



CONESTOGA-ROVERS
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January 16, 2009

Reference No. 30264-01

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

RECEIVED

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Dear Mr. May:

Re: GM Powertrain Group – Tonawanda, New York
Endline Area Semi-Annual Groundwater Monitoring Report

Conestoga-Rovers & Associates (CRA) has prepared this Semi-Annual Groundwater Monitoring Report on behalf of the General Motors Corporation (GM) in accordance with the Sampling and Analysis Plan (SAP) for Monitored Natural Attenuation – Endline Area Chlorinated Solvent Plume, dated August 2008. The New York State Department of Environmental Conservation (NYSDEC) approved the SAP on October 8, 2008. The SAP specifies the groundwater sample collection schedule, sampling methods, laboratory analysis, and reporting schedule for the MNA program. In addition, the NYSDEC requested sampling to 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 Petroleum Spill No. 9875474.

The first round of semi-annual groundwater monitoring was completed on October 31, 2008. All samples were sent to TestAmerica Laboratories (formerly Severn Trent Laboratories) of North Canton, Ohio for analysis. Groundwater samples were collected from MW-2, MW-11, and MW-12 and analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) and the following natural attenuation parameters:

- i) total organic carbon (TOC);
- ii) total iron;
- iii) dissolved iron (field filtered);
- iv) total manganese;
- v) dissolved manganese (field filtered);
- vi) sulfate;
- vii) sulfide;
- viii) nitrate;
- ix) nitrite;
- x) total nitrogen (as ammonia);
- xi) orthophosphate phosphorus;
- xii) total heterotrophic microbial count;
- xiii) total 1,1,1-TCA specific microbial count;
- xiv) chemical oxygen demand (COD);
- xv) biological oxygen demand (BOD);
- xvi) alkalinity;
- xvii) methane; and
- xviii) ethane.



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Reference No. 030264-01

Groundwater samples were collected from perimeter monitoring wells MW-1, MW-9, MW-101, MW-102, and MW-103 and analyzed for TCL VOCs to monitor for potential plume migration. Additionally, groundwater samples were collected from monitoring wells MW-2, MW-3, MW-4, and MW-5 and analyzed for the NYSDEC Spill Technology and Remediation Series (STARS) Memo #1 list of petroleum-related VOC compounds to monitor the conditions in the area related to residual petroleum impacts.

Monitoring well locations are shown on Figure 1. Analytical results for the MNA program are summarized on Table 1 while STARS sampling results are summarized on Table 2.

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.

Based on these results, there are no conclusions this time. As stated in the approved SAP, CRA will evaluate the effectiveness of the MNA program after two years (four rounds of semiannual sampling). An MNA evaluation report will be prepared and submitted to the NYSDEC with recommendations for future sampling or additional remedial actions if necessary.

Please contact Jim Hartnett at 315-463-2391 (GM) or Katherine Galanti at 716-856-2142 (CRA) if you should have any questions or comments.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

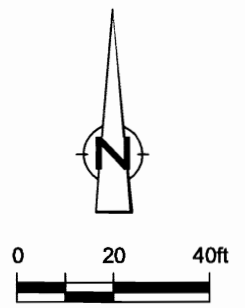
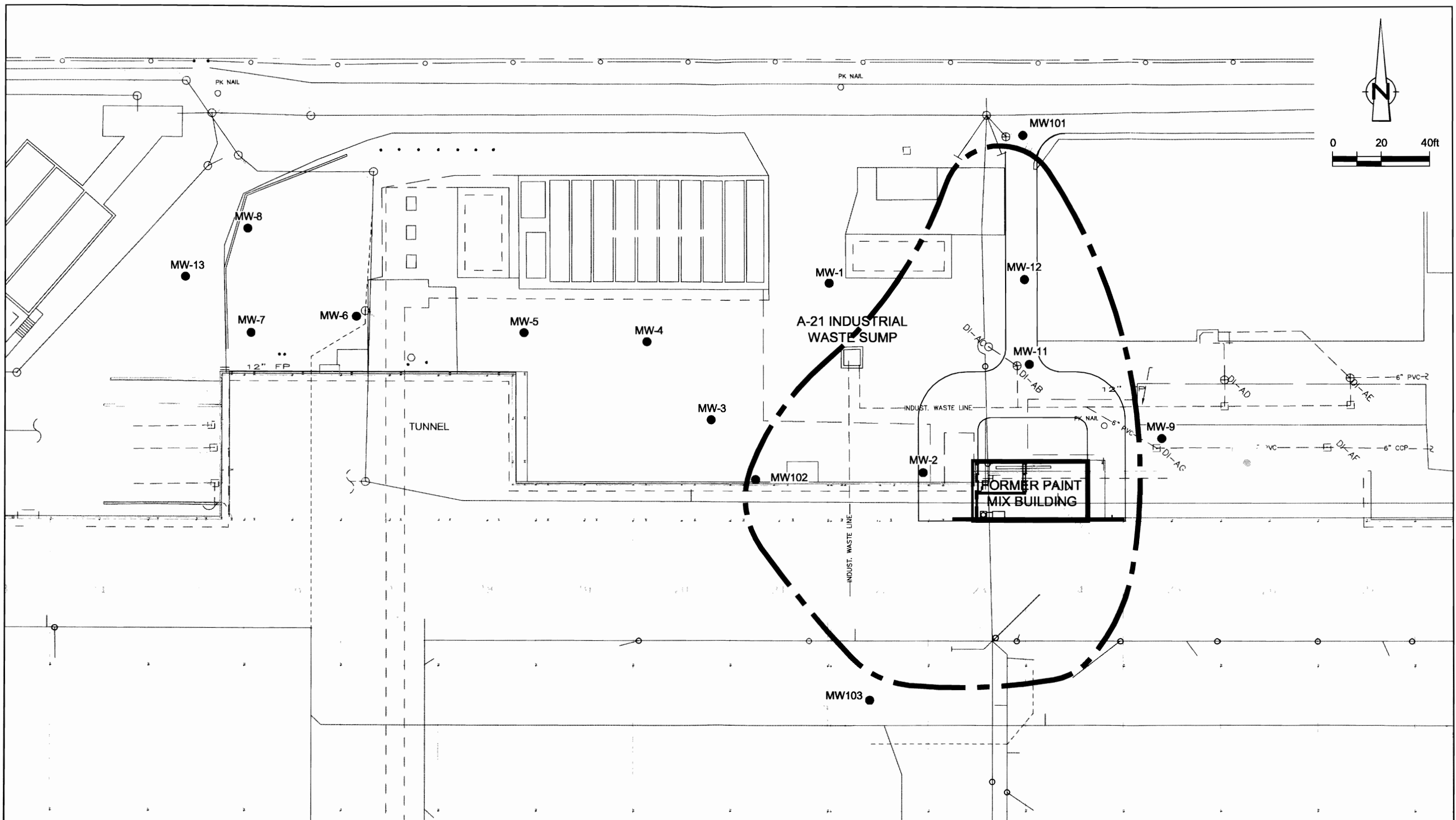
A handwritten signature in cursive script, appearing to read 'Katherine B. Galanti'.

Katherine B. Galanti
Project Manager

KBG/CMB/ck/030264-May-003

Encl.

c.c.: M. Antonetti – GM
J. Hartnett – GM
K. Malinowski – CRA



LEGEND

- MW-1 ● MONITORING WELL LOCATION
- EXTENT OF GROUNDWATER CONTAMINATION

figure 1
 EXTENT OF GROUNDWATER CONTAMINATION AND MONITORING WELL LOCATIONS
 ENDLINE AREA CHLORINATED SOLVENT PLUME MNA
 GM POWERTRAIN GROUP TONAWANDA ENGINE PLANT
 Tonawanda, New York



TABLE 1

ENDOLINE AREA CHLORINATED SOLVENT MNA SEMI-ANNUAL SAMPLING
OCTOBER 2008
GM TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK

	Location ID:	MW-1	MW-2	MW-9	MW-101	MW-101	MW-102	
	Sample Name:	WG-30264-103108-DJT-005	WG-30264-103108-DJT-006	WG-30264-103108-DJT-011	WG-30264-103108-DJT-009	WG-30264-103108-DJT-010	WG-30264-103108-DJT-004	
	Sample Date:	10/31/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008 (Duplicate)	10/31/2008	
Parameters	Units	NYS TOGs						
Volatile Organic Compounds								
1,1,1-Trichloroethane	ug/L	5	1.0 UJ	1900	1.0 U	0.23 J	0.26 J	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	5	1.0 UJ	330 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 UJ
1,1,2-Trichloroethane	ug/L	1	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	5	0.22 J	13000 J	2.2 J	1.0 UJ	1.0 U	1.1 J
1,1-Dichloroethene	ug/L	5	1.0 U	250 J	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	0.6	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethene (total)	ug/L	5	2.0 U	670 U	2.0 U	2.0 U	2.0 U	2.0 U
1,2-Dichloropropane	ug/L	1	1.0 UJ	330 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dioxane	ug/L	NC	50 U	17000 U	50 U	50 U	50 U	50 U
2-Butanone (Methyl Ethyl Ketone)	ug/L	50	10 U	3300 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	50	10 U	3300 U	10 U	10 U	10 U	10 U
4-Methyl-2-Pentanone	ug/L	NC	10 U	3300 U	10 U	10 U	10 U	10 U
Acetone	ug/L	50	10 U	3300 U	3.8 J	1.5 J	3.4 J	2.7 J
Benzene	ug/L	1	1.0 U	220 J	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	50	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	50	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl Bromide)	ug/L	5	1.0 UJ	330 UJ	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	60	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	ug/L	5	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	5	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	5	1.0 U	1100	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	7	1.0 UJ	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane (Methyl Chloride)	ug/L	5	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	NC	1.0 UJ	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	50	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	5	1.0 UJ	140 J	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	5	1.0 UJ	400 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	ug/L	5	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	5	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	5	1.0 U	130 J	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L		1.0 UJ	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	5	1.0 U	330 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	2	1.0 UJ	77 J	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (total)	ug/L	NC	2.0 UJ	810	2.0 U	2.0 U	2.0 U	2.0 U
Metals								
Iron	ug/L	300	--	1020	--	--	--	--
Manganese	ug/L	300	--	111 J	--	--	--	--
Metals (Dissolved)								
Iron (Dissolved)	ug/L	300	--	174	--	--	--	--
Manganese (Dissolved)	ug/L	300	--	95.4 J	--	--	--	--

TABLE 1
ENDOLINE AREA CHLORINATED SOLVENT MNA SEMI-ANNUAL SAMPLING
OCTOBER 2008
GM TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK

Parameters	Units	NYS TOGs	Location ID:	MW-1	MW-2	MW-9	MW-101	MW-101	MW-102
			Sample Name:	WG-30264-103108-DJT-005	WG-30264-103108-DJT-006	WG-30264-103108-DJT-011	WG-30264-103108-DJT-009	WG-30264-103108-DJT-010	WG-30264-103108-DJT-004
			Sample Date:	10/31/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008 (Duplicate)	10/31/2008
Dissolved Gas									
Ethane	ug/L	NC	--	9.7	--	--	--	--	--
Methane	ug/L	NC	--	6400	--	--	--	--	--
Field Parameters									
Conductivity	mS/cm	NC	3.02	1.819	2.438	31.5	--	--	1.08
Dissolved Oxygen	ug/L	NC	1100	2530	1630	900	--	--	1630
Oxidation reduction potential	millivolts	NC	-96	-160.6	-50.1	-27	--	--	-131.1
pH	pH units	NC	6.99	8.97	8.43	7.3	--	--	8.4
Temperature, Field	Deg C	NC	16.2	13.93	15.53	18	--	--	12.78
Turbidity	NTU	NC	1	23.3	0	0	--	--	27.7
Wet Chemistry									
Aerobic 1,1,1-TCA Spec. Microbial Pop.	cfu/mL	NC	--	250	--	--	--	--	--
Aerobic Total Microbial Population	cfu/mL	NC	--	17890	--	--	--	--	--
Alkalinity, Total (as CaCO3)	ug/L	NC	--	226000 J	--	--	--	--	--
Ammonia	ug/L	2000	--	6700	--	--	--	--	--
Anaerobic 1,1,1-TCA Spec. Microbial Pop.	cfu/mL	NC	--	1870	--	--	--	--	--
Anaerobic Total Microbial Population	cfu/mL	NC	--	6640	--	--	--	--	--
Biochemical Oxygen Demand (BOD)	ug/L	NC	--	14000	--	--	--	--	--
Chemical Oxygen Demand (COD)	ug/L	NC	--	85000	--	--	--	--	--
Nitrate (as N)	ug/L	10000	--	100 U	--	--	--	--	--
Nitrite (as N)	ug/L	1000	--	100 U	--	--	--	--	--
Orthophosphate	ug/L	NC	--	100	--	--	--	--	--
Sulfate	ug/L	250000	--	5300	--	--	--	--	--
Sulfide	ug/L	NC	--	2200	--	--	--	--	--
Total Organic Carbon (TOC)	ug/L	NC	--	14000	--	--	--	--	--

Notes:

- 51 - Value exceeds criteria.
- U - Not present at or above the associated value.
- J - Estimated.
- - Not available.
- NC - No criteria.

TABLE 1

ENDOLINE AREA CHLORINATED SOLVENT MNA SEMI-ANNUAL SAMPLING
OCTOBER 2008
GM TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK

Location ID:	MW-103	MW-11	MW-12
Sample Name:	WG-30264-103108-DJT-012	WG-30264-103108-DJT-008	WG-30264-103108-DJT-007
Sample Date:	10/31/2008	10/31/2008	10/31/2008

Parameters	Units	NYS TOGs			
Volatile Organic Compounds					
1,1,1-Trichloroethane	ug/L	5	2.0 U	350	2.5 U
1,1,2,2-Tetrachloroethane	ug/L	5	2.0 U	40 UJ	2.5 UJ
1,1,2-Trichloroethane	ug/L	1	2.0 U	40 U	2.5 U
1,1-Dichloroethane	ug/L	5	2.0 U	1600 J	59 J
1,1-Dichloroethene	ug/L	5	2.0 U	890	0.57 J
1,2-Dichloroethane	ug/L	0.6	2.0 U	10 J	2.5 U
1,2-Dichloroethene (total)	ug/L	5	4.0 U	130	5.0 U
1,2-Dichloropropane	ug/L	1	2.0 U	40 U	2.5 U
1,4-Dioxane	ug/L	NC	100 U	2000 U	48 J
2-Butanone (Methyl Ethyl Ketone)	ug/L	50	20 U	400 U	25 U
2-Hexanone	ug/L	50	20 U	400 U	25 U
4-Methyl-2-Pentanone	ug/L	NC	20 U	400 U	25 U
Acetone	ug/L	50	4.8 J	400 U	25 U
Benzene	ug/L	1	2.0 U	40 U	2.5 U
Bromodichloromethane	ug/L	50	2.0 U	40 U	2.5 U
Bromoform	ug/L	50	2.0 U	40 U	2.5 U
Bromomethane (Methyl Bromide)	ug/L	5	2.0 U	40 U	2.5 U
Carbon disulfide	ug/L	60	2.0 U	40 U	2.5 U
Carbon tetrachloride	ug/L	5	2.0 U	40 U	2.5 U
Chlorobenzene	ug/L	5	2.0 U	40 U	2.5 U
Chloroethane	ug/L	5	2.0 U	27 J	2.5 U
Chloroform (Trichloromethane)	ug/L	7	2.0 U	40 U	2.5 U
Chloromethane (Methyl Chloride)	ug/L	5	2.0 U	40 U	2.5 U
cis-1,3-Dichloropropene	ug/L	NC	2.0 U	40 U	2.5 U
Dibromochloromethane	ug/L	50	2.0 U	40 U	2.5 U
Ethylbenzene	ug/L	5	2.0 U	40 U	2.5 U
Methylene chloride	ug/L	5	2.0 U	40 U	2.5 U
Styrene	ug/L	5	2.0 U	40 U	2.5 U
Tetrachloroethene	ug/L	5	2.0 U	40 U	2.5 U
Toluene	ug/L	5	2.0 U	40 U	2.5 U
trans-1,3-Dichloropropene	ug/L		2.0 U	40 U	2.5 U
Trichloroethene	ug/L	5	2.0 U	23 J	2.5 U
Vinyl chloride	ug/L	2	2.0 U	31 J	2.5 U
Xylene (total)	ug/L	NC	4.0 U	80 U	5.0 U
Metals					
Iron	ug/L	300	--	1190	114
Manganese	ug/L	300	--	286 J	90.2 J
Metals (Dissolved)					
Iron (Dissolved)	ug/L	300	--	1170	100 U
Manganese (Dissolved)	ug/L	300	--	305 J	101 J

TABLE 1

ENDOLINE AREA CHLORINATED SOLVENT MNA SEMI-ANNUAL SAMPLING
 OCTOBER 2008
 GM TONAWANDA ENGINE PLANT
 TONAWANDA, NEW YORK

<i>Location ID:</i>	MW-103	MW-11	MW-12
<i>Sample Name:</i>	WG-30264-103108-DJT-012	WG-30264-103108-DJT-008	WG-30264-103108-DJT-007
<i>Sample Date:</i>	10/31/2008	10/31/2008	10/31/2008

<i>Parameters</i>	<i>Units</i>	<i>NYS TOGs</i>			
<i>Dissolved Gas</i>					
Ethane	ug/L	NC	--	2.2	0.60
Methane	ug/L	NC	--	1900	250
<i>Field Parameters</i>					
Conductivity	mS/cm	NC	5.14	9	6
Dissolved Oxygen	ug/L	NC	1400	1300	1200
Oxidation reduction potential	millivolts	NC	-85	-1	3
pH	pH units	NC	6.99	7.05	7.18
Temperature, Field	Deg C	NC	20.3	16.9	18
Turbidity	NTU	NC	0	0	0
<i>Wet Chemistry</i>					
Aerobic 1,1,1-TCA Spec. Microbial Pop.	cfu/mL	NC	--	155	90
Aerobic Total Microbial Population	cfu/mL	NC	--	5580	80
Alkalinity, Total (as CaCO3)	ug/L	NC	--	420000 J	453000 J
Ammonia	ug/L	2000	--	2000 U	2000 U
Anaerobic 1,1,1-TCA Spec. Microbial Pop.	cfu/mL	NC	--	720	100
Anaerobic Total Microbial Population	cfu/mL	NC	--	4150	40
Biochemical Oxygen Demand (BOD)	ug/L	NC	--	2000 U	2000 U
Chemical Oxygen Demand (COD)	ug/L	NC	--	100000	56000
Nitrate (as N)	ug/L	10000	--	100 U	100 U
Nitrite (as N)	ug/L	1000	--	2000 U	1000 U
Orthophosphate	ug/L	NC	--	100	100
Sulfate	ug/L	250000	--	1390000	896000
Sulfide	ug/L	NC	--	1000 U	1000 U
Total Organic Carbon (TOC)	ug/L	NC	--	6000	8000

Notes:

51 - Value exceeds criteria.

U - Not present at or above the associated value.

J - Estimated.

-- Not available.

NC - No criteria.

TABLE 2

**ENDOLINE AREA SPILL NO. 9875474 STARS SAMPLING
OCTOBER 2008
GM TONAWANDA ENGINE PLANT
TONAWANDA, NEW YORK**

<i>Location ID:</i>	<i>MW-2</i>	<i>MW-3</i>	<i>MW-4</i>	<i>MW-5</i>
<i>Sample Name:</i>	WG-30264-103108-DJT-006	WG-30264-103108-DJT-003	WG-30264-103108-DJT-002	WG-30264-103108-DJT-001
<i>Sample Date:</i>	10/31/2008	10/31/2008	10/31/2008	10/31/2008

<i>Parameters</i>	<i>Units</i>	<i>NYS TOGs</i>				
<i>Volatile Organic Compounds</i>						
1,2,4-Trimethylbenzene	ug/L	5	2500 U	20 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	ug/L	5	2500 U	20 U	5.0 U	5.0 U
2-Phenylbutane (sec-Butylbenzene)	ug/L	5	2500 U	20 U	5.0 U	5.0 U
Benzene	ug/L	1	190 J	12	1.0 U	1.0 U
Cymene (p-Isopropyltoluene)	ug/L	5	2500 U	20 U	5.0 U	5.0 U
Ethylbenzene	ug/L	5	93 J	20 U	5.0 U	5.0 U
Isopropylbenzene	ug/L	5	2500 U	20 U	5.0 U	5.0 U
Methyl Tert Butyl Ether	ug/L	10	5000 U	130	8.9 J	8.8 J
Naphthalene	ug/L	10	5000 U	40 U	10 U	10 U
n-Butylbenzene	ug/L	5	2500 U	20 U	5.0 U	5.0 U
n-Propylbenzene	ug/L	5	2500 U	20 U	5.0 U	5.0 U
tert-Butylbenzene	ug/L	5	2500 U	20 U	5.0 U	5.0 U
Toluene	ug/L	5	120 J	20 U	5.0 U	5.0 U
Xylene (total)	ug/L	NC	600 J	20 U	5.0 U	5.0 U
<i>Field Parameters</i>						
Conductivity	mS/cm	NC	--	1.91	4.794	3.45
Dissolved Oxygen	ug/L	NC	--	1200	1520	200
Oxidation reduction potential	millivolts	NC	--	-79	-164.7	-250
pH	pH units	NC	--	6.74	8.71	7.42
Temperature, Field	Deg C	NC	--	12.7	14.98	14
Turbidity	NTU	NC	--	48	17.2	0

Notes:

51

 - Value exceeds criteria.

U - Not present at or above the associated value.

J - Estimated.

-- - Not available.

NC - No criteria.