October 24, 2003 Reference No. 17303

Mr. Peter T. Masson
Department of Environmental Quality
Jackson District Office
301 East Louis Glick Highway
Jackson, Michigan 48201-1556

Dear Mr. Masson:

RE: Response to Comments 9/12/03
Interim Response Action Status Report
Company Vehicle Operations Area
Former Willow Run Assembly Plant
Washtenaw County, Michigan

On behalf of ENCORE, a wholly owned subsidiary of General Motors (GM), Conestoga-Rovers & Associates, Inc. (CRA) is providing this response to the Michigan Department of Environmental Quality (MDEQ) September 12, 2003 comments on the Interim Response Action (IRA) Status Report (May, 2003) for the Company Vehicle Operations (CVO) Property located in Ypsilanti, Michigan (Site). For clarity, MDEQ comments are provided in Italics, followed by CRA's response.

MDEQ Comment

1. *My first comment had to do with the conclusion made by CRA that the shallow groundwater at the site qualified as groundwater not in an aquifer. Their response was based upon the conclusion reached at the Willow Run Creak Area landfill site that the shallow groundwater was not in an aquifer. This comparison is likely valid. However, there needs to be a demonstration that the geology of the sites is the same or very similar. Likely you have the data in your possession to make this demonstration. If this conclusion is going to factor into your remediation plans, please make sure this demonstration is assembled for review by this office.*

CRA Response

It is CRA's understanding that only a geologic comparison between the Site and the Willow Run Creek Area Landfill is required to demonstrate that the groundwater at the Site is not in an aquifer as determined to be the case at the Willow Run Creek Area Landfill. CRA will review the geology and provide a demonstration to your office for review.

MDEQ Comment

2. *Regarding the excavation of the LNAPL soils, although I have record in my phone log of a call from Mr. Blickle of CRA on June 23, my notes only refer to notification of groundwater sampling at the*

site. However, we may have discussed the soil removal and I failed to make note of it. Either way, I will forward to receiving the information regarding this work.

CRA Response

The Soil IRA Summary Report is submitted with this letter for your review.

MDEQ Comment

3. *My fourth comment regarded concerns about breakdown products from the permanganate injections and whether their affect might be as injuries as the TCE plume, or possibly more so. The information from CRA was less than responsive to this concern. More so than the final breakdown products of this reaction, it was the intermediates, e.g. vinyl chloride, which I was concerned about and whether they maybe persisting in the groundwater. This matter needs to be addressed as part of this response. In addition, since my review of this information, this office has had further discussion regarding permanganate injection at this site and others. The Remediation and Redevelopment Division has provided the following informal guidance for permanganate injection sites:*

    a) *The analytical should include the following: Ammonia, pH, BOD, TOC, Temperature, Chromium VI, Arsenic, Selenium, Dissolved Oxygen, Chloride. The temperature and pH measurements should be used to calculate the unionizable ammonia.*
    b) *A bench-scale treatability study should be conducted to calculate the oxygen demand of the aquifer media. This study should also identify any metals that may be mobilized from the aquifer materials.*
    c) *We must be able to monitor for the hydrogeological effects of precipitation of MnO. Research conducted at Ohio State University shows that plugging of the aquifer pore spaces is a critical element affecting continued groundwater treatment.*
    d) *The treatment must not result in an unnatural color or turbidity in groundwater in compliance with Rule 323.1050 of the Administrative Rules for Part 31 of the Natural Resources and Environmental Protection Act, Act 451 of 1994, as amended.*

    Please discuss how you plan to address these concerns at this site.

CRA Response

Insitu chemical oxidation using potassium permanganate was applied as an initial remedy to address chlorinated volatile organic compound (CVOC) impacts in the source area. CRA's response letter of August 7, 2003 discussed that additional injections were planned during the fall of 2003 and additional remedial alternatives were being evaluated. Since that time the additional injections have been cancelled and a groundwater remedial technology assessment has been completed to study other alternatives, including: enhanced natural attenuation, biosparging oxygen infusion through microporous membranes, etc.; therefore, the comments are no longer applicable. However, the following is our response to the comments regarding insitu chemical oxidation treatment

Potential Formation of Vinyl Chloride: We have not identified literature references indicating that vinyl chloride is formed as an intermediate in the oxidation of CVOCs by $KMnO_4$. However, $KMnO_4$ rapidly oxidizes vinyl chloride. The vinyl chloride seen at the Site is likely the result of anaerobic reductive dechlorination of TCE, which is a naturally occurring mechanism and unrelated to chemical oxidation. Under normal conditions, the Site is predominantly anaerobic and vinyl chloride is expected to be present from the activities of reductive dechlorinating bacteria.

3a) *Ammonia:* We are not aware of the presence of ammonia at the Site. If it is generated as a result of $KMnO_4$ degradation of natural organic content, its concentration will be low and will be utilized quickly by microorganisms. Therefore, ammonia should not be of concern and CRA does not recommend the monitoring of ammonia.

pH, BOD, TOC, Temperature, DO, Chloride: We did monitor for all of these parameters except BOD. CRA does not think that the analysis of BOD is necessary because it will not provide any useful information. In addition to the parameters monitored oxidation-reduction potential (ORP), was also monitored.

Chromium VI, Arsenic, Selenium: In general the concentrations of these metals are low or not detected. Additionally, metals that may be mobilized by chemical oxidative treatment are typically attenuated naturally over a short transport distance particularly since the predominant conditions at the Site remain to be anaerobic. However, if potassium permanganate is applied again at the Site we will include this list of metals in the monitoring parameters.

3b) *Treatability Study:* Bench-scale and pilot tests were performed and showed that the use of insitu chemical oxidation using potassium permanganate was successful in reducing the concentration of chlorinated solvent in the groundwater. However, we agree that additional lab tests should be conducted if it is decided to continue with insitu chemical oxidation treatment.

3c) *Effect of Manganese Dioxide Precipitation:* Manganese dioxide is not a concern because the aquifer matrix is predominantly sand and significant plugging should not and has not occurred.

3d) *Potential Impact On Groundwater Color and Turbidity:* Manganese dioxide produced from potassium permanganate treatment is in a colloidal form and not water-soluble. It typically combines with the soil media leaving the water with little impact. However, we will monitor turbidity and discoloration, if further application of potassium permanganate is conducted.

MDEQ Comment

4. *Two of my final comments concerned monitoring for GSI concerns and whether there were currently any issues with exceedances. The response from CRA indicated that there would be more study performed in the future, and this would lead to placement of GSI monitoring wells. Although this work is appropriate, discovering at a later date that there are GSI exceedances, if they exist, does not address the present concern. Considering the amount of time General Motors has known about this site, and that the injection pilot work has been occurring, this level of characterization should already have been done. Beyond just saying this work will occur, it would be appreciated if a schedule could be provided that outlines when this work will be done so these concerns can be appropriately addressed.*

CRA Response

Three GSI monitoring wells have been installed on the bank of Tyler Pond. Concentrations of constituents in detected in the groundwater samples collected from these monitoring wells do not exceed the Final Acute Values for GSI criteria. Table 1 summarizes the groundwater analytical results from the three existing GSI monitoring points. Figure 1 presents the locations of the three existing GSI monitoring wells.

A comprehensive hydrogeological review of the CVO property was conducted with available information from historical Site investigations. This review concluded that the hydrogeology at the Site is very complicated and additional information is required to create a more accurate understanding of the groundwater behavior at the Site. An investigative Work Plan is currently being prepared to address additional investigation required at the Site. The Work Plan is designed to further characterize the following:

- Groundwater flow pattern;
- Clay confining unit;
- Potential preferential subsurface pathways from the Site to Tyler Pond;
- Additional stratigraphy information for the south bank of Tyler Pond; and
- Determine the appropriate locations for additional GSI monitoring points.

The following is an outline of the expected schedule for the above-described investigative activities:

Work Plan -finalization	October 2003
Field Work – initial phase	November and December 2003
Field Work – additional phases	January 2004
Summary Report	March 2004

It is expected that the Work Plan and Summary Report will be submitted to the MDEQ although approval is not required.

Due to the significant amount of investigations planned at the Site in the near future, Ken Richards, the GM Project Manager, has suggested that we meet on a quarterly basis to address schedule, questions, concerns and comments regarding Site investigation and remediation activities.

If you have any questions or concerns, please do not hesitate to contact us.

Yours truly,

Conestoga-Rovers & Associates

Frederick W. Blickle, P.E.

BL/nl/2/Det.
Encl.

c.c.: Ken Richards, ENCORE
Beth Landale, CRA
Gary Klepper, CRA

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
APRIL 2003
COMPANY VEHICLE OPERATIONS AREA
YPSILANTI, MICHIGAN

Location			**GS-3**	**GS-4**	**GS-5**
Analytes/Sample ID	**GSI**	**FAV**	*GW-17303-040303-KH-185*	*GW-17303-040303-KH-184*	*GW-17303-041003-DCR-188*
VOCs (ug/l):					
1,1,1,2-Tetrachloroethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethane	200		ND (1.0)	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	78 {X}		ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	330 {X}		ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	740		ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	65 {X}		ND (1.0)	ND (1.0)	ND (1.0)
1,2,3-Trichloropropane	NA		ND (1.0)	ND (1.0)	ND (1.0)
1,2,4-Trichlorobenzene	30		ND (1.0)	ND (1.0)	ND (1.0)
1,2,4-Trimethylbenzene	17		ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dibromo-3-chloropropane	NA		ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichlorobenzene	16		ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	360 {X}	15,000	ND (1.0)	ND (1.0)	**2**
1,2-Dichloropropane	290 {X}		ND (1.0)	ND (1.0)	ND (1.0)
1,3,5-Trimethylbenzene	ID		ND (1.0)	ND (1.0)	ND (1.0)
1,3-Dichlorobenzene	38		ND (1.0)	ND (1.0)	ND (1.0)
1,4-Dichlorobenzene	13		ND (1.0)	ND (1.0)	ND (1.0)
2-Butanone (MEK)	2,200		ND (25)	ND (25)	ND (25)
2-Hexanone	NA		ND (50)	ND (50)	ND (50)
4-Methyl-2-pentanone	ID		ND (50)	ND (50)	ND (50)
Acetone	1,700		ND (25)	ND (25)	ND (25)
Benzene	200 {X}		ND (1.0)	ND (1.0)	ND (1.0)
Bromochloromethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
Bromodichloromethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
Bromoform	ID		ND (1.0)	ND (1.0)	ND (1.0)
Bromomethane	35		ND (1.0)	ND (1.0)	ND (1.0)
Carbon disulfide	ID		ND (5.0)	ND (5.0)	ND (5.0)
Carbon tetrachloride	45 {X}		ND (1.0)	ND (1.0)	ND (1.0)
Chlorobenzene	47		ND (1.0)	ND (1.0)	ND (1.0)
Chloroethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
Chloroform	170 {X}		ND (1.0)	ND (1.0)	ND (1.0)
Chloromethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
Dibromochloromethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
Dibromomethane	NA		ND (1.0)	ND (1.0)	ND (1.0)
Dichlorodifluoromethane	ID		ND (1.0)	ND (1.0)	ND (1.0)
Ethyl Ether	ID		ND (20)	ND (20)	ND (20)
Ethylbenzene	18		ND (1.0)	ND (1.0)	ND (1.0)
Iodomethane	NA		ND (10)	ND (10)	ND (10)
Isopropylbenzene	ID		ND (5.0)	ND (5.0)	ND (5.0)
Methylene Chloride	940 {X}		ND (5.0)	ND (5.0)	ND (5.0)
n-Propylbenzene	ID		ND (5.0)	ND (5.0)	ND (5.0)
Naphthalene	13		ND (5.0)	ND (5.0)	ND (5.0)
Styrene	80		ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	45 {X}		ND (1.0)	ND (1.0)	ND (1.0)
Toluene	140	1,700	ND (1.0)	ND (1.0)	**1**
trans-1,4-Dichloro-2-Butene	NA		ND (50)	ND (50)	ND (50)
Trichloroethene	200 {X}		ND (1.0)	ND (1.0)	ND (1.0)
Vinyl chloride	15	17,000	**33**	**110**	**430**
cis-1,2-Dichloroethene	620	11,000	**14**	ND (1.0)	**1,200**
cis-1,3-Dichloropropene	NA		ND (1.0)	ND (1.0)	ND (1.0)
trans-1,2-Dichloroethene	1,500	28,000	ND (1.0)	ND (1.0)	**11**
trans-1,3-Dichloropropene	NA		ND (1.0)	ND (1.0)	ND (1.0)
Xylenes (total)	35		ND (3.0)	ND (3.0)	ND (3.0)

Notes

GSI	Groundwater Surface Water Interface Criteria MDEQ Part 201 Generic Cleanup Criteria and Screening Levels - December 21, 2002
FAV	Final Acute Value, MDEQ [Rule 323.1057 (Toxic Substances) of the Part 4. Water Quality Standards]
{X}	The GSI criterion shown is not protective for surface water that is used as a drinking water source.
ID	Inadequate data to develop criterion.
NA	Criterion or value is not available.
	Exceeds FAV values
	Exceeds GSI criteria
ND (50)	Not detected at the reporting limit (in brackets)