CONESTOGA-ROVERS
& ASSOCIATES

EVALUATION OF MONITORED NATURAL ATTENUATION FOR THE ENDOLINE AREA CHLORINATED SOLVENT PLUME

GENERAL MOTORS COMPANY
TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK

OCTOBER 2010
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1.0 INTRODUCTION

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

1.1 BACKGROUND

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

CRA submitted a Sampling and Analysis Plan (SAP) to NYSDEC August 19, 2008. The SAP specified the groundwater sample collection schedule, sampling methods, laboratory analysis, and reporting schedule for the MNA program. In addition, the NYSDEC requested in its approval of the remedy that sampling be conducted for gasoline constituents at MW-2 through MW-5 located adjacent to the chlorinated solvent plume in order to evaluate current conditions related to the petroleum impacts also associated with Spill Number 9875474. The SAP was approved by NYSDEC in a letter dated October 8, 2008.

The first round of groundwater monitoring was completed on October 31, 2008. A total of four rounds of sampling were completed. A semi-annual groundwater monitoring report was submitted to NYSDEC after rounds one through three. NYSDEC provided documentation of acceptance of each of the semi-annual groundwater reports.

The fourth and final round of semi-annual groundwater monitoring was completed April 26, 2010. This report presents the results of the final round of monitoring, an evaluation of the effectiveness of the MNA remedy, and recommendations for additional actions to remediate the chlorinated solvent plume.

2.0 GROUNDWATER SAMPLING PROGRAM

The groundwater sampling program was designed to monitor the natural 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 chlorinated solvent plume.

Groundwater monitoring wells MW-2, MW-11, and MW-12 located within the plume were sampled to monitor the natural attenuation of the chlorinated solvents. Monitoring wells MW-1, MW-9, MW-101, MW-102, and MW-103 were sampled to monitor plume migration, while groundwater monitoring wells MW-2, MW-3, MW-4, and MW-5 were sampled to monitor the conditions in the area adjacent to the chlorinated solvent plume related to residual petroleum impacts. Groundwater monitoring well locations are shown on Figure 1. The MNA and plume migration sampling was conducted semi-annually, while the sampling to evaluate the petroleum impacts was conducted annually.

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 between 2008 and 2010 to monitor natural attenuation 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 2008 and 2010 are presented on Table 2.

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

The data was validated by CRA. Application of quality assurance criteria was consistent with "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review," EPA-540/R-99/008, October 1999. The data were found to exhibit acceptable levels of accuracy and precision with the qualifiers noted on the tables.

3.0 MONITORING RESULTS

3.1 MONITORED NATURAL ATTENUATION

MNA is a remedial approach that relies on natural subsurface mechanisms that are classified as either destructive or nondestructive. In certain circumstances, MNA can be sufficiently protective of human health and the environment. Biodegradation is the most important in situ destructive mechanism, while non-destructive mechanisms include sorption, dispersion, dilution, and volatilization. However, MNA has its inherent limitations and can be slow, making the time frame for completion relatively long. In order to support successful implementation of MNA at any given site, the United States Environmental Protection Agency (USEPA) recommends that the site be thoroughly characterized and scientific evidence provided to demonstrate that the degradation of the site hydrocarbons is occurring at rates sufficient to be protective of human health and the environment. Three lines of evidence are needed to support the occurrence of MNA:

- Documented loss of contaminants at the field scale
- Geo-chemical analytical data
- Direct lab and field microbiological evidence for microbial biodegradation

3.1.1 CONTAMINANT CONCENTRATIONS

Table 1 presents the analytical results for monitoring wells MW-2, MW-11, and MW-12 for the MNA program starting in 2008. Results from a July 2007 sampling event are provided for a baseline comparison. The concentration of 1,1,1-trichloroethane (1,1,1-TCA) in the groundwater sample collected from monitoring well MW-2 in July 2007 was 20,000 µg/L. Breakdown products 1,1-dichloroethane (DCA) and chloroethane were present at 6,700 µg/L and 570 µg/L, respectively. During the 2-year sampling period, concentrations of 1,1,1-TCA decreased overall. A seasonal fluctuation was observed with lower concentrations of 1,1,1-TCA in the samples collected in May and April and an increase in the concentration in the samples collected during the October sampling events. The concentrations of 1,1-DCA and chloroethane increased to 25,000 µg/L and 1,400 µg/L respectively in October 2009. The concentrations decreased slightly in April 2010 to 20,000 µg/L for 1,1-DCA and 750 µg/L for chloroethane. Vinyl chloride concentrations also increased from 50 µg/L in 2007 to 200 µg/L in April 2010.

In water samples from well MW-11, concentrations of 1,1,1-TCA appeared to increase slightly during the monitoring period. 1,1,1-TCA increased from 350 µg/L in July 2007 to 740 µg/L in April 2010. Concentrations of 1,1,1-TCA breakdown products 1,1-DCA and chloroethane also increased from 1,200 µg/L to 2,400 µg/L and 17 µg/L to 21 µg/L, respectively, during the monitoring period. 1,1-dichloroethene also increased from 880 µg/L to 1,800 µg/L during the monitoring period. Low concentrations of TCE and breakdown products cis-1, 2-DCE and vinyl chloride were also present in this well. Concentrations of these compounds remained constant during the monitoring period.

In water samples from well MW-12, the only VOC detected during the monitoring period was 1,1-DCA. Concentrations of this chemical increased from 51 µg/L to 71 µg/L during the monitoring period.

3.1.2 GEOCHEMICAL DATA

Dissolved Gasses

The dissolved gasses monitored in groundwater included ethane, which is the final product of the anaerobic 1,1,1-TCA degradation pathway, and methane, which is produced only under strictly anaerobic conditions. Methane is, therefore, a good indicator that anaerobic conditions have been established. During the monitoring period, ethane was present at MW-2 between 3 µg/L and 18 µg/L. Methane was low in July 2007 (130 µg/L) but was present at greater than 1,500 µg/L during the rest of the monitoring period. At well MW-11, ethane was present at between 2 µg/L and 4.2 µg/L throughout the monitoring period, and methane was present at between 87 µg/L and 1,900 µg/L. At well MW-12, ethane concentrations were less than 1 µg/L, and methane was present between 41 µg/L and 250 µg/L.

Total and Dissolved Iron and Manganese

For well MW-2, greater than 50 percent of the iron present was in the dissolved form throughout the monitoring period. Manganese appeared to be predominantly in the dissolved form. For wells MW-11 and MW-12, both iron and manganese were predominantly in the dissolved form.

Field Parameters

For well MW-2, the oxidation-reduction potential (ORP) was highly negative, less than –157 millivolts (mV), throughout the monitoring period. The dissolved oxygen (DO) concentration was generally less than 1 milligram per liter (mg/L). pH was between 7.3 and 9. For well MW-11, the ORP was slightly negative, between –1 and -76, DO was between 0.4 and 1.3 mg/L, and pH was between 6.2 and 7.1. For well MW-12, ORP was slightly positive, between +3 and +20, DO was between 1.2 mg/L and 3.7 mg/L and pH was between 6.6 and 7.2.

General Chemistry

At well MW-2, ammonia-nitrogen was present between 4.5 mg/L and 10 mg/L, and nitrate, nitrite, and orthophosphate were not detected. Sulfate levels were low, between 7.3 mg/Land 18.2 mg/L. Total organic carbon (TOC) was between 11 mg/L and 13 mg/L. At well MW-11, ammonia-nitrogen was not detected. Nitrate, nitrite, and orthophosphate were also not detected. Sulfate levels were higher, between 1,390 mg/L and 2,460 mg/L, and TOC was between 6 mg/L and 7 mg/L. At well MW-12, ammonia nitrogen was detected in only one of the five sampling events. Nitrate, nitrite, and orthophosphate were again not detected, and sulfate levels were again high (between 417 mg/L and 1,280 mg/L). TOC was between 7 mg/L and 8 mg/L.

3.1.3 MICROBIAL COUNTS

Aerobic and anaerobic total and 1,1,1-TCA specific microbial counts were performed on the samples. Throughout the monitoring period, the highest counts were found at well MW-2. Total aerobic and anaerobic counts were generally on the order of 10^4, and 1,1,1-TCA-specific counts were generally between 10^2 and 10^3. These counts indicate that a healthy microbial population was present in the area. Counts at well MW-11 were typically about an order of magnitude lower than those at well MW-2, but are still indicative of a healthy microbial population. Counts in MW-12 were low throughout the monitoring period, ranging between 10^1 and 10^2. These counts show that only a small microbial population existed in this area.

3.2 PLUME MIGRATION

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 are presented on Table 2. 1,1,1-TCA was detected at MW-101, however, the concentrations were estimated and below the groundwater standard of 5 µg/L. Although, 1,1-DCA was detected at MW-1, MW-9, MW-102 and MW-103 the concentrations are below the groundwater standard of 5 µg/L and in the case of MW-9, the concentrations have decreased since sampling conducted in 2007 as part of the investigation and delineation of the plume.

3.3 PETROLEUM IMPACTS

The samples collected annually in October at MW-2, MW-3, MW-4, and MW-5 were analyzed for STARS VOCs. The analytical results for the sampling related to the petroleum impacts are presented on Table 3. Due to the elevated concentrations of chlorinated solvents at MW-2 the detection limits were elevated well above the groundwater standards. At MW-2, 1,2,4-trimethylbenze, benzene, ethylbenzene, and toluene were detected at estimated concentrations that exceed the groundwater standards.

Benzene and methyl tert butyl ether (MTBE) were detected at MW-3 at concentrations ranging from 3.9 µg/L to 12 µg/L and 130 µg/L to 160 µg/L, respectively. The concentrations exceed the groundwater standards for those compounds. MTBE was the only compound at MW-4 at a concentration of 12 µg/L which exceeds the groundwater standard of 10 µg/L. There were no exceedances of groundwater standards at MW-5.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

4.1.1 MONITORED NATURAL ATTENUATION

Water from well MW-2 has high concentrations of chlorinated solvents, which exhibited some attenuation during the monitoring period. Conditions in MW-2 appear to be anaerobic. The direct ORP and DO measurements, as well as the presence of dissolved iron and manganese and methane, all suggest that anaerobic conditions are present. The high microbial counts and the fact that breakdown products of 1,1,1-TCA such as chloroethane and ethane are detected in this well suggest that some anaerobic biodegradation of 1,1,1-TCA is occurring; however, the degradation appears to be very slow with what appear to be seasonal fluctuations. It is likely that organic carbon is not present in sufficient concentrations to act as an electron donor for a high rate of biodegradation.

Water from well MW-11 has lower concentrations of chlorinated solvents and again biodegradation appears to be occurring at a slow pace. This well also appears to be anaerobic; however, the ORP and DO measurements as well as the lower methane concentrations suggest that conditions are not as highly reducing as in MW-2. As at well MW-2, however, the presence of breakdown products suggests that some biodegradation is occurring.

Only 1,1-DCA was present in water samples from well MW-12, and this compound does not appear to be attenuating. The ORP, DO, and methane data suggest that this area is only weakly anaerobic; therefore, conditions are not favorable for biodegradation by reductive dechlorination; however, aerobic conditions suitable for aerobic biodegradation also do not exist. The low microbial counts suggest that very little degradation is occurring in this area.

The data suggest that natural attenuation is proceeding slowly. The three lines of evidence that are needed to support the occurrence of MNA are:

i) Documented loss of contaminants at the field scale

ii) Geo-chemical analytical data

iii) Direct lab and field microbiological evidence for microbial biodegradation

The loss of chlorinated compounds cannot be fully documented due to some seasonal fluctuations in the concentration of 1,1,1-TCA, although the presence of breakdown products suggests that it is occurring. The geo-chemical analytical data suggests that at well MW-2, conditions are appropriate for biodegradation of chlorinated compounds, however, at wells MW-11 and MW-12, conditions are not sufficiently anaerobic. Microbial counts show healthy microbial populations at wells MW-2 and MW-11, which supports the contention that some biodegradation is taking place.

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

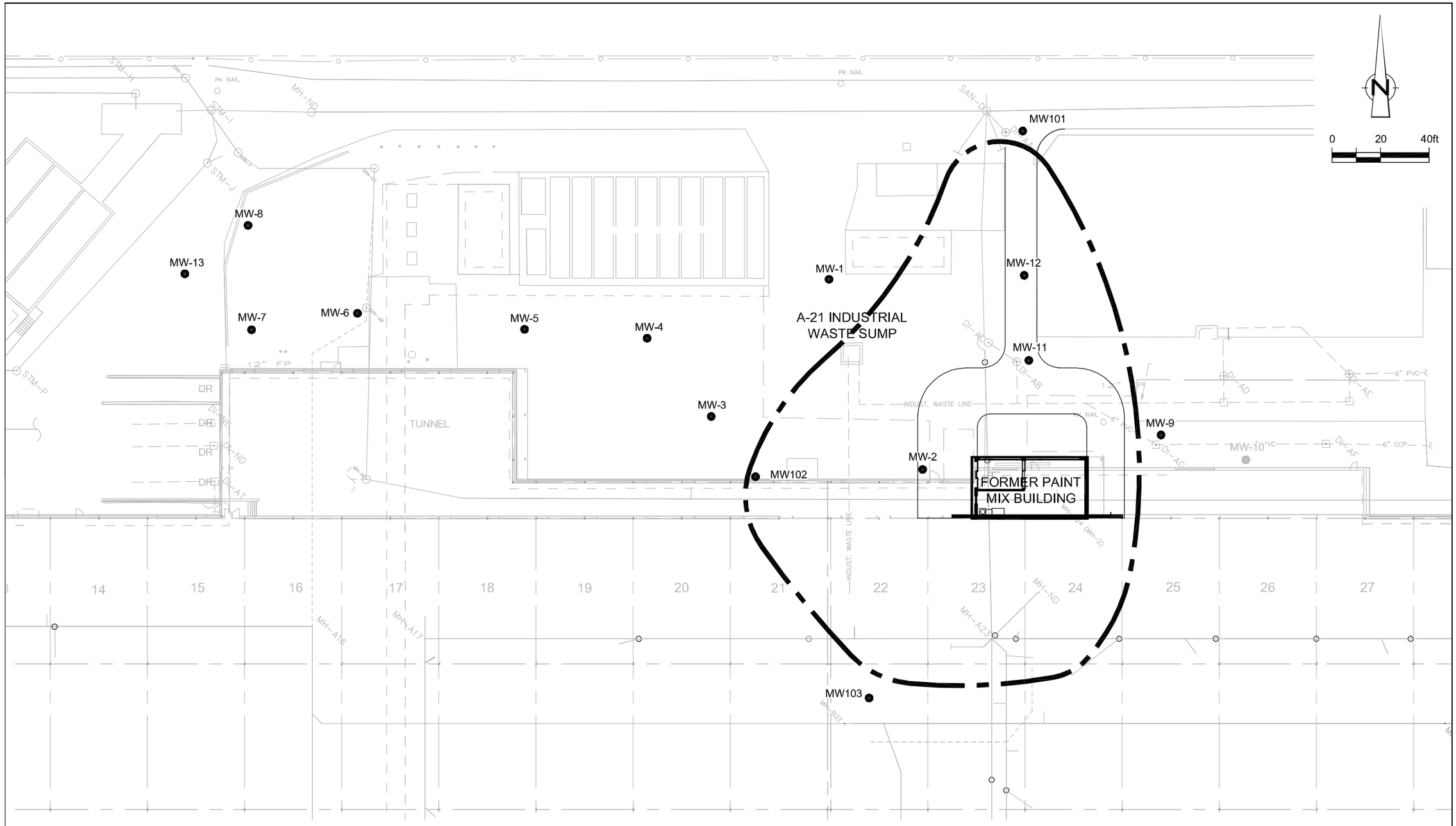
A review of data obtained from MW-2 through MW-5 show that there has been no significant change in concentrations of benzene and MTBE over the two-year monitoring period. Benzene and MTBE are still present at MW-3 at concentrations exceeding groundwater standards.

4.2 RECOMMENDATIONS

The data suggest that MNA of the chlorinated solvent plume will take greater than 10 years to reduce the concentrations of the chlorinated solvents to below target concentrations. Biodegradation rates could be enhanced by the addition of a carbon source. This carbon source would optimize anaerobic conditions and also act as an electron donor for reductive dechlorination. CRA recommends one application of a carbon source and an additional two years of monitoring followed by an evaluation of conditions at that time.

In addition to monitoring the attenuation of the chlorinated solvent contaminants, monitoring for plume migration should continue on a semi annual basis.

Continuation of the annual monitoring of the concentrations at wells MW-2 through MW-5 to ensure that there is no migration or increase of petroleum contaminants is also recommended.



LEGEND

MW-1 ● MONITORING WELL LOCATION

EXTENT OF GROUNDWATER CONTAMINATION

figure 1

EXTENT OF GROUNDWATER CONTAMINATION AND MONITORING WELL LOCATIONS
ENDOLINE AREA CHLORINATED SOLVENT PLUME MNA
GM POWERTRAIN GROUP TONAWANDA ENGINE PLANT
Tonawanda, New York

17390-00(001)GN-BU001 SEP 29/2010

TABLE 1

ANALYTICAL RESULTS SUMMARY
MONITRED NATURAL ATTENUATION
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
JULY 2007 THROUGH APRIL 2010

		Location ID:	*MW-2*					*MW-11*		
		Sample Name:	*WG-30264-071607-007*	*WG-30264-103108-DJT-006*	*WG-30264-052009-002*	*WG-017390-101909-002*	*WG-17390-042610-002*	*WG-30264-071607-009*	*WG-30264-103108-DJT-008*	
		Sample Date:	*7/16/2007*	*10/31/2008*	*5/20/2009*	*10/19/2009*	*4/26/2010*	*7/16/2007*	*10/31/2008*	
Parameters	*Units*	*NYS TOGs GROUNDWATER STANDARDS* [1]								
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/L	5	**20000**	**1900**	**15000**	**1100**	**3200**	**350**	**350**	
1,1,2,2-Tetrachloroethane	ug/L	5	13 U	330 UJ	83 U	710 U	83 U	50 U	40 UJ	
1,1,2-Trichloroethane	ug/L	1	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
1,1-Dichloroethane	ug/L	5	**6700**	**13000 J**	**23000**	**25000**	**20000**	**1200**	**1600 J**	
1,1-Dichloroethene	ug/L	5	**290**	**250 J**	**630**	710 U	**390**	**880**	**890**	
1,2,4-Trimethylbenzene	ug/L	5	**56**	--	--	--	--	50 U	--	
1,2-Dichloroethane	ug/L	0.6	13 U	330 U	83 U	710 U	83 U	50 U	**10 J**	
1,2-Dichloroethene (total)	ug/L	5	**50**	670 U	**42 J**	1400 U	170 U	**100**	**130**	
1,2-Dichloropropane	ug/L	1	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
1,3,5-Trimethylbenzene	ug/L	5	**23**	--	--	--	--	50 U	--	
1,4-Dioxane	ug/L	NC	630 U	17000 U	4200 U	36000 U	4200 U	2500 U	2000 U	
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	63 U	3300 U	830 U	7100 U	830 U	250 U	400 U	
2-Hexanone	ug/L	50	63 U	3300 U	830 U	7100 U	830 U	250 U	400 U	
2-Phenylbutane (sec-Butylbenzene)	ug/L	5	13 U	--	--	--	--	50 U	--	
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	NC	63 U	3300 U	830 U	7100 U	830 U	250 U	400 U	
Acetone	ug/L	50	49 J	3300 U	830 U	7100 U	**120 J**	250 U	400 U	
Benzene	ug/L	1	**160**	**220 J**	**250**	**300 J**	**190**	50 U	40 U	
Bromodichloromethane	ug/L	50	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
Bromoform	ug/L	50	13 U	330 U	83 U	710 U	83 UJ	50 U	40 U	
Bromomethane (Methyl bromide)	ug/L	5	13 U	330 UJ	83 UJ	710 U	83 U	50 U	40 U	
Carbon disulfide	ug/L	60	3.7 J	330 U	83 U	710 U	83 U	50 U	40 U	
Carbon tetrachloride	ug/L	5	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
Chlorobenzene	ug/L	5	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
Chloroethane	ug/L	5	**570**	**1100**	**1800 J**	**1400**	**750 J**	**17 J**	**27 J**	
Chloroform (Trichloromethane)	ug/L	7	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
Chloromethane (Methyl chloride)	ug/L	5	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
cis-1,2-Dichloroethene	ug/L	5	**49**	--	--	--	--	**90**	--	
cis-1,3-Dichloropropene	ug/L	NC	13 U	330 U	83 U	710 U	83 UJ	50 U	40 U	
Cymene (p-Isopropyltoluene)	ug/L	5	13 U	--	--	--	--	50 U	--	
Dibromochloromethane	ug/L	50	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
Ethylbenzene	ug/L	5	**140**	**140 J**	**140**	710 U	**100**	50 U	40 U	
Isopropyl benzene	ug/L	5	**9.5 J**	--	--	--	--	50 U	--	
m&p-Xylene	ug/L	NC	1000	--	--	--	--	100 U	--	
Methyl tert butyl ether (MTBE)	ug/L	10	13 U	--	--	--	--	50 U	--	
Methylene chloride	ug/L	5	**6.5 J**	400 U	83 U	710 U	83 U	50 U	40 U	
Naphthalene	ug/L	10	4.7 J	--	--	--	--	50 U	--	
N-Butylbenzene	ug/L	5	**250 J**	--	--	--	--	50 U	--	
N-Propylbenzene	ug/L	5	**7.5 J**	--	--	--	--	50 U	--	
o-Xylene	ug/L	5	**480**	--	--	--	--	50 U	--	
Styrene	ug/L	5	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
tert-Butylbenzene	ug/L	5	13 U	--	--	--	--	50 U	--	
Tetrachloroethene	ug/L	5	**140**	330 U	83 U	710 U	83 U	50 U	40 U	
Toluene	ug/L	5	**250 J**	**130 J**	**140**	**130 J**	**96**	50 U	40 U	
trans-1,2-Dichloroethene	ug/L	5	13 U	--	--	--	--	50 U	--	
trans-1,3-Dichloropropene	ug/L	NC	13 U	330 U	83 U	710 U	83 U	50 U	40 U	
Trichloroethene	ug/L	5	**38**	330 U	**94**	710 U	**60 J**	50 U	**23 J**	
Vinyl chloride	ug/L	2	**50**	**77 J**	**160**	**240 J**	**200**	**30 J**	**31 J**	
Xylene (total)	ug/L	NC	1500	810	670	530 J	610	50 U	80 U	

TABLE 1

ANALYTICAL RESULTS SUMMARY
MONITRED NATURAL ATTENUATION
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
JULY 2007 THROUGH APRIL 2010

			Location ID:	*MW-2*					*MW-11*	
			Sample Name:	*WG-30264-071607-007*	*WG-30264-103108-DJT-006*	*WG-30264-052009-002*	*WG-017390-101909-002*	*WG-17390-042610-002*	*WG-30264-071607-009*	*WG-30264-103108-DJT-008*
			Sample Date:	*7/16/2007*	*10/31/2008*	*5/20/2009*	*10/19/2009*	*4/26/2010*	*7/16/2007*	*10/31/2008*
Parameters	***Units***	***NYS TOGs GROUNDWATER STANDARDS*** [1]								
Dissolved Gas										
Ethane	ug/L	NC		3	9.7	18	6.7	22	2	2.2
Methane	ug/L	NC		130	6400	3300	1500	5000	87	1900
Metals										
Iron	ug/L	300		**1060**	**1020**	152	**440**	287	**2220**	**1190**
Manganese	ug/L	300		27.1	111 J	40.1	124	52.2 J	**308**	286 J
Metals (Dissolved)										
Iron (dissolved)	ug/L	300		**625**	174	100 U	259	100 U	**971**	**1170**
Manganese (dissolved)	ug/L	300		118	95.4 J	36.6	118	50.0 J	**345**	**305 J**
Field Parameters										
Conductivity	mS/cm	NC		2.44	1.819	1.67	2.49	1.729	7.47	9
Dissolved oxygen (DO)	mg/L	NC		3.8	2.53	0.96	0.56	0.83	6.16	1.3
Oxidation reduction potential (ORP)	millivolts	NC		-115	-160.6	-239	-157	-210	-49	-1
pH	s.u.	NC		7.72	8.97	7.71	6.88	7.29	7.28	7.05
Temperature, field	Deg C	NC		16	13.93	13.96	12.13	10.67	15.2	16.9
Turbidity	NTU	NC		761	23.3	3.93	2.05	2.3	1000 >	0
Wet Chemistry										
Aerobic 1,1,1-TCA specific microbial population	cfu/mL	NC		345	250	8600	1080	13800	650	155
Alkalinity, total (as CaCO3)	mg/L	NC		97.9	226 J	169	222	203 J	430	420 J
Ammonia	mg/L	2		**5.08**	**6.7**	**7.5**	**10**	**4.5**	.1 U	2.0 U
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	NC		1560	1870	7720	665	10560	3560	720
Biochemical oxygen demand (BOD)	mg/L	NC		10	14	12	14	2 U	2 U	2 U
Carbon	mg/L	NC		16.4	--	--	--	--	9.69	--
Chemical oxygen demand (COD)	mg/L	NC		45	85	42	55	40	14	100
Nitrate (as N)	mg/L	10		.05 U	0.10 U	0.10 U	0.10 U	0.10 U	.05 U	0.10 U
Nitrite (as N)	mg/L	1		.05 U	0.10 U	0.10 U	0.10 U	0.10 U	.05 U	2.0 U
Orthophosphate	mg/L	NC		--	0.1	0.1	0.1 U	0.1 U	--	0.1
Phosphate, total	mg/L	NC		.05 U	--	--	--	--	.05 U	--
Sulfate	mg/L	250		18.2	5.3	9.7	7.4	7.3	**2460**	**1390**
Sulfide	mg/L	0.05		**2.2**	**2.2**	**3.5**	**1.7**	**2.4**	1 U	1.0 U
Total microbial population - aerobic	cfu/mL	NC		19200	17890	14680	980	12760	1890	5580
Total microbial population - anaerobic	cfu/mL	NC		19320	6640	14920	600	15720	11280	4150
Total organic carbon (TOC)	mg/L	NC		--	14	11	13	11	--	6

Notes:

[1] NYS TOGs GROUNDWATER STANDARDS - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values Dated June 1998 and addenda.

2.2 Value exceeds criteria.

- - Not available.

J Estimated.

NC No criteria.

U Not present at or above the associated value.

TABLE 1

ANALYTICAL RESULTS SUMMARY
MONITRED NATURAL ATTENUATION
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
JULY 2007 THROUGH APRIL 2010

		MW-11 (cont.)			*MW-12*				
		WG-30264-052009-008	*WG-017390-101909-001*	*WG-17390-042610-001*	*WG-30264-071607-008*	*WG-30264-103108-DJT-007*	*WG-30264-052009-006*	*WG-017390-101909-003*	*WG-17390-042610-003*
		5/20/2009	*10/19/2009*	*4/26/2010*	*7/16/2007*	*10/31/2008*	*5/20/2009*	*10/19/2009*	*4/26/2010*
Parameters	***Units***								
Volatile Organic Compounds									
1,1,1-Trichloroethane	ug/L	**610**	**430**	**740**	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 UJ	1.0 U	2.5 U	1.0 U
1,1,2-Trichloroethane	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
1,1-Dichloroethane	ug/L	**2100**	**1900**	**2400**	**51**	**59 J**	**59**	**80**	**71**
1,1-Dichloroethene	ug/L	**1400**	**1200**	**1800**	1.8 U	0.57 J	0.21 J	2.5 U	1.0 U
1,2,4-Trimethylbenzene	ug/L	--	--	--	0.53 J	--	--	--	--
1,2-Dichloroethane	ug/L	**10**	67 U	**16**	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
1,2-Dichloroethene (total)	ug/L	**100**	**110 J**	**100**	1.8 U	5.0 U	2.0 U	5.0 U	2.0 U
1,2-Dichloropropane	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
1,3,5-Trimethylbenzene	ug/L	--	--	--	0.50 J	--	--	--	--
1,4-Dioxane	ug/L	250 J	3300 U	380 U	89 U	48 J	59	120 U	21 J
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	67 U	670 U	77 U	8.9 U	25 U	10 U	25 U	10 U
2-Hexanone	ug/L	67 U	670 U	77 U	8.9 U	25 U	10 U	25 U	10 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	--	--	--	0.62 J	--	--	--	--
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	67 U	670 U	77 U	8.9 U	25 U	10 U	25 U	10 U
Acetone	ug/L	67 U	670 U	77 U	8.9 U	25 U	10 U	3.3 J	10 U
Benzene	ug/L	6.7 U	67 U	**1.7 J**	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Bromodichloromethane	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Bromoform	ug/L	6.7 U	67 U	7.7 UJ	1.8 U	2.5 U	1.0 U	2.5 U	1.0 UJ
Bromomethane (Methyl bromide)	ug/L	6.7 UJ	67 U	7.7 U	1.8 U	2.5 U	1.0 UJ	2.5 U	1.0 U
Carbon disulfide	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Carbon tetrachloride	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Chlorobenzene	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Chloroethane	ug/L	**20 J**	67 U	**21 J**	1.8 U	2.5 U	1.0 UJ	2.5 U	1.0 UJ
Chloroform (Trichloromethane)	ug/L	6.7 U	67 U	1.4 J	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
cis-1,2-Dichloroethene	ug/L	--	--	--	1.8 U	--	--	--	--
cis-1,3-Dichloropropene	ug/L	6.7 U	67 U	7.7 UJ	1.8 U	2.5 U	1.0 U	2.5 U	1.0 UJ
Cymene (p-Isopropyltoluene)	ug/L	--	--	--	0.71 J	--	--	--	--
Dibromochloromethane	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Ethylbenzene	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Isopropyl benzene	ug/L	--	--	--	1.8 U	--	--	--	--
m&p-Xylene	ug/L	--	--	--	3.6 U	--	--	--	--
Methyl tert butyl ether (MTBE)	ug/L	--	--	--	1.8 U	--	--	--	--
Methylene chloride	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Naphthalene	ug/L	--	--	--	0.75 J	--	--	--	--
N-Butylbenzene	ug/L	--	--	--	1 J	--	--	--	--
N-Propylbenzene	ug/L	--	--	--	0.61 J	--	--	--	--
o-Xylene	ug/L	--	--	--	1.8 U	--	--	--	--
Styrene	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
tert-Butylbenzene	ug/L	--	--	--	1.8 U	--	--	--	--
Tetrachloroethene	ug/L	6.7 U	67 U	7.7 U	0.79 J	2.5 U	1.0 U	2.5 U	1.0 U
Toluene	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
trans-1,2-Dichloroethene	ug/L	--	--	--	1.8 U	--	--	--	--
trans-1,3-Dichloropropene	ug/L	6.7 U	67 U	7.7 U	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Trichloroethene	ug/L	**13**	67 U	**14**	1.8 U	2.5 U	1.0 U	2.5 U	1.0 U
Vinyl chloride	ug/L	**27**	**25 J**	**25**	1.8 U	2.5 U	0.23 J	2.5 U	0.29 J
Xylene (total)	ug/L	13 U	130 U	15 U	1.8 U	5.0 U	2.0 U	5.0 U	2.0 U

TABLE 1

ANALYTICAL RESULTS SUMMARY
MONITRED NATURAL ATTENUATION
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
JULY 2007 THROUGH APRIL 2010

		MW-11 (cont.)			*MW-12*				
		WG-30264-052009-008	*WG-017390-101909-001*	*WG-17390-042610-001*	*WG-30264-071607-008*	*WG-30264-103108-DJT-007*	*WG-30264-052009-006*	*WG-017390-101909-003*	*WG-17390-042610-003*
		5/20/2009	*10/19/2009*	*4/26/2010*	*7/16/2007*	*10/31/2008*	*5/20/2009*	*10/19/2009*	*4/26/2010*
Parameters	***Units***								
Dissolved Gas									
Ethane	ug/L	4.2	1.4	1.8	0.04 J	0.60	0.58	0.50 U	0.50 U
Methane	ug/L	970	320	400	41	250	10	9.3	2.5
Metals									
Iron	ug/L	**639**	**1140**	**1980**	**4570**	114	100 U	229	**517**
Manganese	ug/L	240	270	201 J	230	90.2 J	33.6	204	**321 J**
Metals (Dissolved)									
Iron (dissolved)	ug/L	**466**	**973**	284	**1530**	100 U	100 U	**572**	280
Manganese (dissolved)	ug/L	251	260	184 J	234	101 J	37.4	**410**	268 J
Field Parameters									
Conductivity	mS/cm	11.08	14.42	13.31	4.39	6	5.37	5.92	5.047
Dissolved oxygen (DO)	mg/L	0.33	1.26	0.4	5.05	1.2	0.76	1.86	3.67
Oxidation reduction potential (ORP)	millivolts	-35	-40	-76	-80	3	98	5	20.3
pH	s.u.	7.24	6.25	6.64	7.54	7.18	7.56	6.58	7.02
Temperature, field	Deg C	17.11	15.4	10.15	14.9	18	15.86	15.53	10.96
Turbidity	NTU	3.71	0.52	1.77	521	0	1.86	1.02	8.6
Wet Chemistry									
Aerobic 1,1,1-TCA specific microbial population	cfu/mL	995	225	6820	335	90	125	115	180
Alkalinity, total (as CaCO3)	mg/L	404	424	449 J	431	453 J	452	469	482 J
Ammonia	mg/L	2.0 U	1.4 J	2.0 U	0.0559 J	2.0 U	**3.1**	2.0 U	2.0 U
Anaerobic 1,1,1-TCA specific microbial population	cfu/mL	180	45	1940	3220	100	35	10	155
Biochemical oxygen demand (BOD)	mg/L	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Carbon	mg/L	--	--	--	7.46	--	--	--	--
Chemical oxygen demand (COD)	mg/L	150	73	88	20 U	56	78	37	30
Nitrate (as N)	mg/L	0.10 U	0.10 U	0.10 U	.05 U	0.10 U	0.10 U	0.10 U	0.20
Nitrite (as N)	mg/L	2.0 U	2.0 U	0.10 U	.05 U	1.0 U	2.0 U	0.10 U	0.10 U
Orthophosphate	mg/L	0.1 U	0.1 U	0.1 U	--	0.1	0.1 U	0.1 U	0.1 U
Phosphate, total	mg/L	--	--	--	.05 U	--	--	--	--
Sulfate	mg/L	**1690**	**1680**	**2020**	**417**	**896**	**1050**	**1040**	**1280**
Sulfide	mg/L	**1.4**	1.0 U	1.0 U	1 U	1.0 U	**0.60 J**	1.0 U	1.0 U
Total microbial population - aerobic	cfu/mL	2975	730	10190	8300	80	45	35	520
Total microbial population - anaerobic	cfu/mL	315	30	18040	7140	40	215	25	335
Total organic carbon (TOC)	mg/L	6	7	7	--	8	7	8	7

Notes:

[1] NYS TOGs GROUNDWATER STANDARDS - New York State Department c
Conservation Division of Water Technical and Operational Guidance Series (
Quality Standards and Guidance Values Dated June 1998 and addenda.

2.2 Value exceeds criteria.

- - Not available.

J Estimated.

NC No criteria.

U Not present at or above the associated value.

TABLE 2

ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
OCTOBER 2008 THROUGH APRIL 2010

Location ID:			*MW-1*					*MW-9*		
Sample Name:			*WG-30264-103108-DJT-005*	*WG-30264-052009-001*	*WG-017390-101909-008*	*WG-017390-101909-009*	*WG-17390-042610-009*	*WG-30264-103108-DJT-011*	*WG-30264-052009-009*	*WG-017390-101909-011*
Sample Date:			*10/31/2008*	*5/20/2009*	*10/19/2009*	*10/19/2009*	*4/26/2010*	*10/31/2008*	*5/20/2009*	*10/19/2009*
						Duplicate				
Parameters	*Units*	*NYS TOGs GROUNDWATER STANDARDS* [1]								
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/L	5	1.0 UJ	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	5	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	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	5	0.22 J	1.0 U	1.0 U	1.0 U	1.0 U	2.2 J	2.0	2.8
1,1-Dichloroethene	ug/L	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	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-Dichloropropane	ug/L	1	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	10 U	10 U	10 U	10 U	1.8 J	10 U	10 U	10 U
2-Hexanone	ug/L	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	ug/L	50	10 U	10 U	10 U	10 U	10 U	3.8 J	10 U	10 U
Benzene	ug/L	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	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	5	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 UJ	1.0 UJ
Carbon disulfide	ug/L	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	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	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	5	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 UJ	1.0 UJ
Chloroform (Trichloromethane)	ug/L	7	1.0 UJ	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	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
Dibromochloromethane	ug/L	50	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	5	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	5	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	ug/L	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
Tetrachloroethene	ug/L	5	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	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
Trichloroethene	ug/L	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	2	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

[1] NYS TOGs GROUNDWATER STANDARDS - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values Dated June 1998 and addenda.

2.2 Value exceeds criteria.

- - Not available.

J Estimated.

NC No criteria.

U Not present at or above the associated value.

TABLE 2

ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
OCTOBER 2008 THROUGH APRIL 2010

Location ID:			*MW-9 (cont.)*	*MW-101*					*MW-102*	
Sample Name:			*WG-17390-042610-005*	*WG-30264-103108-DJT-009*	*WG-30264-103108-DJT-010*	*WG-30264-052009-005*	*WG-017390-101909-010*	*WG-17390-042610-004*	*WG-30264-103108-DJT-004*	*WG-30264-052009-003*
Sample Date:			*4/26/2010*	*10/31/2008*	*10/31/2008*	*5/20/2009*	*10/19/2009*	*4/26/2010*	*10/31/2008*	*5/20/2009*
					Duplicate					
Parameters	*Units*	*NYS TOGs GROUNDWATER STANDARDS* [1]								
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/L	5	1.0 U	0.23 J	0.26 J	1.0 U	0.31 J	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	5	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,2-Trichloroethane	ug/L	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	5	2.1	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.1 J	3.2
1,1-Dichloroethene	ug/L	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	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-Dichloropropane	ug/L	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
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	ug/L	50	10 U	1.5 J	3.4 J	10 U	10 UJ	10 U	2.7 J	10 U
Benzene	ug/L	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	1.0 UJ	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	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 UJ
Carbon disulfide	ug/L	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	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	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	5	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	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	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
Dibromochloromethane	ug/L	50	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	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
Methylene chloride	ug/L	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
Styrene	ug/L	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
Tetrachloroethene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 UJ
Toluene	ug/L	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
Trichloroethene	ug/L	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	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U

s:

NYS TOGs GROUNDWATER STANDARDS - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values Dated June 1998 and addenda.

Value exceeds criteria.

Not available.

Estimated.

No criteria.

Not present at or above the associated value.

TABLE 2

ANALYTICAL RESULTS SUMMARY
PLUME MIGRATION MONITORING
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
OCTOBER 2008 THROUGH APRIL 2010

Location ID:			*MW-102 (cont.)*				*MW-103*			
Sample Name:			*WG-30264-052009-004*	*WG-017390-101909-004*	*WG-17390-042610-006*	*WG-17390-042610-008*	*WG-30264-103108-DJT-012*	*WG-30264-052009-007*	*WG-017390-101909-012*	*WG-17390-042610-007*
Sample Date:			*5/20/2009*	*10/19/2009*	*4/26/2010*	*4/26/2010*	*10/31/2008*	*5/20/2009*	*10/19/2009*	*4/26/2010*
			Duplicate			*Duplicate*				
Parameters	*Units*	*NYS TOGs GROUNDWATER STANDARDS* [1]								
Volatile Organic Compounds										
1,1,1-Trichloroethane	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	1	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	5	3.3	2.7	3.2	3.1	2.0 U	0.25 J	0.25 J	0.22 J
1,1-Dichloroethene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	0.6	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	1	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	50	10 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
2-Hexanone	ug/L	50	10 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U
Acetone	ug/L	50	10 U	10 U	10 U	10 U	4.8 J	10 U	10 U	10 U
Benzene	ug/L	1	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	50	1.0 U	1.0 U	1.0 UJ	1.0 UJ	2.0 U	1.0 U	1.0 U	1.0 UJ
Bromoform	ug/L	50	1.0 U	1.0 U	1.0 UJ	1.0 UJ	2.0 U	1.0 U	1.0 U	1.0 UJ
Bromomethane (Methyl bromide)	ug/L	5	1.0 U	1.0 UJ	1.0 U	1.0 U	2.0 U	1.0 UJ	1.0 UJ	1.0 U
Carbon disulfide	ug/L	60	1.0 U	0.42 J	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	5	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ	2.0 U	1.0 U	1.0 UJ	1.0 UJ
Chloroform (Trichloromethane)	ug/L	7	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	50	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Styrene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 UJ	1.0 U	1.0 U
Toluene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	2	1.0 U	1.0 U	1.0 U	1.0 U	2.0 U	1.0 U	1.0 U	1.0 U

s:

NYS TOGs GROUNDWATER STANDARDS - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values Dated June 1998 and addenda.

Value exceeds criteria.

Not available.

Estimated.

No criteria.

Not present at or above the associated value.

TABLE 3

ANALYTICAL RESULTS SUMMARY
PETROLEUM IMPACTS MONITORING
GENERAL MOTORS COMPANY
TONAWANDA, NEW YORK
OCTOBER 2008 THROUGH APRIL 2010

Location ID:			*MW-2*		*MW-3*		*MW-4*		*MW-5*	
Sample Name:			*WG-30264-103108-DJT-006*	*WG-017390-101909-002*	*WG-30264-103108-DJT-003*	*WG-017390-101909-005*	*WG-30264-103108-DJT-002*	*WG-017390-101909-006*	*WG-30264-103108-DJT-001*	*WG-017390-101909-007*
Sample Date:			*10/31/2008*	*10/19/2009*	*10/31/2008*	*10/19/2009*	*10/31/2008*	*10/19/2009*	*10/31/2008*	*10/19/2009*
Parameters	*Units*	*NYS TOGs GROUNDWATER STANDARDS* [1]								
Volatile Organic Compounds										
1,2,4-Trimethylbenzene	ug/L	5	2500 U	**19 J**	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	ug/L	5	2500 U	420 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	5	2500 U	420 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	ug/L	1	**220 J**	**300 J**	**12**	**3.9**	1.0 U	1.0 U	1.0 U	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	5	2500 U	420 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	ug/L	5	**140 J**	710 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Isopropyl benzene	ug/L	5	2500 U	420 U	20 U	0.21 J	5.0 U	5.0 U	5.0 U	5.0 U
Methyl tert butyl ether (MTBE)	ug/L	10	5000 U	830 U	**130**	**160**	8.9 J	**12**	8.8 J	7.3 J
Naphthalene	ug/L	10	5000 U	830 U	40 U	10 U	10 U	10 U	10 U	10 U
N-Butylbenzene	ug/L	5	2500 U	420 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
N-Propylbenzene	ug/L	5	2500 U	420 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
o-Xylene	ug/L	5	--	--	--	--	--	--	--	--
tert-Butylbenzene	ug/L	5	2500 U	420 U	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	ug/L	5	**130 J**	**130 J**	20 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U

Notes:

[1] NYS TOGs GROUNDWATER STANDARDS - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values Dated June 1998 and addenda.

2.2 Value exceeds criteria.

- - Not available.

J Estimated.

NC No criteria.

U Not present at or above the associated value.