ug/L	NC	NC	-	-	-
Methane	ug/L	NC	NC	-	-	-
Wet Chemistry						
Alkalinity, total (as CaCO3)	ug/L	NC	NC	-	-	-
Ammonia	ug/L	NC	2000	-	-	-
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC	NC	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	-	-	-
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	-	-	-

Table 2
Analytical Results Summary
Plume Migration Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-103	MW-103	MW-103
Sample Name:				WG-17390-051116-012	WG-17390-111416-KL-05	WG-17390-103117-008
Sample Date:		NYSDEC TOGs[1] Groundwater		5/11/2016	11/14/2016	10/31/17
Parameters	**Units**	**Guidance Value**	**Standard**			
Nitrite (as N)	ug/L	NC	1000	-	-	-
Orthophosphate	ug/L	NC	NC	-	-	-
pH, lab	s.u.	NC	NC	-	-	-
Phosphorus	ug/L	NC	NC	-	-	-
Sulfate	ug/L	NC	250000	-	-	-
Sulfide	ug/L	50	NC	-	-	-
TOC averages	ug/L	NC	NC	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	-	-	-
Total solids	ug/L	NC	NC	-	-	-
Field Parameters						
Conductivity	mS/cm	NC	NC	-	3.04	3.77
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-	1310	0.99
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-
Oxidation reduction potential (ORP), field	millivolts	NC	NC	-	68	28
pH	s.u.	NC	NC	-	-	-
pH, field	s.u.	NC	NC	6	6.25	6.82
Temperature, field	Deg C	NC	NC	-	20.1	16.61
Temperature, field	Deg F	NC	NC	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-
Turbidity	NTU	NC	NC	-	1.9	25.1

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.
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 2
Analytical Results Summary
Petroleum Impacts Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
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	WG-17390-091615-006	WG-17390-022916-001
Sample Date:		NYSDEC TOGs[1] Groundwater		4/26/2011	12/19/2011	3/26/2012	3/26/2012 (Duplicate)	9/20/2012	3/11/2013	9/27/2013	9/16/2015	2/29/2016
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	1000 U	620 J
1,1,2,2-Tetrachloroethane	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,1,2-Trichloroethane	ug/L	NC	1	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,1-Dichloroethane	ug/L	NC	5	4700	23000	24000	22000	1300 U	3600	1500	710 J	11000
1,1-Dichloroethene	ug/L	NC	5	140 J	1100	190 J	170 J	1300 U	330 U	420 U	1000 U	1000 U
1,2-Dichloroethane	ug/L	NC	0.6	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,2-Dichloroethene (total)	ug/L	5	NC	670 U	-	-	-	-	-	-	2000 U	2000 U
1,2-Dichloropropane	ug/L	NC	1	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
1,4-Dioxane	ug/L	NC	NC	17000 U	-	42000 U	31000 U	63000 U	17000 U	21000 U	50000 U	50000 U
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	10000 U	10000 U
2-Hexanone	ug/L	50	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	10000 U	10000 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	830 U	-	-	330 U	-	-	-
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	3300 U	7100 U	8300 U	6300 U	13000 U	3300 U	4200 U	10000 U	10000 U
Acetone	ug/L	50	NC	3300 U	7100 U	1200 J	980 J	13000 U	3300 U	1600 J	10000 U	1100 JB
Benzene	ug/L	NC	1	330 U	200 J	270 J	260 J	320 J	190 J	170 J	1000 U	1000 U
Bromodichloromethane	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Bromoform	ug/L	50	NC	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Bromomethane (Methyl bromide)	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Carbon disulfide	ug/L	60	60	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Carbon tetrachloride	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Chlorobenzene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Chloroethane	ug/L	NC	5	740	3700	4200 J	2400 J	42000	13000	10000	22000	26000
Chloroform (Trichloromethane)	ug/L	NC	7	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Chloromethane (Methyl chloride)	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 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	1000 U	1000 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	1000 U	1000 U
Ethylbenzene	ug/L	NC	5	80 J	120 J	160 J	140 J	1300 U	90 J	84 J	1000 U	1000 U
Isopropyl benzene	ug/L	NC	5	-	710 U	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	1000 U	1000 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	1000 U	1000 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	1000 U	1000 U
Toluene	ug/L	NC	5	68 J	190 J	180 J	170 J	390 J	220 J	200 J	1000 U	1000 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	1000 U	1000 U
Trichloroethene	ug/L	NC	5	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Vinyl chloride	ug/L	NC	2	330 U	710 U	830 U	630 U	1300 U	330 U	420 U	1000 U	1000 U
Xylenes (total)	ug/L	NC	5	380 J	590 J	680 J	600 J	410 J	450 J	480 J	2000 U	2000 U
Dissolved Gases												
Ethane	ug/L	NC	NC	19	25	11	18	54	48	79	240	-
Methane	ug/L	NC	NC	5800	3700	2700	3300	1200	6300	3500	5100	-
Wet Chemistry												
Alkalinity, total (as CaCO3)	ug/L	NC	NC	209000	240000	260000 J	280000	230000	330000	220000	310000	350000
Ammonia	ug/L	NC	2000	3000	4200	3600	3600	4200	3400 J	2900	2100	1500
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	1260	1470	10900	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	12000	43000 J	94000	98000	91000 J	71000	69000	24000 U	26000
Chemical oxygen demand (COD)	ug/L	NC	NC	35000	200000	190000 J	180000	210000	130000	84000	81000	120000
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	absent	present	present	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	present	present	present	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-	-

Table 2
Analytical Results Summary
Petroleum Impacts Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-2
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	WG-17390-091615-006	WG-17390-022916-001
Sample Date:		NYSDEC TOGs[1] Groundwater		4/26/2011	12/19/2011	3/26/2012	3/26/2012 (Duplicate)	9/20/2012	3/11/2013	9/27/2013	9/16/2015	2/29/2016
Parameters	**Units**	**Guidance Value**	**Standard**									
Nitrate (as N)	ug/L	NC	10000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	500 U	100 U
Nitrite (as N)	ug/L	NC	1000	100 U	100 U	100 U	100 U	100 U	100 U	100 U	500 U	100 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	-	-	-	-	-	80 J	100 U
Sulfate	ug/L	NC	250000	6000	1000	460 J	400 J	4700	850 J	4300	5600	1400
Sulfide	ug/L	50	NC	**1400**	**2400**	**1100**	**960 J**	**2100**	1000 U	**470 J**	**5500**	1000 U
TOC averages	ug/L	NC	NC	-	-	46000	43000	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	56640	1770	15200	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	11880	3520	13900	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	10000	65000	-	-	78000	37000	22000	24000	29000
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-	-
Field Parameters												
Conductivity	mS/cm	NC	NC	-	1.289	1.47	-	1.76	1.49	4.66	1.03	1.51
Dissolved oxygen (DO)	ug/L	NC	NC	-	280	2800	-	-	6580	-	-	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-	-	-	-	5560	-	420	540	0
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-209.2	-119	-	-	-148	-	-	-
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-	-	-	-	-153	-	-166	-134	-152
pH	s.u.	NC	NC	-	6.82	7.11	-	-	7.32	-	-	-
pH, field	s.u.	NC	NC	-	-	-	-	6.77	-	7.29	7.08	7.67
Temperature, field	Deg C	NC	NC	-	8.4	6.1	-	18	11	17.73	18.67	8.02
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	-	1	5.8	-	1	11	0	1.37	4.04

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.
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 2
Analytical Results Summary
Petroleum Impacts Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-3	MW-3
Sample Name:				WG-17390-051016-002	WG-17390-111516-KL-08	WG-17390-111516-KL-09	WG-17390-051817-DO-005	WG-17390-051817-DO-006	WG-17390-103117-005	GW-17390-042711-KL-08	WG-17390-032712-KL-08
Sample Date:		NYSDEC TOGs[1] Groundwater		5/10/2016	11/15/2016	11/15/2016 (Duplicate)	5/18/2017	5/18/2017 Duplicate	10/31/17	4/27/2011	3/27/2012
Parameters	**Units**	**Guidance Value**	**Standard**								
Volatile Organic Compounds											
1,1,1-Trichloroethane	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
1,1,2,2-Tetrachloroethane	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
1,1,2-Trichloroethane	ug/L	NC	1	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
1,1-Dichloroethane	ug/L	NC	5	8900	2400 J	2600	1300 U	630 J	4200	11 U	10 U
1,1-Dichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
1,2-Dichloroethane	ug/L	NC	0.6	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
1,2-Dichloroethene (total)	ug/L	5	NC	3300 U	5000 U	5000 U	2500 U	2500 U	2000 U	22 U	-
1,2-Dichloropropane	ug/L	NC	1	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
1,4-Dioxane	ug/L	NC	NC	83000 U	130000 U	130000 U	63000 U	63000 U	50000 U	560 U	500 U
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	110 U	100 U
2-Hexanone	ug/L	50	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	110 U	100 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	10 U
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	110 U	100 U
Acetone	ug/L	50	NC	17000 U	25000 U	25000 U	13000 U	13000 U	10000 U	110 U	100 U
Benzene	ug/L	NC	1	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	15	6.1 J
Bromodichloromethane	ug/L	50	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Bromoform	ug/L	50	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Bromomethane (Methyl bromide)	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Carbon disulfide	ug/L	60	60	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Carbon tetrachloride	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Chlorobenzene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Chloroethane	ug/L	NC	5	34000	45000	49000	37000	38000	60000	11 U	10 U
Chloroform (Trichloromethane)	ug/L	NC	7	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Chloromethane (Methyl chloride)	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
cis-1,2-Dichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	-	10 U
cis-1,3-Dichloropropene	ug/L	NC	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Cymene (p-Isopropyltoluene)	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	10 U
Dibromochloromethane	ug/L	50	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Ethylbenzene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Isopropyl benzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	10 U
Methyl tert butyl ether (MTBE)	ug/L	10	NC	-	-	-	1300 U	1300 U	-	-	300
Methylene chloride	ug/L	NC	5	1700 U	2500 U	3850 U	1300 U	1300 U	1000 U	11 U	10 U
Naphthalene	ug/L	10	NC	-	-	-	1300 U	1300 U	-	-	10 U
N-Butylbenzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	10 U
N-Propylbenzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	10 U
Styrene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
tert-Butylbenzene	ug/L	NC	5	-	-	-	1300 U	1300 U	-	-	10 U
Tetrachloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Toluene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
trans-1,2-Dichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	-	10 U
trans-1,3-Dichloropropene	ug/L	NC	NC	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Trichloroethene	ug/L	NC	5	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Vinyl chloride	ug/L	NC	2	1700 U	2500 U	2500 U	1300 U	1300 U	1000 U	11 U	10 U
Xylenes (total)	ug/L	NC	5	3300 U	5000 U	5000 U	2500 U	2500 U	350 J	22 U	20 U
Dissolved Gases											
Ethane	ug/L	NC	NC	140	170	180	230	230	290	0.50 U	0.50 U
Methane	ug/L	NC	NC	6300	4400	5200	9600	9000	9800	1300	1600
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	360000	310000	320000	280000	290000	260000	612000 J	650000
Ammonia	ug/L	NC	2000	1700 B	2800 B	2800 B	--	--	3500	2000 U	2000 U
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	-	-	-	--	--	--	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	43000	60000 B	68000 B	95000 J	82000 J	35000	9000	8000
Chemical oxygen demand (COD)	ug/L	NC	NC	140000	250000 J	240000 J	230000	220000	250000	48000	62000
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	-	-	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-

Table 2
Analytical Results Summary
Petroleum Impacts Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-2	MW-2	MW-2	MW-2	MW-2	MW-2	MW-3	MW-3
Sample Name:				WG-17390-051016-002	WG-17390-111516-KL-08	WG-17390-111516-KL-09	WG-17390-051817-DO-005	WG-17390-051817-DO-006	WG-17390-103117-005	GW-17390-042711-KL-08	WG-17390-032712-KL-08
Sample Date:		NYSDEC TOGs[1] Groundwater		5/10/2016	11/15/2016	11/15/2016 (Duplicate)	5/18/2017	5/18/2017 Duplicate	10/31/17	4/27/2011	3/27/2012
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrate (as N)	ug/L	NC	10000	100 U	100 U	100 U	100 UJ	100 UJ	100 U	41 J	100 U
Nitrite (as N)	ug/L	NC	1000	500 U	100 U	100 U	100 UJ	100 UJ	100 U	500 U	100 U
Orthophosphate	ug/L	NC	NC	-	-	-	--	--	--	-	100 U
pH, lab	s.u.	NC	NC	-	-	-	--	--	--	-	-
Phosphorus	ug/L	NC	NC	-	61 J	100 U	96 J	68 J	54 J	67 J	-
Sulfate	ug/L	NC	250000	810 J	760 J	1300	1000 U	1000 U	1000 U	**278000**	**280000**
Sulfide	ug/L	50	NC	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	11000
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	30000	68000	66000	37000	36000	75000	12000	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	1.36	1.65	1.65	1.48	1.48	1.86	-	2.13
Dissolved oxygen (DO)	ug/L	NC	NC	-	-	-	--	--	--	-	160
Dissolved oxygen (DO), field	ug/L	NC	NC	3800	580	580	0.24	0.24	0.98	-	-
Oxidation reduction potential (ORP)	millivolts	NC	NC	-	-	-	--	--	--	-	-88
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-	-101	-101	-145	-145	-52	-	-
pH	s.u.	NC	NC	-	-	-	--	--	--	-	9.41
pH, field	s.u.	NC	NC	7.43	7.71	7.71	7.29	7.29	7.11	-	-
Temperature, field	Deg C	NC	NC	14.87	14.0	14.0	17.58	17.58	13.77	-	10.2
Temperature, field	Deg F	NC	NC	-	-	-	--	--	--	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	--	--	--	-	-
Turbidity	NTU	NC	NC	3.8	3.6	3.6	2.52	2.52	28.6	-	-

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical a
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, da
June 1998 and addenda.
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
100 U - result is non-detect at the associated value

Table 2
Analytical Results Summary
Petroleum Impacts Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-3	MW-3	MW-4	MW-4	MW-4	MW-5	MW-5	MW-5
Sample Name:				WG-17390-031213-KL-012	WG-17390-051116-008	WG-17390-032712-KL-10	WG-17390-031213-KL-013	WG-17390-051116-009	WG-17390-032712-KL-12	WG-17390-031213-KL-014	WG-17390-051116-011
Sample Date:		NYSDEC TOGs[1] Groundwater		3/12/2013	5/11/2016	3/27/2012	3/12/2013	5/11/2016	3/27/2012	3/12/2013	5/11/2016
Parameters	**Units**	**Guidance Value**	**Standard**								
Volatile Organic Compounds											
1,1,1-Trichloroethane	ug/L	NC	5	-	-	-	-	-	-	-	-
1,1,2,2-Tetrachloroethane	ug/L	NC	5	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	ug/L	NC	1	-	-	-	-	-	-	-	-
1,1-Dichloroethane	ug/L	NC	5	-	-	-	-	-	-	-	-
1,1-Dichloroethene	ug/L	NC	5	-	-	-	-	-	-	-	-
1,2-Dichloroethane	ug/L	NC	0.6	-	-	-	-	-	-	-	-
1,2-Dichloroethene (total)	ug/L	5	NC	-	-	-	-	-	-	-	-
1,2-Dichloropropane	ug/L	NC	1	-	-	-	-	-	-	-	-
1,4-Dioxane	ug/L	NC	NC	-	-	-	-	-	-	-	-
2-Butanone (Methyl ethyl ketone) (ME	ug/L	50	NC	-	-	-	-	-	-	-	-
2-Hexanone	ug/L	50	NC	-	-	-	-	-	-	-	-
2-Phenylbutane (sec-Butylbenzene)	ug/L	NC	5	13 U	17 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
4-Methyl-2-pentanone (Methyl isobuty	ug/L	NC	NC	-	-	-	-	-	-	-	-
Acetone	ug/L	50	NC	-	-	-	-	-	-	-	-
Benzene	ug/L	NC	1	**4.2 J**	17 U	1.0 U	1.0 U	1.0 U	0.38 J	1.0 U	1.0 U
Bromodichloromethane	ug/L	50	NC	-	-	-	-	-	-	-	-
Bromoform	ug/L	50	NC	-	-	-	-	-	-	-	-
Bromomethane (Methyl bromide)	ug/L	NC	5	-	-	-	-	-	-	-	-
Carbon disulfide	ug/L	60	60	-	-	-	-	-	-	-	-
Carbon tetrachloride	ug/L	NC	5	-	-	-	-	-	-	-	-
Chlorobenzene	ug/L	NC	5	-	-	-	-	-	-	-	-
Chloroethane	ug/L	NC	5	-	-	-	-	-	-	-	-
Chloroform (Trichloromethane)	ug/L	NC	7	-	-	-	-	-	-	-	-
Chloromethane (Methyl chloride)	ug/L	NC	5	-	-	-	-	-	-	-	-
cis-1,2-Dichloroethene	ug/L	NC	5	-	-	-	-	-	-	-	-
cis-1,3-Dichloropropene	ug/L	NC	NC	-	-	-	-	-	-	-	-
Cymene (p-Isopropyltoluene)	ug/L	NC	5	13 U	17 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	50	NC	-	-	-	-	-	-	-	-
Ethylbenzene	ug/L	NC	5	13 U	17 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	13 U	17 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	10	NC	**360**	**360**	**18**	**14**	**24**	4.3 J	6.9	5.4
Methylene chloride	ug/L	NC	5	-	-	-	-	-	-	-	-
Naphthalene	ug/L	10	NC	13 U	17 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
N-Butylbenzene	ug/L	NC	5	13 U	17 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
N-Propylbenzene	ug/L	NC	5	13 U	17 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	ug/L	NC	5	-	-	-	-	-	-	-	-
tert-Butylbenzene	ug/L	NC	5	13 U	17 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	NC	5	-	-	-	-	-	-	-	-
Toluene	ug/L	NC	5	2.0 J	17 U	1.0 U	1.0 U	1.0 U	1.9	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	NC	5	-	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	ug/L	NC	NC	-	-	-	-	-	-	-	-
Trichloroethene	ug/L	NC	5	-	-	-	-	-	-	-	-
Vinyl chloride	ug/L	NC	2	-	-	-	-	-	-	-	-
Xylenes (total)	ug/L	NC	5	25 U	33 U	2.0 U	2.0 U	2.0 U	0.93 J	2.0 U	2.0 U
Dissolved Gases											
Ethane	ug/L	NC	NC	-	-	-	-	-	-	-	-
Methane	ug/L	NC	NC	-	-	-	-	-	-	-	-
Wet Chemistry											
Alkalinity, total (as CaCO3)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Ammonia	ug/L	NC	2000	-	-	-	-	-	-	-	-
Anaerobic 1,1,1-TCA specific microbia	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Biochemical oxygen demand (BOD)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Chemical oxygen demand (COD)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Cyanide (total)	ug/L	NC	200	-	-	-	-	-	-	-	-
Dehalobacter spp.	unknown	NC	NC	-	-	-	-	-	-	-	-
Dehalococcoides spp.	unknown	NC	NC	-	-	-	-	-	-	-	-
Ignitability	Deg F	NC	NC	-	-	-	-	-	-	-	-

Table 2
Analytical Results Summary
Petroleum Impacts Monitoring
GM Tonawanda Engine Plant - Endoline Area
April 2011 through October 2017

Location ID:				MW-3	MW-3	MW-4	MW-4	MW-4	MW-5	MW-5	MW-5
Sample Name:				WG-17390-031213-KL-012	WG-17390-051116-008	WG-17390-032712-KL-10	WG-17390-031213-KL-013	WG-17390-051116-009	WG-17390-032712-KL-12	WG-17390-031213-KL-014	WG-17390-051116-011
Sample Date:		NYSDEC TOGs[1] Groundwater		3/12/2013	5/11/2016	3/27/2012	3/12/2013	5/11/2016	3/27/2012	3/12/2013	5/11/2016
Parameters	**Units**	**Guidance Value**	**Standard**								
Nitrate (as N)	ug/L	NC	10000	-	-	-	-	-	-	-	-
Nitrite (as N)	ug/L	NC	1000	-	-	-	-	-	-	-	-
Orthophosphate	ug/L	NC	NC	-	-	-	-	-	-	-	-
pH, lab	s.u.	NC	NC	-	-	-	-	-	-	-	-
Phosphorus	ug/L	NC	NC	-	-	-	-	-	-	-	-
Sulfate	ug/L	NC	250000	-	-	-	-	-	-	-	-
Sulfide	ug/L	50	NC	-	-	-	-	-	-	-	-
TOC averages	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - aerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total microbial population - anaerobic	cfu/mL	NC	NC	-	-	-	-	-	-	-	-
Total organic carbon (TOC)	ug/L	NC	NC	-	-	-	-	-	-	-	-
Total solids	ug/L	NC	NC	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity	mS/cm	NC	NC	2.24	1.95	3.42	3.28	3.16	3.79	3.44	3.37
Dissolved oxygen (DO)	ug/L	NC	NC	0	-	0	0	-	0	1380	-
Dissolved oxygen (DO), field	ug/L	NC	NC	-	4150	-	-	8070	-	-	7390
Oxidation reduction potential (ORP)	millivolts	NC	NC	54	-	-194	-112	-	-279	-247	-
Oxidation reduction potential (ORP), f	millivolts	NC	NC	-	-	-	-	-	-	-	-
pH	s.u.	NC	NC	6.94	-	10.95	7.54	-	11.99	7.61	-
pH, field	s.u.	NC	NC	-	7.16	-	-	7.23	-	-	7.45
Temperature, field	Deg C	NC	NC	7	13.65	10.1	6.02	14.53	9.3	5.3	15.25
Temperature, field	Deg F	NC	NC	-	-	-	-	-	-	-	-
Temperature, sample	Deg C	NC	NC	-	-	-	-	-	-	-	-
Turbidity	NTU	NC	NC	64.2	6.68	0	47.4	9.7	0	13	0.9

Notes:
[1] - NYSDEC TOGs Groundwater Standards and Guidance - NYSDEC Division of Water Technical a
Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values, da
June 1998 and addenda.
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
100 U - result is non-detect at the associated value

Table 4

Groundwater 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